

รายการอ้างอิง

ภาษาไทย

1. ปราโมทย์ เดชะอำไพ .ไฟไนต์เอลิเมนต์ในงานวิศวกรรม. กรุงเทพมหานคร: สำนักพิมพ์ จุฬาลงกรณ์มหาวิทยาลัย, 2527.
2. ปราโมทย์ เดชะอำไพ .ระเบียบวิธีเชิงตัวเลขในงานวิศวกรรม. กรุงเทพมหานคร: สำนักพิมพ์จุฬาลงกรณ์มหาวิทยาลัย, 2538.

ภาษาอังกฤษ

3. Beles, A.A. and Soare, M.V. Berechnung von Schalenträgwerken. Bauverlag GmbH. Wiesbaden und Berlin , 1972.
4. Kraus, H. Thin Elastic Shells. New York : John Wiley and Sons , 1967.
5. Flugge, W. Stresses in Shells. Berlin : Springer-Verlag , 1973.
6. Rao, M.N.K. Analysis of the General Hyperbolic Paraboloid Shell. Indian Concrete Journal V.33 No. 12 (Dec. 1959) pp. 450-454.
7. Candelar, F. General Formulas for Membrane Stresses in Hyperbolic Paraboloidal Shells. Journal of the American Concrete Institute Proc. V.57 (Oct. 1960) pp. 353-371.
8. Rother, H. Zur Membrantheorie der schiefwinkligen hyperbolischen Paraboloidschale in Asymptotendarstellung. Ingenieur-Archiv (1971) pp.304-310.
9. F.K. Bogner, R.L. Fox and L.A. Schmit. A cylindrical shell discrete element. AIAA J. 5(4), 745-750 (1967).
10. J.J. Connor and C. A. Brebbia. Stiffness matrix for shallow rectangular shell element. Journal of the Engineering Mechanics Division, ASCE, V.93, No. EM5, 43-65 (1967).
11. J.A. Stricklin, D.R. Navaratna and T.H.H. Pian. Improvement on the analysis of shells of revolution by the matrix displacement method. AIAA J. 4(10), 2069-2071 (1966).
12. R.E. Jones and D.R. Strome. Direct stiffness method of analysis of shells of revolution utilising curved element. AIAA J. 4(9), 1519-1525 (1966).

13. T.Y. Yang. High-order rectangular shallow shell finite element. Journal of the Engineering Mechanics Division, ASCE, V.99, No. EM1, 157-182 (1973).
14. J.N. Bandyopadhyay and A.K. Aditya. Bending Analysis of Doubly Curved Shell Structures by Finite Element Method. Computers and Structures V.31, No. 5, pp. 717-728 (1989).
15. E. Hellinger. Der allgemeine Ansatz der Mechanik der Kontinua, Encyclopadie der mathematischen Wissenschaften, Part 4, 4, 602-694 (1914).
16. E. Reissner. Variational considerations for elastic beam and shells, Journal of the Engineering Mechanics Division, ASCE, V.88, 23-57 (1962).
17. M.H. Omurtag and A.Y. Akoz. Hyperbolic Paraboloid Shell Analysis via Mixed Finite Element Formulation. International Journal for Numerical Methods In Engineering, V.37, 3037-3056 (1994).
18. Timoshenko, Stephen P. and Woinowsky-Krieger, S. Theory of Plates and Shells 2nd. Singapore: McGraw-Hill, Inc. 1959.
19. E. Reissner. On Some Aspects of the Theory of Thin Elastic Shell, Jour. Of Boston Soc. C.E., April 1955, pp. 100-133.

บรรณานุกรม

1. Kraus, Harry. Thin Elastic Shells. New York : John Wiley & Sons, Inc. 1967.
2. Zienkiewicz, O.C.,Frs. And R.L. Taylor. The Finite Element Method 4th. Vol. 1:Basic Formulation and Linear Problems. Singapore: McGraw-Hill, Inc., 1989.
3. Zienkiewicz, O.C.,Frs. And R.L. Taylor. The Finite Element Method 4th. Vol. 2:Solid and Fluid Mechanics, Dynamics and Non-Linearity. Singapore: McGraw-Hill, Inc., 1989.



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จุฬาลงกรณ์มหาวิทยาลัย



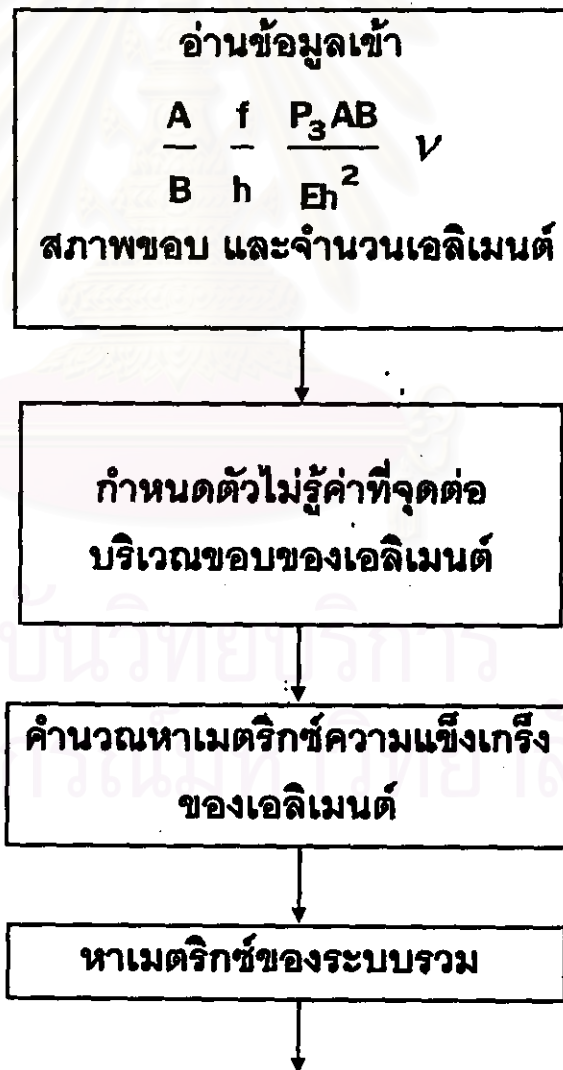
สถาบันวิทยบริการ
จุฬาลงกรณ์มหาวิทยาลัย

ภาคผนวก ก.

รายละเอียดของโปรแกรมคำนวณผลและแสดงผล

โปรแกรมแสดงผล AOD4421

ขั้นตอนโดยรวมของโปรแกรมนี้คือ



↓

แก้สมการเมตริกซ์ของระบบรวม
เพื่อหาค่าของตัวไม่รู้ค่าที่จุดต่อ
โดยใช้วิธี Gauss Elimination

↓

หาค่า $\hat{u}_i, \hat{v}_i, \hat{w}_i, \hat{u}_j, \hat{v}_j, \hat{w}_j$
โดยวิธีผลต่างการแบ่ง
ย่อย (Devided-Difference)

↓

หาค่า $\frac{M_{xx}}{P_{3AB}} \quad \frac{M_{yy}}{P_{3AB}} \quad \frac{M_{xy}}{P_{3AB}}$
 $\frac{N_{xx}}{K} \quad \frac{N_{yy}}{K} \quad \frac{N_{xy}}{K}$

C

C

C PROGRAM HYPAR SHELL

C BY MONCHAI PRUKVILAILERT

C

C

IMPLICIT REAL*4 (A-H,O-Z)

C

C --- MAXIMUM ELEMENTS =324 ELEMENTS ---

C --- COE = ELEMENT STIFFNESS MATRIX ---

C --- S = SYSTEM MATRIX ---

C --- CQ = FORCES MATRIX ---

C --- SQ = SYSTEM FORCES MATRIX ---

C

DIMENSION P(400,5),COE(20,20),NA(400,4),CQ(20),XC(361),YC(361)

DIMENSION S(1500,1500),BC(1500),SQ(1500),SL(1500)

DIMENSION U(361),LX(361),UY(361),V(361),VX(361),VY(361)

DIMENSION W(361),WX(361),WY(361),WXX(361),WYY(361),WXY(361)

DIMENSION X(60),FX(60,60),FXD(100),DIFF(100,361)

```

DIMENSION SWXX(361),SWYY(361),WXXM(361),WYYM(361),COUNT(361)
DIMENSION XXM(361),YYM(361),XYM(361),XXN(361),YYN(361),XYN(361)
DIMENSION INTMAT(3,700),XY(2,700)
CHARACTER*20 NAME1, NAME2

```

C

C — DATA FILE IS DATA.DAT _____

C — SOLUTION FILE IS SOLU.DAT _____

C

```

WRITE(*,*) 'PLEASE ENTER THE INPUT DATA FILE NAME USING FOR:MAT
* D*.DAT:'
WRITE(*,*)
READ(5,*) NAME1
OPEN(UNIT=7, FILE=NAME1, STATUS='OLD',ERR=21)
GOTO 19
21 WRITE(*,*) 'DATA FILE MISSING'
WRITE(*,*) 'CAN NOT RUN PROGRAM'
READ(*,*)
STOP
19 WRITE(*,*) 'DO YOU WANT TO RUN PROGRAM?(only type number)'
WRITE(*,*) '1.YES'
WRITE(*,*) '2.NO '
WRITE(*,*)
READ(*,*) DISN
IF(DISN.EQ.1.) GOTO 18
IF(DISN.EQ.2.) STOP
IF(DISN.NE.1..AND.DISN.NE.2.) GOTO 19
18 WRITE(*,*) 'PLEASE ENTER THE NEW SOLUTION FILE NAME USING FORMAT
* S*.DAT:'
WRITE(*,*)
READ(5,*) NAME2
OPEN(UNIT=8, FILE=NAME2, STATUS='NEW',ERR=6)
GOTO 7
6 WRITE(6,*) 'THIS FILE NAME ALREADY EXISTS'
WRITE(6,*) 'REPLACE?'
WRITE(6,*) '1.YES'
WRITE(6,*) '2.NO'
WRITE(*,*)
READ(5,*) CHOO
IF(CHOO.EQ.1.) OPEN(UNIT=8, FILE=NAME2, STATUS='OLD')
IF(CHOO.EQ.2.) GOTO 18
7 CONTINUE

```

C

C — READ TITLE OF COMPUTATION:_____

C

```

DO 100 ILINE=1,5
  READ(7,1) TEXT
  1 FORMAT(20A4)
100 CONTINUE
C
C --- READ INPUT DATA: -----
C
C  NUMA = NUMBER OF ELEMENTS IN X DIRECTION
C  NUMB = NUMBER OF ELEMENTS IN Y DIRECTION
C  RISE = F/H
C  SIZE = LENGTH IN X DIRECTION/LENGTH IN Y DIRECTION
C  PLOAD= Pab/Eh^2
C  AT  = LENGTH OF EDGED/(A or B FROM (Z(X,Y)=(F/AB)*XY))
C  R   = POISSON'S RATIO
C  E1,..E4 = CLAMPED,SIMPLY OR FREE EDGED
C
  READ(7,1) TEXT
  READ(7,*) NUMA, NUMB
  READ(7,1) TEXT
  READ(7,*) RISE, SIZE, PLOAD, AT, R
  A = AT/NUMA/2
  B = AT/NUMB/2
  NPOIN = (NUMA+1)*(NUMB+1)
  READ(7,1) TEXT
  READ(7,2) E1, E2, E3, E4
  2 FORMAT(4A4)
  WRITE(6,4)
  4 FORMAT(/,' PROGRAM IS RUNNING ',/)
C
C --- APPLY BOUNDARY CONDITIONS -----
C
  IF (E1.EQ.' C') THEN
    DO 700 I=1,((NUMA+1)*(NUMB+1)-NUMA),(NUMA+1)
      DO 800 J=1,5
        P(I,J)=0
      800 CONTINUE
    700 CONTINUE
  END IF
  IF (E1.EQ.' S') THEN
    DO 900 I=1,((NUMA+1)*(NUMB+1)-NUMA),(NUMA+1)
      DO 800 J=1,5
        P(I,J)=0
        IF (J.EQ.4) P(I,J)=1
      800 CONTINUE
    900 CONTINUE
  END IF

```



```

900 CONTINUE
END IF
IF (E1.EQ.' F') THEN
DO 1100 I=1,((NUMA+1)*(NUMB+1)-NUMA),(NUMA+1)
DO 1000 J=1,5
P(I,J)=1
1000 CONTINUE
1100 CONTINUE
END IF

```

C

C

```

IF (E2.EQ.' C') THEN
DO 1300 I=1,(NUMA+1)
DO 1200 J=1,5
P(I,J)=0
1200 CONTINUE
1300 CONTINUE
END IF
IF (E2.EQ.' S') THEN
DO 1500 I=1,(NUMA+1)
DO 1400 J=1,5
P(I,J)=0
IF (J.EQ.5) P(I,J)=1
IF (E1.EQ.' C') P(1,5)=0
IF (E1.EQ.' S') P(1,5)=0

```

1400 CONTINUE

1500 CONTINUE

END IF

IF (E2.EQ.' F') THEN

DO 1700 I=1,(NUMA+1)

DO 1600 J=1,5

P(I,J)=1

IF (E1.EQ.' C') P(1,J)=0

IF (E1.EQ.' S') THEN

P(1,J)=0

IF (J.EQ.4) P(1,J)=1

END IF

1600 CONTINUE

1700 CONTINUE

END IF

C

C

IF (E3.EQ.' C') THEN

DO 1900 I=(NUMA+1),NPOIN,(NUMA+1)

```

DO 1800 J=1,5
  P(I,J)=0
1800 CONTINUE
1900 CONTINUE
END IF
IF (E3.EQ.' S') THEN
DO 2200 I=(NUMA+1),NPOIN,(NUMA+1)
  DO 2100 J=1,5
    P(I,J)=0
    IF (J.EQ.4) P(I,J)=1
    IF (E2.EQ.' C') P((NUMA+1),4)=0
    IF (E2.EQ.' S') P((NUMA+1),4)=0
2100 CONTINUE
2200 CONTINUE
END IF
IF (E3.EQ.' F') THEN
DO 2400 I=(NUMA+1),NPOIN,(NUMA+1)
  DO 2300 J=1,5
    P(I,J)=1
    IF (E2.EQ.' C') P((NUMA+1),J)=0
    IF (E2.EQ.' S') THEN
      P((NUMA+1),J)=0
    IF (J.EQ.5) P((NUMA+1),J)=1
    END IF
2300 CONTINUE
2400 CONTINUE
END IF
C
C
IF (E4.EQ.' C') THEN
DO 2600 I=(NPOIN-NUMA),NPOIN
  DO 2500 J=1,5
    P(I,J)=0
2500 CONTINUE
2600 CONTINUE
END IF
IF (E4.EQ.' S') THEN
DO 2800 I=(NPOIN-NUMA),NPOIN
  DO 2700 J=1,5
    P(I,J)=0
    IF (J.EQ.5) P(I,J)=1
    IF (E1.EQ.' C') P((NPOIN-NUMA),5)=0
    IF (E1.EQ.' S') P((NPOIN-NUMA),5)=0
    IF (E3.EQ.' C') P(NPOIN,5)=0

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```

      IF (E3.EQ.' S') P(NPOIN,5)=0
2700  CONTINUE
2800  CONTINUE
      END IF
      IF (E4.EQ.' F') THEN
        DO 3000 I=(NPOIN-NUMA),NPOIN
          DO 2900 J=1,5
            P(I,J)=1
            IF (E1.EQ.' C') P((I,NPOIN-NUMA),J)=0
            IF (E1.EQ.' S') THEN
              P((NPOIN-NUMA),J)=0
              IF (J.EQ.4) P((NPOIN-NUMA),J)=1
            END IF
            IF (E3.EQ.' C') P(NPOIN,J)=0
            IF (E3.EQ.' S') THEN
              P(NPOIN,J)=0
              IF (J.EQ.4) P(NPOIN,J)=1
            END IF
          DO 2900 CONTINUE
        DO 3000 CONTINUE
      END IF
      DO 3300 K=(NUMA+3),(NPOIN-2*NUMA),(NUMA+1)
        DO 3200 I=K,K+NUMA-2
          DO 3100 J=1,5
            P(I,J)=1
          DO 3100 CONTINUE
        DO 3200 CONTINUE
      DO 3300 CONTINUE
      K=0
      DO 3500 I=1,NPOIN
        DO 3400 J=1,5
          BC(K+J)=1-P(I,J)
        DO 3400 CONTINUE
        K=K+5
      DO 3500 CONTINUE

```

C

C— ELEMENT STIFFNESS MATRIX —————

C

```

COE(1,1) = B/3/A+(1/8.-1/8.*R)*(SIZE**2)*(A/B)
COE(1,8) = -1/3.*B/A+(1/12.-1/12.*R)*(SIZE**2)*(A/B)
COE(1,11) = -1/8.*B/A-(1/12.-1/12.*R)*(SIZE**2)*(A/B)
COE(1,16) = 1/8.*B/A-(1/8.-1/8.*R)*(SIZE**2)*(A/B)
COE(1,2) = 1/8.*R+1/8.
COE(1,7) = 3/8.*R-1/8.

```

$$\begin{aligned}
\text{COE}(1,12) &= -1/8 \cdot R - 1/8. \\
\text{COE}(1,17) &= -3/8 \cdot R + 1/8. \\
\text{COE}(1,3) &= 7/20 \cdot \text{RISE} \cdot (1-R) \cdot \text{SIZE} \cdot A \\
\text{COE}(1,4) &= 1/10 \cdot \text{RISE} \cdot (1-R) \cdot \text{SIZE} \cdot A^2 \\
\text{COE}(1,5) &= 1/8 \cdot \text{RISE} \cdot (1-R) \cdot \text{SIZE} \cdot A \cdot B \\
\text{COE}(1,8) &= 3/20 \cdot \text{RISE} \cdot (1-R) \cdot \text{SIZE} \cdot A \\
\text{COE}(1,9) &= -1/15 \cdot \text{RISE} \cdot (1-R) \cdot \text{SIZE} \cdot A^2 \\
\text{COE}(1,10) &= 1/18 \cdot \text{RISE} \cdot (1-R) \cdot \text{SIZE} \cdot A \cdot B \\
\text{COE}(1,13) &= 3/20 \cdot \text{RISE} \cdot (1-R) \cdot \text{SIZE} \cdot A \\
\text{COE}(1,14) &= -1/15 \cdot \text{RISE} \cdot (1-R) \cdot \text{SIZE} \cdot A^2 \\
\text{COE}(1,15) &= -1/18 \cdot \text{RISE} \cdot (1-R) \cdot \text{SIZE} \cdot A \cdot B \\
\text{COE}(1,18) &= 7/20 \cdot \text{RISE} \cdot (1-R) \cdot \text{SIZE} \cdot A \\
\text{COE}(1,19) &= 1/10 \cdot \text{RISE} \cdot (1-R) \cdot \text{SIZE} \cdot A^2 \\
\text{COE}(1,20) &= -1/8 \cdot \text{RISE} \cdot (1-R) \cdot \text{SIZE} \cdot A \cdot B \\
\text{COE}(6,1) &= -1/3 \cdot B/A + (1/12 - 1/12 \cdot R) \cdot (\text{SIZE}^2) \cdot A/B \\
\text{COE}(6,6) &= 1/3 \cdot B/A + (1/8 - 1/8 \cdot R) \cdot (\text{SIZE}^2) \cdot A/B \\
\text{COE}(6,11) &= 1/6 \cdot B/A - (1/8 - 1/8 \cdot R) \cdot (\text{SIZE}^2) \cdot A/B \\
\text{COE}(6,16) &= -1/6 \cdot B/A - (1/12 - 1/12 \cdot R) \cdot (\text{SIZE}^2) \cdot A/B \\
\text{COE}(6,2) &= -3/8 \cdot R + 1/8. \\
\text{COE}(6,7) &= -1/8 \cdot R - 1/8. \\
\text{COE}(6,12) &= 3/8 \cdot R - 1/8. \\
\text{COE}(6,17) &= 1/8 \cdot R + 1/8. \\
\text{COE}(6,3) &= 3/20 \cdot \text{RISE} \cdot (1-R) \cdot \text{SIZE} \cdot A \\
\text{COE}(6,4) &= 1/15 \cdot \text{RISE} \cdot (1-R) \cdot \text{SIZE} \cdot A^2 \\
\text{COE}(6,5) &= 1/18 \cdot \text{RISE} \cdot (1-R) \cdot \text{SIZE} \cdot A \cdot B \\
\text{COE}(6,8) &= 7/20 \cdot \text{RISE} \cdot (1-R) \cdot \text{SIZE} \cdot A \\
\text{COE}(6,9) &= -1/10 \cdot \text{RISE} \cdot (1-R) \cdot \text{SIZE} \cdot A^2 \\
\text{COE}(6,10) &= 1/8 \cdot \text{RISE} \cdot (1-R) \cdot \text{SIZE} \cdot A \cdot B \\
\text{COE}(6,13) &= 7/20 \cdot \text{RISE} \cdot (1-R) \cdot \text{SIZE} \cdot A \\
\text{COE}(6,14) &= -1/10 \cdot \text{RISE} \cdot (1-R) \cdot \text{SIZE} \cdot A^2 \\
\text{COE}(6,15) &= -1/8 \cdot \text{RISE} \cdot (1-R) \cdot \text{SIZE} \cdot A \cdot B \\
\text{COE}(6,18) &= 3/20 \cdot \text{RISE} \cdot (1-R) \cdot \text{SIZE} \cdot A \\
\text{COE}(6,19) &= 1/15 \cdot \text{RISE} \cdot (1-R) \cdot \text{SIZE} \cdot A^2 \\
\text{COE}(6,20) &= -1/18 \cdot \text{RISE} \cdot (1-R) \cdot \text{SIZE} \cdot A \cdot B \\
\text{COE}(11,1) &= -1/8 \cdot B/A - (1/12 - 1/12 \cdot R) \cdot (\text{SIZE}^2) \cdot A/B \\
\text{COE}(11,6) &= 1/6 \cdot B/A - (1/8 - 1/8 \cdot R) \cdot (\text{SIZE}^2) \cdot A/B \\
\text{COE}(11,11) &= 1/3 \cdot B/A + (1/8 - 1/8 \cdot R) \cdot (\text{SIZE}^2) \cdot A/B \\
\text{COE}(11,16) &= -1/3 \cdot B/A + (1/12 - 1/12 \cdot R) \cdot (\text{SIZE}^2) \cdot A/B \\
\text{COE}(11,2) &= -1/8 \cdot R - 1/8. \\
\text{COE}(11,7) &= -3/8 \cdot R + 1/8. \\
\text{COE}(11,12) &= 1/8 \cdot R + 1/8. \\
\text{COE}(11,17) &= 3/8 \cdot R - 1/8. \\
\text{COE}(11,3) &= -3/20 \cdot \text{RISE} \cdot (1-R) \cdot \text{SIZE} \cdot A \\
\text{COE}(11,4) &= -1/15 \cdot \text{RISE} \cdot (1-R) \cdot \text{SIZE} \cdot A^2
\end{aligned}$$

$$\begin{aligned}
\text{COE}(11,5) &= -1/18 \cdot \text{RISE} \cdot (1-R) \cdot \text{SIZE} \cdot A \cdot B \\
\text{COE}(11,8) &= -7/20 \cdot \text{RISE} \cdot (1-R) \cdot \text{SIZE} \cdot A \\
\text{COE}(11,9) &= 1/10 \cdot \text{RISE} \cdot (1-R) \cdot \text{SIZE} \cdot A^2 \\
\text{COE}(11,10) &= -1/9 \cdot \text{RISE} \cdot (1-R) \cdot \text{SIZE} \cdot A \cdot B \\
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\text{COE}(11,14) &= 1/10 \cdot \text{RISE} \cdot (1-R) \cdot \text{SIZE} \cdot A^2 \\
\text{COE}(11,15) &= 1/9 \cdot \text{RISE} \cdot (1-R) \cdot \text{SIZE} \cdot A \cdot B \\
\text{COE}(11,18) &= -3/20 \cdot \text{RISE} \cdot (1-R) \cdot \text{SIZE} \cdot A \\
\text{COE}(11,19) &= -1/15 \cdot \text{RISE} \cdot (1-R) \cdot \text{SIZE} \cdot A^2 \\
\text{COE}(11,20) &= 1/18 \cdot \text{RISE} \cdot (1-R) \cdot \text{SIZE} \cdot A \cdot B \\
\text{COE}(16,1) &= 1/6 \cdot B/A - (1/6 - 1/6 \cdot R) \cdot (\text{SIZE}^2) \cdot A/B \\
\text{COE}(16,6) &= -1/6 \cdot B/A - (1/12 - 1/12 \cdot R) \cdot (\text{SIZE}^2) \cdot A/B \\
\text{COE}(16,11) &= -1/3 \cdot B/A + (1/12 - 1/12 \cdot R) \cdot (\text{SIZE}^2) \cdot A/B \\
\text{COE}(16,16) &= 1/3 \cdot B/A + (1/6 - 1/6 \cdot R) \cdot (\text{SIZE}^2) \cdot A/B \\
\text{COE}(16,2) &= 3/8 \cdot R - 1/8 \\
\text{COE}(16,7) &= 1/8 \cdot R + 1/8 \\
\text{COE}(16,12) &= -3/8 \cdot R + 1/8 \\
\text{COE}(16,17) &= -1/8 \cdot R - 1/8 \\
\text{COE}(16,3) &= -7/20 \cdot \text{RISE} \cdot (1-R) \cdot \text{SIZE} \cdot A \\
\text{COE}(16,4) &= -1/10 \cdot \text{RISE} \cdot (1-R) \cdot \text{SIZE} \cdot A^2 \\
\text{COE}(16,5) &= -1/9 \cdot \text{RISE} \cdot (1-R) \cdot \text{SIZE} \cdot A \cdot B \\
\text{COE}(16,8) &= -3/20 \cdot \text{RISE} \cdot (1-R) \cdot \text{SIZE} \cdot A \\
\text{COE}(16,9) &= 1/15 \cdot \text{RISE} \cdot (1-R) \cdot \text{SIZE} \cdot A^2 \\
\text{COE}(16,10) &= -1/18 \cdot \text{RISE} \cdot (1-R) \cdot \text{SIZE} \cdot A \cdot B \\
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\text{COE}(16,15) &= 1/18 \cdot \text{RISE} \cdot (1-R) \cdot \text{SIZE} \cdot A \cdot B \\
\text{COE}(16,18) &= -7/20 \cdot \text{RISE} \cdot (1-R) \cdot \text{SIZE} \cdot A \\
\text{COE}(16,19) &= -1/10 \cdot \text{RISE} \cdot (1-R) \cdot \text{SIZE} \cdot A^2 \\
\text{COE}(16,20) &= 1/9 \cdot \text{RISE} \cdot (1-R) \cdot \text{SIZE} \cdot A \cdot B \\
\text{COE}(2,1) &= 1/8 \cdot R + 1/8 \\
\text{COE}(2,6) &= -3/8 \cdot R + 1/8 \\
\text{COE}(2,11) &= -1/8 \cdot R - 1/8 \\
\text{COE}(2,16) &= 3/8 \cdot R - 1/8 \\
\text{COE}(2,2) &= (1/6 - 1/6 \cdot R) \cdot \text{SIZE}^2 \cdot B/A + 1/3 \cdot A/B \\
\text{COE}(2,7) &= 1/6 \cdot A/B - (1/6 - 1/6 \cdot R) \cdot \text{SIZE}^2 \cdot B/A \\
\text{COE}(2,12) &= (-1/12 + 1/12 \cdot R) \cdot \text{SIZE}^2 \cdot B/A - 1/6 \cdot A/B \\
\text{COE}(2,17) &= (1/12 - 1/12 \cdot R) \cdot \text{SIZE}^2 \cdot B/A - 1/3 \cdot A/B \\
\text{COE}(2,3) &= 7/20 \cdot \text{RISE} \cdot (1-R) \cdot \text{SIZE} \cdot B \\
\text{COE}(2,4) &= 1/9 \cdot \text{RISE} \cdot (1-R) \cdot \text{SIZE} \cdot B \cdot A \\
\text{COE}(2,5) &= 1/10 \cdot \text{RISE} \cdot (1-R) \cdot \text{SIZE} \cdot B^2 \\
\text{COE}(2,8) &= 7/20 \cdot \text{RISE} \cdot (1-R) \cdot \text{SIZE} \cdot B \\
\text{COE}(2,9) &= -1/9 \cdot \text{RISE} \cdot (1-R) \cdot \text{SIZE} \cdot B \cdot A \\
\text{COE}(2,10) &= 1/10 \cdot \text{RISE} \cdot (1-R) \cdot \text{SIZE} \cdot B^2
\end{aligned}$$

$$\begin{aligned}
\text{COE}(2,13) &= 3/20 \cdot \text{RISE} \cdot (1-R) \text{SIZE} \cdot B \\
\text{COE}(2,14) &= -1/18 \cdot \text{RISE} \cdot (1-R) \text{SIZE} \cdot B \cdot A \\
\text{COE}(2,15) &= -1/15 \cdot \text{RISE} \cdot (1-R) \text{SIZE} \cdot B \cdot B^2 \\
\text{COE}(2,18) &= 3/20 \cdot \text{RISE} \cdot (1-R) \text{SIZE} \cdot B \\
\text{COE}(2,19) &= 1/18 \cdot \text{RISE} \cdot (1-R) \text{SIZE} \cdot B \cdot A \\
\text{COE}(2,20) &= -1/15 \cdot \text{RISE} \cdot (1-R) \text{SIZE} \cdot B \cdot B^2 \\
\text{COE}(7,1) &= 3/8 \cdot R - 1/8. \\
\text{COE}(7,6) &= -1/8 \cdot R - 1/8. \\
\text{COE}(7,11) &= -3/8 \cdot R + 1/8. \\
\text{COE}(7,16) &= 1/8 \cdot R + 1/8. \\
\text{COE}(7,2) &= (-1/8 + 1/8 \cdot R) \text{SIZE}^2 \cdot B/A + 1/8 \cdot A/B \\
\text{COE}(7,7) &= 1/3 \cdot A/B + (1/8 - 1/8 \cdot R) \text{SIZE}^2 \cdot B/A \\
\text{COE}(7,12) &= (1/12 - 1/12 \cdot R) \text{SIZE}^2 \cdot B/A - 1/3 \cdot A/B \\
\text{COE}(7,17) &= (-1/12 + 1/12 \cdot R) \text{SIZE}^2 \cdot B/A - 1/8 \cdot A/B \\
\text{COE}(7,3) &= -7/20 \cdot \text{RISE} \cdot (1-R) \text{SIZE} \cdot B \\
\text{COE}(7,4) &= -1/9 \cdot \text{RISE} \cdot (1-R) \text{SIZE} \cdot B \cdot A \\
\text{COE}(7,5) &= -1/10 \cdot \text{RISE} \cdot (1-R) \text{SIZE} \cdot B \cdot B^2 \\
\text{COE}(7,8) &= -7/20 \cdot \text{RISE} \cdot (1-R) \text{SIZE} \cdot B \\
\text{COE}(7,9) &= 1/9 \cdot \text{RISE} \cdot (1-R) \text{SIZE} \cdot B \cdot A \\
\text{COE}(7,10) &= -1/10 \cdot \text{RISE} \cdot (1-R) \text{SIZE} \cdot B \cdot B^2 \\
\text{COE}(7,13) &= -3/20 \cdot \text{RISE} \cdot (1-R) \text{SIZE} \cdot B \\
\text{COE}(7,14) &= 1/18 \cdot \text{RISE} \cdot (1-R) \text{SIZE} \cdot B \cdot A \\
\text{COE}(7,15) &= 1/15 \cdot \text{RISE} \cdot (1-R) \text{SIZE} \cdot B \cdot B^2 \\
\text{COE}(7,18) &= -3/20 \cdot \text{RISE} \cdot (1-R) \text{SIZE} \cdot B \\
\text{COE}(7,19) &= -1/18 \cdot \text{RISE} \cdot (1-R) \text{SIZE} \cdot B \cdot A \\
\text{COE}(7,20) &= 1/15 \cdot \text{RISE} \cdot (1-R) \text{SIZE} \cdot B \cdot B^2 \\
\text{COE}(12,1) &= -1/8 \cdot R - 1/8. \\
\text{COE}(12,6) &= 3/8 \cdot R - 1/8. \\
\text{COE}(12,11) &= 1/8 \cdot R + 1/8. \\
\text{COE}(12,16) &= -3/8 \cdot R + 1/8. \\
\text{COE}(12,2) &= (-1/12 + 1/12 \cdot R) \text{SIZE}^2 \cdot B/A - 1/8 \cdot A/B \\
\text{COE}(12,7) &= -1/3 \cdot A/B + (1/12 - 1/12 \cdot R) \text{SIZE}^2 \cdot B/A \\
\text{COE}(12,12) &= (1/8 - 1/8 \cdot R) \text{SIZE}^2 \cdot B/A + 1/3 \cdot A/B \\
\text{COE}(12,17) &= (-1/8 + 1/8 \cdot R) \text{SIZE}^2 \cdot B/A + 1/8 \cdot A/B \\
\text{COE}(12,3) &= -3/20 \cdot \text{RISE} \cdot (1-R) \text{SIZE} \cdot B \\
\text{COE}(12,4) &= -1/18 \cdot \text{RISE} \cdot (1-R) \text{SIZE} \cdot B \cdot A \\
\text{COE}(12,5) &= -1/15 \cdot \text{RISE} \cdot (1-R) \text{SIZE} \cdot B \cdot B^2 \\
\text{COE}(12,8) &= -3/20 \cdot \text{RISE} \cdot (1-R) \text{SIZE} \cdot B \\
\text{COE}(12,9) &= 1/18 \cdot \text{RISE} \cdot (1-R) \text{SIZE} \cdot B \cdot A \\
\text{COE}(12,10) &= -1/15 \cdot \text{RISE} \cdot (1-R) \text{SIZE} \cdot B \cdot B^2 \\
\text{COE}(12,13) &= -7/20 \cdot \text{RISE} \cdot (1-R) \text{SIZE} \cdot B \\
\text{COE}(12,14) &= 1/9 \cdot \text{RISE} \cdot (1-R) \text{SIZE} \cdot B \cdot A \\
\text{COE}(12,15) &= 1/10 \cdot \text{RISE} \cdot (1-R) \text{SIZE} \cdot B \cdot B^2 \\
\text{COE}(12,18) &= -7/20 \cdot \text{RISE} \cdot (1-R) \text{SIZE} \cdot B
\end{aligned}$$

$$\begin{aligned}
\text{COE}(12,19) &= -1/9 \cdot \text{RISE} \cdot (1-R) \text{SIZE} \cdot B \cdot A \\
\text{COE}(12,20) &= 1/10 \cdot \text{RISE} \cdot (1-R) \text{SIZE} \cdot B \cdot B^2 \\
\text{COE}(17,1) &= -3/8 \cdot R + 1/8 \\
\text{COE}(17,8) &= 1/8 \cdot R + 1/8 \\
\text{COE}(17,11) &= 3/8 \cdot R - 1/8 \\
\text{COE}(17,16) &= -1/8 \cdot R - 1/8 \\
\text{COE}(17,2) &= (1/12 - 1/12 \cdot R) \text{SIZE}^2 \cdot B/A - 1/3 \cdot A/B \\
\text{COE}(17,7) &= -1/6 \cdot A/B - (1/12 - 1/12 \cdot R) \text{SIZE}^2 \cdot B/A \\
\text{COE}(17,12) &= (-1/6 + 1/6 \cdot R) \text{SIZE}^2 \cdot B/A + 1/6 \cdot A/B \\
\text{COE}(17,17) &= (1/6 - 1/6 \cdot R) \text{SIZE}^2 \cdot B/A + 1/3 \cdot A/B \\
\text{COE}(17,3) &= 3/20 \cdot \text{RISE} \cdot (1-R) \text{SIZE} \cdot B \\
\text{COE}(17,4) &= 1/18 \cdot \text{RISE} \cdot (1-R) \text{SIZE} \cdot B \cdot A \\
\text{COE}(17,5) &= 1/15 \cdot \text{RISE} \cdot (1-R) \text{SIZE} \cdot B \cdot B^2 \\
\text{COE}(17,6) &= 3/20 \cdot \text{RISE} \cdot (1-R) \text{SIZE} \cdot B \\
\text{COE}(17,9) &= -1/18 \cdot \text{RISE} \cdot (1-R) \text{SIZE} \cdot B \cdot A \\
\text{COE}(17,10) &= 1/15 \cdot \text{RISE} \cdot (1-R) \text{SIZE} \cdot B \cdot B^2 \\
\text{COE}(17,13) &= 7/20 \cdot \text{RISE} \cdot (1-R) \text{SIZE} \cdot B \\
\text{COE}(17,14) &= -1/9 \cdot \text{RISE} \cdot (1-R) \text{SIZE} \cdot B \cdot A \\
\text{COE}(17,15) &= -1/10 \cdot \text{RISE} \cdot (1-R) \text{SIZE} \cdot B \cdot B^2 \\
\text{COE}(17,18) &= 7/20 \cdot \text{RISE} \cdot (1-R) \text{SIZE} \cdot B \\
\text{COE}(17,19) &= 1/9 \cdot \text{RISE} \cdot (1-R) \text{SIZE} \cdot B \cdot A \\
\text{COE}(17,20) &= -1/10 \cdot \text{RISE} \cdot (1-R) \text{SIZE} \cdot B \cdot B^2 \\
\text{COE}(3,1) &= 7/20 \cdot \text{RISE} \cdot (1-R) \text{SIZE} \cdot A \\
\text{COE}(3,6) &= 3/20 \cdot \text{RISE} \cdot (1-R) \text{SIZE} \cdot A \\
\text{COE}(3,11) &= -3/20 \cdot \text{RISE} \cdot (1-R) \text{SIZE} \cdot A \\
\text{COE}(3,16) &= -7/20 \cdot \text{RISE} \cdot (1-R) \text{SIZE} \cdot A \\
\text{COE}(3,2) &= 7/20 \cdot \text{RISE} \cdot (1-R) \text{SIZE} \cdot B \\
\text{COE}(3,7) &= -7/20 \cdot \text{RISE} \cdot (1-R) \text{SIZE} \cdot B \\
\text{COE}(3,12) &= -3/20 \cdot \text{RISE} \cdot (1-R) \text{SIZE} \cdot B \\
\text{COE}(3,17) &= 3/20 \cdot \text{RISE} \cdot (1-R) \text{SIZE} \cdot B \\
\text{COE}(3,3) &= 1/24 \cdot R/A/B + 1727/1575 \cdot \text{RISE}^2 \cdot (1-R) \cdot A \cdot B + \\
&7/10 \cdot (1/12 - 1/12 \cdot R) \cdot A/B + 1/12 \cdot \text{SIZE}^2 \cdot B/A^3 + 1/12 \cdot \\
&\text{SIZE}^2 \cdot A/B^3 \\
\text{COE}(3,4) &= 481/1575 \cdot \text{RISE}^2 \cdot (1-R) \cdot A^2 \cdot B + 1/12 \cdot \text{SIZE}^2 \cdot B/A^2 \\
&+ 1/24 \cdot R/B + 1/10 \cdot (1/12 - 1/12 \cdot R) \cdot B \\
\text{COE}(3,5) &= 1/10 \cdot (1/12 - 1/12 \cdot R) \cdot A + 481/1575 \cdot \text{RISE}^2 \cdot \\
&(1-R) \cdot A \cdot B^2 + 1/24 \cdot R/A + 1/12 \cdot \text{SIZE}^2 \cdot A/B^2 \\
\text{COE}(3,8) &= -7/10 \cdot (1/12 - 1/12 \cdot R) \cdot A/B + 1/24 \cdot \text{SIZE}^2 \cdot A/B^3 \\
&- 1/24 \cdot R/A/B + 613/1575 \cdot \text{RISE}^2 \cdot (1-R) \cdot A \cdot B - 1/12 \cdot \text{SIZE}^2 \cdot B/A^3 \\
\text{COE}(3,9) &= 1/10 \cdot (1/12 - 1/12 \cdot R) \cdot B - 274/1575 \cdot \text{RISE}^2 \cdot (1-R) \cdot \\
&A^2 \cdot B + 1/12 \cdot \text{SIZE}^2 \cdot B/A^2 \\
\text{COE}(3,10) &= 199/1575 \cdot \text{RISE}^2 \cdot (1-R) \cdot A \cdot B^2 - 1/10 \cdot (1/12 - \\
&1/12 \cdot R) \cdot A + 1/24 \cdot \text{SIZE}^2 \cdot A/B^2 - 1/24 \cdot R/A \\
\text{COE}(3,13) &= 197/1575 \cdot \text{RISE}^2 \cdot (1-R) \cdot A \cdot B + 7/10 \cdot (1/12 - 1/12 \cdot R)
\end{aligned}$$

$$\begin{aligned}
 & *I/A/B+1/24.*R/A/B-1/24./SIZE^{**2}*B/A^{**3}-1/24.*SIZE^{**2}*A/B^{**3} \\
 COE(3,14) &= -116/1575.*RISE^{**2}*(1-R)^A^{**2}*B+1/24./SIZE^{**2}*B/A^{**2} \\
 & *-1/10.*(1/12.-1/12.*R)/B \\
 COE(3,15) &= -116/1575.*RISE^{**2}*(1-R)^A*B^{**2}-1/10.*(1/12.- \\
 & *1/12.*R)/A+1/24.*SIZE^{**2}*A/B^{**2} \\
 COE(3,16) &= 1/24./SIZE^{**2}*B/A^{**3}-1/12.*SIZE^{**2}*A/B^{**3}-7/10.* \\
 & *(1/12.-1/12.*R)/A/B+813/1575.*RISE^{**2}*(1-R)^A*B-1/24.*R/A/B \\
 COE(3,19) &= 199/1575.*RISE^{**2}*(1-R)^A^{**2}*B-1/24.*R/B+1/24. \\
 & */SIZE^{**2}*B/A^{**2}-1/240.*(2-2*R)/P \\
 COE(3,20) &= -274/1575.*RISE^{**2}*(1-R)^A*B^{**2}+(1/120.-1/120.*R) \\
 & */A+1/12.*SIZE^{**2}*A/B^{**2} \\
 COE(8,1) &= 3/20.*RISE*(1-R)*SIZE^A \\
 COE(8,6) &= 7/20.*RISE*(1-R)*SIZE^A \\
 COE(8,11) &= -7/20.*RISE*(1-R)*SIZE^A \\
 COE(8,16) &= -3/20.*RISE*(1-R)*SIZE^A \\
 COE(8,2) &= 7/20.*RISE*(1-R)*SIZE^B \\
 COE(8,7) &= -7/20.*RISE*(1-R)*SIZE^B \\
 COE(8,12) &= -3/20.*RISE*(1-R)*SIZE^B \\
 COE(8,17) &= 3/20.*RISE*(1-R)*SIZE^B \\
 COE(8,3) &= 813/1575.*RISE^{**2}*(1-R)^A*B-1/24.*R/A/B-(7/120- \\
 & *7/120.*R)/A/B+1/24.*SIZE^{**2}*A/B^{**3}-1/12./SIZE^{**2}*B/A^{**3} \\
 COE(8,4) &= -1/10.*(1/12.-1/12.*R)/B+274/1575.*RISE^{**2} \\
 & *(1-R)^A^{**2}*B-1/12./SIZE^{**2}*B/A^{**2} \\
 COE(8,5) &= -1/10.*(1/12.-1/12.*R)/A+199/1575.*RISE^{**2}*(1-R) \\
 & **A*B^{**2}+1/24.*SIZE^{**2}*A/B^{**2}-1/24.*R/A \\
 COE(8,8) &= 1/24.*R/A/B+1727/1575.*RISE^{**2}*(1-R)^A*B+1/12. \\
 & */SIZE^{**2}*B/A^{**3}+1/12.*SIZE^{**2}*A/B^{**3}+7/10.*(1/12.-1/12.*R) \\
 & */A/B \\
 COE(8,9) &= -1/12./SIZE^{**2}*B/A^{**2}-1/24.*R/A-1/10.*(1/12.- \\
 & *1/12.*R)/B-481/1575.*RISE^{**2}*(1-R)^A^{**2}*B \\
 COE(8,10) &= 481/1575.*RISE^{**2}*(1-R)^A*B^{**2}+1/12.*SIZE^{**2}*A \\
 & */B^{**2}+1/24.*R/A+1/10.*(1/12.-1/12.*R)/A \\
 COE(8,13) &= 1/24./SIZE^{**2}*B/A^{**3}-1/24.*R/A/B-1/12.*SIZE^{**2} \\
 & **A/B^{**3}+813/1575.*RISE^{**2}*(1-R)^A*B-7/10.*(1/12.-1/12.*R)/A/B \\
 COE(8,14) &= -199/1575.*RISE^{**2}*(1-R)^A^{**2}*B-1/24./SIZE^{**2}*B \\
 & */A^{**2}+1/24.*R/B+1/10.*(1/12.-1/12.*R)/B \\
 COE(8,15) &= 1/12.*SIZE^{**2}*A/B^{**2}-274/1575.*RISE^{**2}*(1-R) \\
 & **A*B^{**2}+1/10.*(1/12.-1/12.*R)/A \\
 COE(8,18) &= -1/24./SIZE^{**2}*B/A^{**3}-1/24.*SIZE^{**2}*A/B^{**3}+ \\
 & *1/24.*R/A/B+197/1575.*RISE^{**2}*(1-R)^A*B+7/10.*(1/12.-1/12.* \\
 & *R)/A/B \\
 COE(8,19) &= -1/24./SIZE^{**2}*B/A^{**2}+116/1575.*RISE^{**2}*(1-R) \\
 & */A^{**2}*B+1/10.*(1/12.-1/12.*R)/B \\
 COE(8,20) &= -116/1575.*RISE^{**2}*(1-R)^A*B^{**2}+1/24.*SIZE^{**2}*A
 \end{aligned}$$

$\frac{1}{B} \cdot \frac{1}{240} \cdot (2 - 2 \cdot R)A$
 $COE(13,1) = 3/20 \cdot RISE^{(1-R)} \cdot SIZE^A$
 $COE(13,6) = 7/20 \cdot RISE^{(1-R)} \cdot SIZE^A$
 $COE(13,11) = -7/20 \cdot RISE^{(1-R)} \cdot SIZE^A$
 $COE(13,16) = -3/20 \cdot RISE^{(1-R)} \cdot SIZE^A$
 $COE(13,2) = 3/20 \cdot RISE^{(1-R)} \cdot SIZE^B$
 $COE(13,7) = -3/20 \cdot RISE^{(1-R)} \cdot SIZE^B$
 $COE(13,12) = -7/20 \cdot RISE^{(1-R)} \cdot SIZE^B$
 $COE(13,17) = 7/20 \cdot RISE^{(1-R)} \cdot SIZE^B$
 $COE(13,3) = 197/1575 \cdot RISE^{**2} \cdot (1-R)^A \cdot B - 1/24 \cdot SIZE^{**2} \cdot B/A^{**3} +$
 $1/24 \cdot R/A/B + (7/120 - 7/120 \cdot R)A/B - 1/24 \cdot SIZE^{**2} \cdot A/B^{**3}$
 $COE(13,4) = -1/24 \cdot SIZE^{**2} \cdot B/A^{**2} + 116/1575 \cdot RISE^{**2} \cdot (1-R)^A$
 $A^{**2} \cdot B + 1/10 \cdot (1/12 - 1/12 \cdot R)A$
 $COE(13,5) = 116/1575 \cdot RISE^{**2} \cdot (1-R)^A \cdot B^{**2} - 1/24 \cdot SIZE^{**2} \cdot A$
 $B^{**2} + 1/10 \cdot (1/12 - 1/12 \cdot R)A$
 $COE(13,8) = -1/24 \cdot R/A/B + 613/1575 \cdot RISE^{**2} \cdot (1-R)^A \cdot B - 7/10 \cdot$
 $(1/12 - 1/12 \cdot R)A/B - 1/12 \cdot SIZE^{**2} \cdot A/B^{**3} + 1/24 \cdot SIZE^{**2} \cdot B/A^{**3}$
 $COE(13,9) = -199/1575 \cdot RISE^{**2} \cdot (1-R)^A \cdot B^{**2} + 1/10 \cdot (1/12 - 1/12 \cdot$
 $R)B + 1/24 \cdot R/B - 1/24 \cdot SIZE^{**2} \cdot B/A^{**2}$
 $COE(13,10) = -1/10 \cdot (1/12 - 1/12 \cdot R)A + 274/1575 \cdot RISE^{**2} \cdot (1-R)^A$
 $B^{**2} - 1/12 \cdot SIZE^{**2} \cdot A/B^{**2}$
 $COE(13,13) = 1/24 \cdot R/A/B + 7/10 \cdot (1/12 - 1/12 \cdot R)A/B + 1/12 \cdot$
 $SIZE^{**2} \cdot B/A^{**3} + 1727/1575 \cdot RISE^{**2} \cdot (1-R)^A \cdot B + 1/12 \cdot SIZE^{**2} \cdot A/B^{**3}$
 $COE(13,14) = -481/1575 \cdot RISE^{**2} \cdot (1-R)^A \cdot B^{**2} - 1/24 \cdot R/B - 1/10 \cdot$
 $(1/12 - 1/12 \cdot R)B - 1/12 \cdot SIZE^{**2} \cdot B/A^{**2}$
 $COE(13,15) = -481/1575 \cdot RISE^{**2} \cdot (1-R)^A \cdot B^{**2} - 1/24 \cdot R/A - 1/12 \cdot$
 $SIZE^{**2} \cdot A/B^{**2} - 1/10 \cdot (1/12 - 1/12 \cdot R)A$
 $COE(13,18) = -1/12 \cdot SIZE^{**2} \cdot B/A^{**3} + 1/24 \cdot SIZE^{**2} \cdot A/B^{**3} - 1/24 \cdot$
 $R/A/B + 613/1575 \cdot RISE^{**2} \cdot (1-R)^A \cdot B - 7/10 \cdot (1/12 - 1/12 \cdot R)A/B$
 $COE(13,19) = -1/12 \cdot SIZE^{**2} \cdot B/A^{**2} + 274/1575 \cdot RISE^{**2} \cdot (1-R)^A \cdot B^{**2}$
 $- 1/10 \cdot (1/12 - 1/12 \cdot R)B$
 $COE(13,20) = -199/1575 \cdot RISE^{**2} \cdot (1-R)^A \cdot B^{**2} - 1/24 \cdot SIZE^{**2} \cdot A$
 $B^{**2} + 1/24 \cdot R/A + 1/240 \cdot (2 - 2 \cdot R)A$
 $COE(18,1) = 7/20 \cdot RISE^{(1-R)} \cdot SIZE^A$
 $COE(18,6) = 3/20 \cdot RISE^{(1-R)} \cdot SIZE^A$
 $COE(18,11) = -3/20 \cdot RISE^{(1-R)} \cdot SIZE^A$
 $COE(18,16) = -7/20 \cdot RISE^{(1-R)} \cdot SIZE^A$
 $COE(18,2) = 3/20 \cdot RISE^{(1-R)} \cdot SIZE^B$
 $COE(18,7) = -3/20 \cdot RISE^{(1-R)} \cdot SIZE^B$
 $COE(18,12) = -7/20 \cdot RISE^{(1-R)} \cdot SIZE^B$
 $COE(18,17) = 7/20 \cdot RISE^{(1-R)} \cdot SIZE^B$
 $COE(18,3) = 613/1575 \cdot RISE^{**2} \cdot (1-R)^A \cdot B - (7/120 - 7/120 \cdot R)A/B$
 $+ 1/24 \cdot SIZE^{**2} \cdot B/A^{**3} - 1/12 \cdot SIZE^{**2} \cdot A/B^{**3} - 1/24 \cdot R/A/B$
 $COE(18,4) = 199/1575 \cdot RISE^{**2} \cdot (1-R)^A \cdot B^{**2} + 1/24 \cdot SIZE^{**2} \cdot B/A^{**2}$

$$\begin{aligned}
& -1/10 \cdot (1/12 - 1/12 \cdot R)B - 1/24 \cdot R/B \\
\text{COE}(18,5) &= 274/1575 \cdot \text{RISE}^{**2}(1-R)A^*B^{**2} - 1/10 \cdot (1/12 - \\
& 1/12 \cdot R)A - 1/12 \cdot \text{SIZE}^{**2}A/B^{**2} \\
\text{COE}(18,8) &= 197/1575 \cdot \text{RISE}^{**2}(1-R)A^*B - 1/24 \cdot \text{SIZE}^{**2}B/A^{**3} \\
& - 1/24 \cdot \text{SIZE}^{**2}A/B^{**3} + 7/10 \cdot (1/12 - 1/12 \cdot R)A/B + 1/24 \cdot R/A/B \\
\text{COE}(18,9) &= -116/1575 \cdot \text{RISE}^{**2}(1-R)A^{**2}B - 1/10 \cdot (1/12 - \\
& 1/12 \cdot R)B + 1/24 \cdot \text{SIZE}^{**2}B/A^{**2} \\
\text{COE}(18,10) &= 1/10 \cdot (1/12 - 1/12 \cdot R)A + 116/1575 \cdot \text{RISE}^{**2}(1-R) \\
& **A^*B^{**2} - 1/24 \cdot \text{SIZE}^{**2}A/B^{**2} \\
\text{COE}(18,13) &= 613/1575 \cdot \text{RISE}^{**2}(1-R)A^*B - 7/10 \cdot (1/12 - 1/12 \cdot R) \\
& /A/B - 1/24 \cdot R/A/B - 1/12 \cdot \text{SIZE}^{**2}B/A^{**3} + 1/24 \cdot \text{SIZE}^{**2}A/B^{**3} \\
\text{COE}(18,14) &= -274/1575 \cdot \text{RISE}^{**2}(1-R)A^{**2}B + 1/12 \cdot \text{SIZE}^{**2}B/A^{**2} \\
& + 1/10 \cdot (1/12 - 1/12 \cdot R)B \\
\text{COE}(18,15) &= -199/1575 \cdot \text{RISE}^{**2}(1-R)A^*B^{**2} + 1/10 \cdot (1/12 - 1/12 \cdot \\
& **R)A - 1/24 \cdot \text{SIZE}^{**2}A/B^{**2} + 1/24 \cdot R/A \\
\text{COE}(18,18) &= 1/12 \cdot \text{SIZE}^{**2}B/A^{**3} + 1/12 \cdot \text{SIZE}^{**2}A/B^{**3} + 7/10 \cdot \\
& (1/12 - 1/12 \cdot R)A/B + 1727/1575 \cdot \text{RISE}^{**2}(1-R)A^*B + 1/24 \cdot R/A/B \\
\text{COE}(18,19) &= 481/1575 \cdot \text{RISE}^{**2}(1-R)A^{**2}B + 1/24 \cdot R/B + 1/12 \cdot \\
& **\text{SIZE}^{**2}B/A^{**2} + 1/10 \cdot (1/12 - 1/12 \cdot R)B \\
\text{COE}(18,20) &= -481/1575 \cdot \text{RISE}^{**2}(1-R)A^*B^{**2} - 1/12 \cdot \text{SIZE}^{**2} \\
& **A/B^{**2} - 1/24 \cdot R/A - 1/240(2 - 2 \cdot R)A \\
\text{COE}(4,1) &= 1/10 \cdot \text{RISE}^*(1-R) \text{SIZE}^*A^{**2} \\
\text{COE}(4,6) &= 1/15 \cdot \text{RISE}^*(1-R) \text{SIZE}^*A^{**2} \\
\text{COE}(4,11) &= -1/15 \cdot \text{RISE}^*(1-R) \text{SIZE}^*A^{**2} \\
\text{COE}(4,16) &= -1/10 \cdot \text{RISE}^*(1-R) \text{SIZE}^*A^{**2} \\
\text{COE}(4,2) &= 1/9 \cdot \text{RISE}^*(1-R) \text{SIZE}^*B^*A \\
\text{COE}(4,7) &= -1/9 \cdot \text{RISE}^*(1-R) \text{SIZE}^*B^*A \\
\text{COE}(4,12) &= -1/18 \cdot \text{RISE}^*(1-R) \text{SIZE}^*B^*A \\
\text{COE}(4,17) &= 1/18 \cdot \text{RISE}^*(1-R) \text{SIZE}^*B^*A \\
\text{COE}(4,3) &= 461/1575 \cdot \text{RISE}^{**2}(1-R)A^{**2}B + 1/12 \cdot \text{SIZE}^{**2}B/ \\
& **A^{**2} + 1/10 \cdot (1/12 - 1/12 \cdot R)B + 1/24 \cdot R/B \\
\text{COE}(4,4) &= 32/315 \cdot \text{RISE}^{**2}(1-R)A^{**3}B + 4/15 \cdot (1/12 - 1/ \\
& **12 \cdot R)A/B + 1/9 \cdot \text{SIZE}^{**2}B/A \\
\text{COE}(4,5) &= 2/25 \cdot \text{RISE}^{**2}(1-R)A^{**2}B^{**2} + 1/12 \cdot R \\
\text{COE}(4,8) &= 274/1575 \cdot \text{RISE}^{**2}(1-R)A^{**2}B - 1/12 \cdot \text{SIZE}^{**2}B/A^{**2} \\
& - 1/10 \cdot (1/12 - 1/12 \cdot R)B \\
\text{COE}(4,9) &= 1/18 \cdot \text{SIZE}^{**2}B/A - 6/105 \cdot \text{RISE}^{**2}(1-R)A^{**3}B - 1/15 \cdot \\
& ** (1/12 - 1/12 \cdot R)A/B \\
\text{COE}(4,10) &= 4/75 \cdot \text{RISE}^{**2}(1-R)A^{**2}B^{**2} \\
\text{COE}(4,13) &= 116/1575 \cdot \text{RISE}^{**2}(1-R)A^{**2}B - 1/24 \cdot \text{SIZE}^{**2}B/A^{**2} \\
& + 1/10 \cdot (1/12 - 1/12 \cdot R)B \\
\text{COE}(4,14) &= 1/36 \cdot \text{SIZE}^{**2}B/A - 4/105 \cdot \text{RISE}^{**2}(1-R)A^{**3}B + \\
& 1/15 \cdot (1/12 - 1/12 \cdot R)A/B \\
\text{COE}(4,15) &= -8/225 \cdot \text{RISE}^{**2}(1-R)A^{**2}B^{**2}
\end{aligned}$$

$COE(4,18) = 199/1575 \cdot RISE^{**2} \cdot (1-R) \cdot A^{**2} \cdot B + 1/24 \cdot SIZE^{**2} \cdot B/A^{**2}$
 $- 1/10 \cdot (1/12 - 1/12 \cdot R) \cdot B - 1/24 \cdot R/B$
 $COE(4,19) = 16/315 \cdot RISE^{**2} \cdot (1-R) \cdot A^{**3} \cdot B + 1/18 \cdot SIZE^{**2} \cdot B/A$
 $\cdot 4/15 \cdot (1/12 - 1/12 \cdot R) \cdot A/B$
 $COE(4,20) = -4/75 \cdot RISE^{**2} \cdot (1-R) \cdot A^{**2} \cdot B^{**2}$
 $COE(9,1) = -1/15 \cdot RISE \cdot (1-R) \cdot SIZE \cdot A^{**2}$
 $COE(9,6) = -1/10 \cdot RISE \cdot (1-R) \cdot SIZE \cdot A^{**2}$
 $COE(9,11) = 1/10 \cdot RISE \cdot (1-R) \cdot SIZE \cdot A^{**2}$
 $COE(9,18) = 1/15 \cdot RISE \cdot (1-R) \cdot SIZE \cdot A^{**2}$
 $COE(9,2) = -1/9 \cdot RISE \cdot (1-R) \cdot SIZE \cdot B \cdot A$
 $COE(9,7) = 1/9 \cdot RISE \cdot (1-R) \cdot SIZE \cdot B \cdot A$
 $COE(9,12) = 1/18 \cdot RISE \cdot (1-R) \cdot SIZE \cdot B \cdot A$
 $COE(9,17) = -1/18 \cdot RISE \cdot (1-R) \cdot SIZE \cdot B \cdot A$
 $COE(9,3) = -274/1575 \cdot RISE^{**2} \cdot (1-R) \cdot A^{**2} \cdot B + 1/12 \cdot SIZE^{**2} \cdot B/A^{**2}$
 $+ 1/10 \cdot (1/12 - 1/12 \cdot R) \cdot B$
 $COE(9,4) = -1/15 \cdot (1/12 - 1/12 \cdot R) \cdot A/B - 8/105 \cdot RISE^{**2} \cdot (1-R)$
 $\cdot A^{**3} \cdot B + 1/18 \cdot SIZE^{**2} \cdot B/A$
 $COE(9,5) = -4/75 \cdot RISE^{**2} \cdot (1-R) \cdot A^{**2} \cdot B^{**2}$
 $COE(9,8) = -1/12 \cdot SIZE^{**2} \cdot B/A^{**2} - 481/1575 \cdot RISE^{**2} \cdot (1-R) \cdot A^{**2} \cdot B$
 $- 1/24 \cdot R/B - 1/10 \cdot (1/12 - 1/12 \cdot R) \cdot B$
 $COE(9,9) = 1/9 \cdot SIZE^{**2} \cdot B/A + 32/315 \cdot RISE^{**2} \cdot (1-R) \cdot A^{**3} \cdot B + 4/15 \cdot$
 $\cdot (1/12 - 1/12 \cdot R) \cdot A/B$
 $COE(9,10) = -2/25 \cdot RISE^{**2} \cdot (1-R) \cdot A^{**2} \cdot B^{**2} - 1/12 \cdot R$
 $COE(9,13) = 1/24 \cdot R/B - 199/1575 \cdot RISE^{**2} \cdot (1-R) \cdot A^{**2} \cdot B - 1/24 \cdot$
 $\cdot SIZE^{**2} \cdot B/A^{**2} + 1/10 \cdot (1/12 - 1/12 \cdot R) \cdot B$
 $COE(9,14) = 1/18 \cdot SIZE^{**2} \cdot B/A + 16/315 \cdot RISE^{**2} \cdot (1-R) \cdot A^{**3} \cdot B -$
 $\cdot 4/15 \cdot (1/12 - 1/12 \cdot R) \cdot A/B$
 $COE(9,15) = 4/75 \cdot RISE^{**2} \cdot (1-R) \cdot A^{**2} \cdot B^{**2}$
 $COE(9,18) = -116/1575 \cdot RISE^{**2} \cdot (1-R) \cdot A^{**2} \cdot B - 1/10 \cdot (1/12 -$
 $\cdot 1/12 \cdot R) \cdot B + 1/24 \cdot SIZE^{**2} \cdot B/A^{**2}$
 $COE(9,19) = -4/105 \cdot RISE^{**2} \cdot (1-R) \cdot A^{**3} \cdot B + 1/36 \cdot SIZE^{**2} \cdot B/A +$
 $\cdot 1/15 \cdot (1/12 - 1/12 \cdot R) \cdot A/B$
 $COE(9,20) = 8/225 \cdot RISE^{**2} \cdot (1-R) \cdot A^{**2} \cdot B^{**2}$
 $COE(14,1) = -1/15 \cdot RISE \cdot (1-R) \cdot SIZE \cdot A^{**2}$
 $COE(14,6) = -1/10 \cdot RISE \cdot (1-R) \cdot SIZE \cdot A^{**2}$
 $COE(14,11) = 1/10 \cdot RISE \cdot (1-R) \cdot SIZE \cdot A^{**2}$
 $COE(14,16) = 1/15 \cdot RISE \cdot (1-R) \cdot SIZE \cdot A^{**2}$
 $COE(14,2) = -1/9 \cdot RISE \cdot (1-R) \cdot SIZE \cdot B \cdot A$
 $COE(14,7) = 1/9 \cdot RISE \cdot (1-R) \cdot SIZE \cdot B \cdot A$
 $COE(14,12) = 1/18 \cdot RISE \cdot (1-R) \cdot SIZE \cdot B \cdot A$
 $COE(14,17) = -1/18 \cdot RISE \cdot (1-R) \cdot SIZE \cdot B \cdot A$
 $COE(14,3) = -116/1575 \cdot RISE^{**2} \cdot (1-R) \cdot A^{**2} \cdot B + 1/24 \cdot SIZE^{**2} \cdot B/A^{**2}$
 $- 1/10 \cdot (1/12 - 1/12 \cdot R) \cdot B$
 $COE(14,4) = -4/105 \cdot RISE^{**2} \cdot (1-R) \cdot A^{**3} \cdot B + 1/36 \cdot SIZE^{**2} \cdot B/A +$

$$\begin{aligned}
& *1/15.*{(1/12.-1/12.*R)}^A/B \\
& \text{COE}(14,5) = -8/225.*\text{RISE}^{**2}(1-R)^A**2^B**2 \\
& \text{COE}(14,8) = 1/24.*R/B-199/1575.*\text{RISE}^{**2}(1-R)^A**2^B-1/24J \\
& *SIZE^{**2}B/A**2+1/10.*{(1/12.-1/12.*R)}B \\
& \text{COE}(14,9) = 16/315.*\text{RISE}^{**2}(1-R)^A**3^B+1/18./SIZE^{**2}B/A- \\
& *4/15.*{(1/12.-1/12.*R)}^A/B \\
& \text{COE}(14,10) = -4/75.*\text{RISE}^{**2}(1-R)^A**2^B**2 \\
& \text{COE}(14,13) = -1/24.*R/B-481/1575.*\text{RISE}^{**2}(1-R)^A**2^B-1/12. \\
& */SIZE^{**2}B/A**2.1/10.*{(1/12.-1/12.*R)}B \\
& \text{COE}(14,14) = 1/9./SIZE^{**2}B/A+32/315.*\text{RISE}^{**2}(1-R)^A**3^B+ \\
& *4/15.*{(1/12.-1/12.*R)}^A/B \\
& \text{COE}(14,15) = 2/25.*\text{RISE}^{**2}(1-R)^A**2^B**2+1/12.*R \\
& \text{COE}(14,18) = -274/1575.*\text{RISE}^{**2}(1-R)^A**2^B+1/10.*{(1/12.- \\
& *1/12.*R)}B+1/12./SIZE^{**2}B/A**2 \\
& \text{COE}(14,19) = -8/105.*\text{RISE}^{**2}(1-R)^A**3^B+1/18./SIZE^{**2}B/A- \\
& *1/15.*{(1/12.-1/12.*R)}^A/B \\
& \text{COE}(14,20) = 4/75.*\text{RISE}^{**2}(1-R)^A**2^B**2 \\
& \text{COE}(19,1) = 1/10.*\text{RISE}^*(1-R)*SIZE^A**2 \\
& \text{COE}(19,8) = 1/15.*\text{RISE}^*(1-R)*SIZE^A**2 \\
& \text{COE}(19,11) = -1/15.*\text{RISE}^*(1-R)*SIZE^A**2 \\
& \text{COE}(19,16) = -1/10.*\text{RISE}^*(1-R)*SIZE^A**2 \\
& \text{COE}(19,2) = 1/18.*\text{RISE}^*(1-R)/SIZE^B^A \\
& \text{COE}(19,7) = -1/18.*\text{RISE}^*(1-R)/SIZE^B^A \\
& \text{COE}(19,12) = -1/9.*\text{RISE}^*(1-R)/SIZE^B^A \\
& \text{COE}(19,17) = 1/9.*\text{RISE}^*(1-R)/SIZE^B^A \\
& \text{COE}(19,3) = 199/1575.*\text{RISE}^{**2}(1-R)^A**2^B+1/24./SIZE^{**2}B/A**2 \\
& *-1/24.*R/B-1/10.*{(1/12.-1/12.*R)}B \\
& \text{COE}(19,4) = 1/18./SIZE^{**2}B/A+16/315.*\text{RISE}^{**2}(1-R)^A**3^B- \\
& *4/15.*{(1/12.-1/12.*R)}^A/B \\
& \text{COE}(19,5) = 4/75.*\text{RISE}^{**2}(1-R)^A**2^B**2 \\
& \text{COE}(19,8) = 1/10.*{(1/12.-1/12.*R)}B+118/1575.*\text{RISE}^{**2}(1-R) \\
& **A**2^B-1/24./SIZE^{**2}B/A**2 \\
& \text{COE}(19,9) = 1/15.*{(1/12.-1/12.*R)}^A/B-4/105.*\text{RISE}^{**2}(1-R)^A**3 \\
& **B+1/36./SIZE^{**2}B/A \\
& \text{COE}(19,10) = 8/225.*\text{RISE}^{**2}(1-R)^A**2^B**2 \\
& \text{COE}(19,13) = 274/1575.*\text{RISE}^{**2}(1-R)^A**2^B-1/12./SIZE^{**2}B/A**2 \\
& *-1/10.*{(1/12.-1/12.*R)}B \\
& \text{COE}(19,14) = 1/18./SIZE^{**2}B/A-8/105.*\text{RISE}^{**2}(1-R)^A**3^B \\
& *-1/15.*{(1/12.-1/12.*R)}^A/B \\
& \text{COE}(19,15) = -4/75.*\text{RISE}^{**2}(1-R)^A**2^B**2 \\
& \text{COE}(19,18) = 481/1575.*\text{RISE}^{**2}(1-R)^A**2^B+1/12./SIZE^{**2}B/A**2 \\
& *+1/24.*R/B+1/10.*{(1/12.-1/12.*R)}B \\
& \text{COE}(19,19) = 1/9./SIZE^{**2}B/A+32/315.*\text{RISE}^{**2}(1-R)^A**3^B+ \\
& *4/15.*{(1/12.-1/12.*R)}^A/B
\end{aligned}$$

$COE(19,20) = -2/25 \cdot RISE^{**2} \cdot (1-R)^A \cdot B^{**2} - 1/12 \cdot R$
 $COE(5,1) = 1/9 \cdot RISE \cdot (1-R) \cdot SIZE \cdot A \cdot B$
 $COE(5,6) = 1/18 \cdot RISE \cdot (1-R) \cdot SIZE \cdot A \cdot B$
 $COE(5,11) = -1/18 \cdot RISE \cdot (1-R) \cdot SIZE \cdot A \cdot B$
 $COE(5,16) = -1/9 \cdot RISE \cdot (1-R) \cdot SIZE \cdot A \cdot B$
 $COE(5,2) = 1/10 \cdot RISE \cdot (1-R) \cdot SIZE \cdot B^{**2}$
 $COE(5,7) = -1/10 \cdot RISE \cdot (1-R) \cdot SIZE \cdot B^{**2}$
 $COE(5,12) = -1/15 \cdot RISE \cdot (1-R) \cdot SIZE \cdot B^{**2}$
 $COE(5,17) = 1/15 \cdot RISE \cdot (1-R) \cdot SIZE \cdot B^{**2}$
 $COE(5,3) = 461/1575 \cdot RISE^{**2} \cdot (1-R)^A \cdot B^{**2} + 1/24 \cdot R/A + (1/120 \cdot$
 $1/120 \cdot R) \cdot A + 1/12 \cdot SIZE^{**2} \cdot A/B^{**2}$
 $COE(5,4) = 2/25 \cdot RISE^{**2} \cdot (1-R)^A \cdot B^{**2} + 1/12 \cdot R$
 $COE(5,5) = 32/315 \cdot RISE^{**2} \cdot (1-R)^A \cdot B^{**3} + 1/9 \cdot SIZE^{**2} \cdot A/B$
 $+ (1/45 \cdot -1/45 \cdot R) \cdot B/A$
 $COE(5,8) = 199/1575 \cdot RISE^{**2} \cdot (1-R)^A \cdot B^{**2} - 1/24 \cdot R/A - 1/10 \cdot$
 $(1/12 \cdot -1/12 \cdot R) \cdot A + 1/24 \cdot SIZE^{**2} \cdot A/B^{**2}$
 $COE(5,9) = -4/75 \cdot RISE^{**2} \cdot (1-R)^A \cdot B^{**2}$
 $COE(5,10) = 1/18 \cdot SIZE^{**2} \cdot A/B + 16/315 \cdot RISE^{**2} \cdot (1-R)^A \cdot B^{**3} -$
 $(1/45 \cdot -1/45 \cdot R) \cdot B/A$
 $COE(5,13) = -1/24 \cdot SIZE^{**2} \cdot A/B^{**2} + 116/1575 \cdot RISE^{**2} \cdot (1-R)^A \cdot B^{**2}$
 $+ 1/10 \cdot (1/12 \cdot -1/12 \cdot R) \cdot A$
 $COE(5,14) = -8/225 \cdot RISE^{**2} \cdot (1-R)^A \cdot B^{**2}$
 $COE(5,15) = (1/180 \cdot -1/180 \cdot R) \cdot B/A - 4/105 \cdot RISE^{**2} \cdot (1-R)^A \cdot B^{**3}$
 $+ 1/36 \cdot SIZE^{**2} \cdot A/B$
 $COE(5,18) = -1/10 \cdot (1/12 \cdot -1/12 \cdot R) \cdot A + 274/1575 \cdot RISE^{**2} \cdot$
 $(1-R)^A \cdot B^{**2} - 1/12 \cdot SIZE^{**2} \cdot A/B^{**2}$
 $COE(5,19) = 4/75 \cdot RISE^{**2} \cdot (1-R)^A \cdot B^{**2}$
 $COE(5,20) = 1/18 \cdot SIZE^{**2} \cdot A/B - 8/105 \cdot RISE^{**2} \cdot (1-R)^A \cdot B^{**3} -$
 $(1/180 \cdot -1/180 \cdot R) \cdot B/A$
 $COE(10,1) = 1/18 \cdot RISE \cdot (1-R) \cdot SIZE \cdot A \cdot B$
 $COE(10,6) = 1/9 \cdot RISE \cdot (1-R) \cdot SIZE \cdot A \cdot B$
 $COE(10,11) = -1/9 \cdot RISE \cdot (1-R) \cdot SIZE \cdot A \cdot B$
 $COE(10,16) = -1/18 \cdot RISE \cdot (1-R) \cdot SIZE \cdot A \cdot B$
 $COE(10,2) = 1/10 \cdot RISE \cdot (1-R) \cdot SIZE \cdot B^{**2}$
 $COE(10,7) = -1/10 \cdot RISE \cdot (1-R) \cdot SIZE \cdot B^{**2}$
 $COE(10,12) = -1/15 \cdot RISE \cdot (1-R) \cdot SIZE \cdot B^{**2}$
 $COE(10,17) = 1/15 \cdot RISE \cdot (1-R) \cdot SIZE \cdot B^{**2}$
 $COE(10,3) = 199/1575 \cdot RISE^{**2} \cdot (1-R)^A \cdot B^{**2} - 1/24 \cdot R/A +$
 $1/24 \cdot SIZE^{**2} \cdot A/B^{**2} - (1/120 \cdot -1/120 \cdot R) \cdot A$
 $COE(10,4) = 4/75 \cdot RISE^{**2} \cdot (1-R)^A \cdot B^{**2}$
 $COE(10,5) = 16/315 \cdot RISE^{**2} \cdot (1-R)^A \cdot B^{**3} - (1/45 \cdot -1/45 \cdot R) \cdot B/A$
 $+ 1/18 \cdot SIZE^{**2} \cdot A/B$
 $COE(10,8) = 461/1575 \cdot RISE^{**2} \cdot (1-R)^A \cdot B^{**2} + 1/24 \cdot R/A + 1/12 \cdot$
 $SIZE^{**2} \cdot A/B^{**2} + 1/10 \cdot (1/12 \cdot -1/12 \cdot R) \cdot A$

$$\begin{aligned}
\text{COE}(10,9) &= -1/12 \cdot R \cdot 2/25 \cdot \text{RISE}^{**2} \cdot (1-R) \cdot A^{**2} \cdot B^{**2} \\
\text{COE}(10,10) &= 1/9 \cdot \text{SIZE}^{**2} \cdot A/B + 32/315 \cdot \text{RISE}^{**2} \cdot (1-R) \cdot A \cdot B^{**3} + \\
&\quad \cdot (1/45 - 1/45 \cdot R) \cdot B/A \\
\text{COE}(10,13) &= -1/12 \cdot \text{SIZE}^{**2} \cdot A/B^{**2} + 274/1575 \cdot \text{RISE}^{**2} \cdot (1-R) \cdot A \cdot B^{**2} \\
&\quad \cdot -1/10 \cdot (1/12 - 1/12 \cdot R) \cdot R \cdot Y \cdot A \\
\text{COE}(10,14) &= -4/75 \cdot \text{RISE}^{**2} \cdot (1-R) \cdot A^{**2} \cdot B^{**2} \\
\text{COE}(10,15) &= (-1/180 + 1/180 \cdot R) \cdot B/A - 8/105 \cdot \text{RISE}^{**2} \cdot (1-R) \cdot A \cdot B^{**3} \\
&\quad \cdot +1/18 \cdot \text{SIZE}^{**2} \cdot A/B \\
\text{COE}(10,18) &= 1/10 \cdot (1/12 - 1/12 \cdot R) \cdot R \cdot Y \cdot A + 116/1575 \cdot \text{RISE}^{**2} \cdot (1-R) \\
&\quad \cdot A \cdot B^{**2} - 1/24 \cdot \text{SIZE}^{**2} \cdot A/B^{**2} \\
\text{COE}(10,19) &= 8/225 \cdot \text{RISE}^{**2} \cdot (1-R) \cdot A^{**2} \cdot B^{**2} \\
\text{COE}(10,20) &= (1/180 - 1/180 \cdot R) \cdot B/A - 4/105 \cdot \text{RISE}^{**2} \cdot (1-R) \cdot A \cdot B^{**3} \\
&\quad \cdot +1/36 \cdot \text{SIZE}^{**2} \cdot A/B \\
\text{COE}(15,1) &= -1/18 \cdot \text{RISE} \cdot (1-R) \cdot \text{SIZE} \cdot A \cdot B \\
\text{COE}(15,6) &= -1/9 \cdot \text{RISE} \cdot (1-R) \cdot \text{SIZE} \cdot A \cdot B \\
\text{COE}(15,11) &= 1/9 \cdot \text{RISE} \cdot (1-R) \cdot \text{SIZE} \cdot A \cdot B \\
\text{COE}(15,16) &= 1/18 \cdot \text{RISE} \cdot (1-R) \cdot \text{SIZE} \cdot A \cdot B \\
\text{COE}(15,2) &= -1/15 \cdot \text{RISE} \cdot (1-R) \cdot \text{SIZE} \cdot B^{**2} \\
\text{COE}(15,7) &= 1/15 \cdot \text{RISE} \cdot (1-R) \cdot \text{SIZE} \cdot B^{**2} \\
\text{COE}(15,12) &= 1/10 \cdot \text{RISE} \cdot (1-R) \cdot \text{SIZE} \cdot B^{**2} \\
\text{COE}(15,17) &= -1/10 \cdot \text{RISE} \cdot (1-R) \cdot \text{SIZE} \cdot B^{**2} \\
\text{COE}(15,3) &= -116/1575 \cdot \text{RISE}^{**2} \cdot (1-R) \cdot A \cdot B^{**2} + 1/24 \cdot \text{SIZE}^{**2} \cdot A/B^{**2} \\
&\quad \cdot -(1/120 - 1/120 \cdot R) \cdot R \cdot Y \cdot A \\
\text{COE}(15,4) &= -8/225 \cdot \text{RISE}^{**2} \cdot (1-R) \cdot A^{**2} \cdot B^{**2} \\
\text{COE}(15,5) &= -4/105 \cdot \text{RISE}^{**2} \cdot A \cdot B^{**3} + 1/36 \cdot \text{SIZE}^{**2} \cdot A/B + \\
&\quad \cdot (1/180 - 1/180 \cdot R) \cdot B/A \\
\text{COE}(15,8) &= 1/10 \cdot (1/12 - 1/12 \cdot R) \cdot R \cdot Y \cdot A - 274/1575 \cdot \text{RISE}^{**2} \cdot (1-R) \\
&\quad \cdot A \cdot B^{**2} + 1/12 \cdot \text{SIZE}^{**2} \cdot A/B^{**2} \\
\text{COE}(15,9) &= 4/75 \cdot \text{RISE}^{**2} \cdot (1-R) \cdot A^{**2} \cdot B^{**2} \\
\text{COE}(15,10) &= 1/18 \cdot \text{SIZE}^{**2} \cdot A/B - 8/105 \cdot \text{RISE}^{**2} \cdot (1-R) \cdot A \cdot B^{**3} - \\
&\quad \cdot (1/180 - 1/180 \cdot R) \cdot B/A \\
\text{COE}(15,13) &= -1/10 \cdot (1/12 - 1/12 \cdot R) \cdot R \cdot Y \cdot A - 461/1575 \cdot \text{RISE}^{**2} \cdot (1-R) \\
&\quad \cdot A \cdot B^{**2} - 1/24 \cdot R \cdot A - 1/12 \cdot \text{SIZE}^{**2} \cdot A/B^{**2} \\
\text{COE}(15,14) &= 2/25 \cdot \text{RISE}^{**2} \cdot (1-R) \cdot A^{**2} \cdot B^{**2} + 1/12 \cdot R \\
\text{COE}(15,15) &= 32/315 \cdot \text{RISE}^{**2} \cdot (1-R) \cdot A \cdot B^{**3} + 1/9 \cdot \text{SIZE}^{**2} \cdot A/B + \\
&\quad \cdot (1/45 - 1/45 \cdot R) \cdot B/A \\
\text{COE}(15,18) &= -199/1575 \cdot \text{RISE}^{**2} \cdot (1-R) \cdot A \cdot B^{**2} + 1/24 \cdot R \cdot A + \\
&\quad \cdot 1/10 \cdot (1/12 - 1/12 \cdot R) \cdot R \cdot Y \cdot A - 1/24 \cdot \text{SIZE}^{**2} \cdot A/B^{**2} \\
\text{COE}(15,19) &= -4/75 \cdot \text{RISE}^{**2} \cdot (1-R) \cdot A^{**2} \cdot B^{**2} \\
\text{COE}(15,20) &= 16/315 \cdot \text{RISE}^{**2} \cdot (1-R) \cdot A \cdot B^{**3} - (1/45 - 1/45 \cdot R) \cdot B/A \\
&\quad \cdot +1/18 \cdot \text{SIZE}^{**2} \cdot A/B \\
\text{COE}(20,1) &= -1/9 \cdot \text{RISE} \cdot (1-R) \cdot \text{SIZE} \cdot A \cdot B \\
\text{COE}(20,6) &= -1/18 \cdot \text{RISE} \cdot (1-R) \cdot \text{SIZE} \cdot A \cdot B \\
\text{COE}(20,11) &= 1/18 \cdot \text{RISE} \cdot (1-R) \cdot \text{SIZE} \cdot A \cdot B
\end{aligned}$$

```

COE(20,16) = 1./9.*RISE**(1-R)*SIZE*A*B
COE(20,2) = -1./15.*RISE**(1-R)/SIZE*B**2
COE(20,7) = 1./15.*RISE**(1-R)/SIZE*B**2
COE(20,12) = 1./10.*RISE**(1-R)/SIZE*B**2
COE(20,17) = -1./10.*RISE**(1-R)/SIZE*B**2
COE(20,3) = -274./1575.*RISE**2*(1-R)*A*B**2+(1./120.-1./120.*R)
*/A+1./12.*SIZE**2*A/B**2
COE(20,4) = -4./75.*RISE**2*(1-R)*A**2*B**2
COE(20,5) = -8./105.*RISE**2*(1-R)*A*B**3-(1./180.-1./180.*R)*B/A
*+1./18.*SIZE**2*A/B
COE(20,8) = 1./24.*SIZE**2*A/B**2-116./1575.*RISE**2*(1-R)*A*B**2
*-1./10.*(1./12.-1./12.*R)/A
COE(20,9) = 8./275.*RISE**2*(1-R)*A**2*B**2
COE(20,10) = (1./180.-1./180.*R)*B/A-4./105.*RISE**2*(1-R)*A*B**3
*+1./36.*SIZE**2*A/B
COE(20,13) = -1./24.*SIZE**2*A/B**2-199./1575.*RISE**2*(1-R)*A*B**2
*+1./24.*R/A+1./10.*(1./12.-1./12.*R)/A
COE(20,14) = 4./75.*RISE**2*(1-R)*A**2*B**2
COE(20,15) = 16./315.*RISE**2*(1-R)*A*B**3-(1./45.-1./45.*R)*B/A
*+1./18.*SIZE**2*A/B
COE(20,18) = -461./1575.*RISE**2*(1-R)*A*B**2-1./24.*R/A-1./12.
**SIZE**2*A/B**2-1./10.*(1./12.-1./12.*R)/A
COE(20,19) = -1./12.*R-2./25.*RISE**2*(1-R)*A**2*B**2
COE(20,20) = 32./315.*RISE**2*(1-R)*A*B**3+1./9.*SIZE**2*A/B+
*(1./45.-1./45.*R)*B/A

```

C

C

C

```

DO 30 I = 1,NPOIN*5
DO 30 J = 1,NPOIN*5
S(I,J)=0
30 CONTINUE
J=0
DO 50 K=1,(NPOIN-2*NUMA)-1,(NUMA+1)
DO 40 I=0,(NUMA-1)
J = J+1
NA(J,1) = K+I
NA(J,2) = K+I+1
NA(J,3) = (NUMA+2+K)+I
NA(J,4) = (NUMA+1+K)+I
40 CONTINUE
50 CONTINUE
DO 60 I=1,NUMA*NUMB
N1=0

```

```

N2=0
DO 70 M1=1,4
DO 80 J=NA(I,M1)*5-4,NA(I,M1)*5
N1=N1+1
N2=0
DO 90 M2=1,4
DO 110 K=NA(I,M2)*5-4,NA(I,M2)*5
N2=N2+1
S(J,K)=S(J,K)+COE(N1,N2)
110 CONTINUE
90 CONTINUE
80 CONTINUE
70 CONTINUE
60 CONTINUE

```

C

C— FORCES MATRIX —————

C

```

CQ(1) = 0
CQ(2) = 0
CQ(3) = PLOAD*(1-R**2)*A*B
CQ(4) = 1./3.*PLOAD*(1-R**2)*A**2*B
CQ(5) = 1./3.*PLOAD*(1-R**2)*A*B**2
CQ(6) = 0
CQ(7) = 0
CQ(8) = PLOAD*(1-R**2)*A*B
CQ(9) = -1./3.*PLOAD*(1-R**2)*A**2*B
CQ(10) = 1./3.*PLOAD*(1-R**2)*A*B**2
CQ(11) = 0
CQ(12) = 0
CQ(13) = PLOAD*(1-R**2)*A*B
CQ(14) = -1./3.*PLOAD*(1-R**2)*A**2*B
CQ(15) = -1./3.*PLOAD*(1-R**2)*A*B**2
CQ(16) = 0
CQ(17) = 0
CQ(18) = PLOAD*(1-R**2)*A*B
CQ(19) = 1./3.*PLOAD*(1-R**2)*A**2*B
CQ(20) = -1./3.*PLOAD*(1-R**2)*A*B**2

```

C

C—

C

```

DO 170 I=1,NPOIN*5
SQ(I)=0
170 CONTINUE

```

C


```

DO 180 I=1,NUMA*NUMB
  N1=0
  DO 190 M1=1,4
    DO 190 J=NA(I,M1)*5-4,NA(I,M1)*5
      N1=N1+1
      SQ(J)=SQ(J)+CQ(N1)
190 CONTINUE
180 CONTINUE
C
C
C
DO 130 I=1,NPOIN*5
  IF(BC(I),EQ.0) GOTO 130
  DO 140 J=1,NPOIN*5
    S(I,J)=0
    IF (J.EQ.I) S(I,J)=1.
140 CONTINUE
  DO 150 K=1,NPOIN*5
    S(K,I)=0
    IF (K.EQ.I) S(K,I)=1.
150 CONTINUE
  SQ(I)=0
130 CONTINUE

C
C— SOLVE A SET OF SIMULTANEOUS EQUATIONS USING GAUSS ELIMINATION
C
C—SCALE——
DO 310 IE=1,NPOIN*5
  BIG = ABS(S(IE,1))
  DO 320 IC=2,NPOIN*5
    SMAX = ABS(S(IE,IC))
    IF(SMAX.GT.BIG) BIG = SMAX
320 CONTINUE
  DO 330 IC=1,NPOIN*5
    S(IE,IC) = S(IE,IC)/BIG
330 CONTINUE
  SQ(IE) = SQ(IE)/BIG
310 CONTINUE
C———
DO 210 IP=1,(NPOIN*5-1)
C——PIVOT——
  JP = IP
  BIG = ABS(S(IP,IP))

```

```

DO 410 I=IP+1,NPOIN*5
  SMAX = ABS(S(I,IP))
  IF (SMAX.GT.BIG) THEN
    BIG = SMAX
    JP = I
  ENDIF
410 CONTINUE
  IF (JP.NE.IP) THEN
    DO 420 J=IP,NPOIN*5
      DUMMY = S(JP,J)
      S(JP,J) = S(IP,J)
      S(IP,J) = DUMMY
    420 CONTINUE
    DUMMY = SQ(JP)
    SQ(JP)= SQ(IP)
    SQ(IP)= DUMMY
  ENDIF
C-----
DO 220 IE=IP+1,NPOIN*5
  RATIO = S(IE,IP)/S(IP,IP)
  DO 230 IC=IP+1,NPOIN*5
    S(IE,IC) = S(IE,IC)-RATIO*S(IP,IC)
  230 CONTINUE
  SQ(IE) = SQ(IE) - RATIO*SQ(IP)
220 CONTINUE
DO 240 IE=IP+1,NPOIN*5
  S(IE,IP) = 0.
240 CONTINUE
210 CONTINUE
SL(NPOIN*5) = SQ(NPOIN*5)/S(NPOIN*5,NPOIN*5)
DO 250 IE=NPOIN*5-1,1,-1
  SUM = 0.
  DO 260 IC=IE+1,NPOIN*5
    SUM = SUM + S(IE,IC)*SL(IC)
  260 CONTINUE
  SL(IE)=(SQ(IE) - SUM)/S(IE,IE)
250 CONTINUE
C
C
  J=0
  DO 8 I=1,NPOIN*5,5
    J=J+1
    U(J) = SL(I)
    V(J) = SL(I+1)

```

W(J) = SL(I+2)

WX(J) = SL(I+3)

WY(J) = SL(I+4)

8 CONTINUE

C

C

DO 595 I=1,NPOIN

SWXX(I) = 0.

COUNT(I) = 0.

595 CONTINUE

C

C

DO 540 I=1,NUMA*NUMB

WXX(NA(I,1)) = -3./2./A**2*SL(NA(I,1)**5-2)-2./A*SL(NA(I,1)**5-1)

+3./2./A**2*SL(NA(I,2)**5-2)-1./A*SL(NA(I,2)**5-1)

WXX(NA(I,2)) = 3./2./A**2*SL(NA(I,1)**5-2)+1./A*SL(NA(I,1)**5-1)

-3./2./A**2*SL(NA(I,2)**5-2)+2./A*SL(NA(I,2)**5-1)

WXX(NA(I,3)) = -3./2./A**2*SL(NA(I,3)**5-2)+2./A*SL(NA(I,3)**5-1)

+3./2./A**2*SL(NA(I,4)**5-2)+1./A*SL(NA(I,4)**5-1)

WXX(NA(I,4)) = 3./2./A**2*SL(NA(I,3)**5-2)-1./A*SL(NA(I,3)**5-1)

-3./2./A**2*SL(NA(I,4)**5-2)-2./A*SL(NA(I,4)**5-1)

SWXX(NA(I,1)) = SWXX(NA(I,1))+WXX(NA(I,1))

SWXX(NA(I,2)) = SWXX(NA(I,2))+WXX(NA(I,2))

SWXX(NA(I,3)) = SWXX(NA(I,3))+WXX(NA(I,3))

SWXX(NA(I,4)) = SWXX(NA(I,4))+WXX(NA(I,4))

COUNT(NA(I,1)) = COUNT(NA(I,1))+1

COUNT(NA(I,2)) = COUNT(NA(I,2))+1

COUNT(NA(I,3)) = COUNT(NA(I,3))+1

COUNT(NA(I,4)) = COUNT(NA(I,4))+1

540 CONTINUE

C

DO 610 I=1,NPOIN

WXXM(I) = SWXX(I)/COUNT(I)

610 CONTINUE

C

DO 615 I=1,NPOIN

SWYY(I) = 0.

COUNT(I) = 0.

615 CONTINUE

C

DO 545 I=1,NUMA*NUMB

WYY(NA(I,1)) = -3./2./B**2*SL(NA(I,1)**5-2)-2./B*SL(NA(I,1)**5)

+3./2./B**2*SL(NA(I,4)**5-2)-1./B*SL(NA(I,4)**5)

WYY(NA(I,2)) = -3./2./B**2*SL(NA(I,2)**5-2)-2./B*SL(NA(I,2)**5)

```

**3./2./B**2*SL(NA(I,3)*5-2)-1./B*SL(NA(I,3)*5)
WYY(NA(I,3)) = 3./2./B**2*SL(NA(I,2)*5-2)+1./B*SL(NA(I,2)*5)
*-3./2./B**2*SL(NA(I,3)*5-2)+2./B*SL(NA(I,3)*5)
WYY(NA(I,4)) = 3./2./B**2*SL(NA(I,1)*5-2)+1./B*SL(NA(I,1)*5)
*-3./2./B**2*SL(NA(I,4)*5-2)+2./B*SL(NA(I,4)*5)
SWYY(NA(I,1)) = SWYY(NA(I,1))+WYY(NA(I,1))
SWYY(NA(I,2)) = SWYY(NA(I,2))+WYY(NA(I,2))
SWYY(NA(I,3)) = SWYY(NA(I,3))+WYY(NA(I,3))
SWYY(NA(I,4)) = SWYY(NA(I,4))+WYY(NA(I,4))
COUNT(NA(I,1)) = COUNT(NA(I,1))+1
COUNT(NA(I,2)) = COUNT(NA(I,2))+1
COUNT(NA(I,3)) = COUNT(NA(I,3))+1
COUNT(NA(I,4)) = COUNT(NA(I,4))+1

```

545 CONTINUE

C

C

```

DO 625 I=1,NPOIN
  WYIM(I) = SWYY(I)/COUNT(I)

```

625 CONTINUE

C

C FIND DERIVATIVE WITH X AND Y DIRECTION OF U V W_x AND W_y

C

```

DO 560 I=1,(NUMA+1)
  DO 560 IROW=1,(NUMB+1)
    X(IROW) = 2*B*(IROW - 1)
    FX(IROW,1) = SL((1+(IROW-1)*(NUMA+1)+(I-1))*5-1)

```

560 CONTINUE

M = NUMB+1

DO 565 ICOL=2,NUMB+1

M = M-1

DO 570 IROW=1,M

FX(IROW,ICOL) = FX(IROW+1,ICOL-1)-FX(IROW,ICOL-1)

FX(IROW,ICOL) = FX(IROW,ICOL)/(X(IROW+ICOL-1)-X(IROW))

570 CONTINUE

585 CONTINUE

NO = 2.*NUMB+1

H = AT/(NO-1)

XX = 0.

DO 575 K=1,NO

FF = FX(1,1)

FAC = 1.

DO 580 I1=2,(NUMB+1)

FAC = FAC*(X(I1)-X(I1-1))

FF = FF+FX(1,I1)*FAC

580 CONTINUE

FXD(K) = FF

XX = XX + H

575 CONTINUE

DIFF(1,I) = (-FXD(3)+4*FXD(2)-3*FXD(1))/2./H

DIFF(2,I) = (-FXD(4)+4*FXD(3)-3*FXD(2))/2./H

DO 585 I2=3,NO-2

DIFF(I2,I) = (-FXD(I2+2)+8*FXD(I2+1)-8*FXD(I2-1)+FXD(I2-2))

*/(12./H)

585 CONTINUE

DIFF(NO-1,I) = (3*FXD(NO-1)-4*FXD(NO-2)+FXD(NO-3))/2./H

DIFF(NO,I) = (3*FXD(NO)-4*FXD(NO-1)+FXD(NO-2))/2./H

560 CONTINUE

C

C

DO 590 I=1,NUMA+1

DO 590 J=1,NUMB+1

WXY(1+(J-1)*(NUMA+1)+(I-1)) = DIFF(1+(J-1)*2.,I)

590 CONTINUE

C

C

C

DO 650 I=1,(NUMA+1)

DO 660 IROW=1,(NUMB+1)

X(IROW) = 2*B*(IROW - 1)

FX(IROW,1) = SL((1+(IROW-1)*(NUMA+1)+(I-1))*5-4)

660 CONTINUE

M = NUMB+1

DO 685 ICOL=2,NUMB+1

M = M-1

DO 670 IROW=1,M

FX(IROW,ICOL) = FX(IROW+1,ICOL-1)-FX(IROW,ICOL-1)

FX(IROW,ICOL) = FX(IROW,ICOL)/(X(IROW+ICOL-1)-X(IROW))

670 CONTINUE

665 CONTINUE

NO = 2.*NUMB+1

H = AT/(NO-1)

XX = 0.

DO 675 K=1,NO

FF = FX(1,1)

FAC = 1.

DO 680 I1=2,(NUMB+1)

FAC = FAC*(XX-X(I1-1))

FF = FF+FX(1,I1)*FAC

```

680 CONTINUE
    FXD(K) = FF
    XX = XX + H
675 CONTINUE
    DIFF(1,I) = (-FXD(3)+4*FXD(2)-3*FXD(1))/2./H
    DIFF(2,I) = (-FXD(4)+4*FXD(3)-3*FXD(2))/2./H
    DO 685 I2=3,NO-2
        DIFF(I2,I) = (-FXD(I2+2)+8*FXD(I2+1)-8*FXD(I2-1)+FXD(I2-2))
            *(12./I)
685 CONTINUE
    DIFF(NO-1,I) = (3*FXD(NO-1)-4*FXD(NO-2)+FXD(NO-3))/2./H
    DIFF(NO,I) = (3*FXD(NO)-4*FXD(NO-1)+FXD(NO-2))/2./H
650 CONTINUE
C
C
    DO 690 I=1,NUMA+1
    DO 690 J=1,NUMB+1
        UY(1+(J-1)*(NUMA+1)+(I-1)) = DIFF(1+(J-1)*2.,I)
690 CONTINUE
C
C
C
    DO 710 I=1,(NUMA+1)
    DO 715 IROW=1,(NUMB+1)
        X(IROW) = 2*B*(IROW - 1)
        FX(IROW,1) = SL((1+(IROW-1)*(NUMA+1)+(I-1))*5-3)
715 CONTINUE
    M = NUMB+1
    DO 720 ICOL=2,NUMB+1
        M = M-1
    DO 725 IROW=1,M
        FX(IROW,ICOL) = FX(IROW+1,ICOL-1)-FX(IROW,ICOL-1)
        FX(IROW,ICOL) = FX(IROW,ICOL)/(X(IROW+ICOL-1)-X(IROW))
725 CONTINUE
720 CONTINUE
    NO = 2.*NUMB+1
    H = AT/(NO-1)
    XX = 0.
    DO 730 K=1,NO
        FF = FX(1,1)
        FAC = 1.
    DO 735 I1=2,(NUMB+1)
        FAC = FAC*(XX-X(I1-1))
        FF = FF+FX(1,I1)*FAC

```

735 CONTINUE

FXD(K) = FF

XX = XX + H

730 CONTINUE

DIFF(1,I) = (-FXD(3)+4*FXD(2)-3*FXD(1))/2./H

DIFF(2,I) = (-FXD(4)+4*FXD(3)-3*FXD(2))/2./H

DO 740 I2=3,NO-2

DIFF(I2,I) = (-FXD(I2+2)+8*FXD(I2+1)-8*FXD(I2-1)+FXD(I2-2))

*/(12.*H)

740 CONTINUE

DIFF(NO-1,I) = (3*FXD(NO-1)-4*FXD(NO-2)+FXD(NO-3))/2./H

DIFF(NO,I) = (3*FXD(NO)-4*FXD(NO-1)+FXD(NO-2))/2./H

710 CONTINUE

C

C

DO 745 I=1,NUMA+1

DO 745 J=1,NUMB+1

VY(1+(J-1)*(NUMA+1)+(I-1)) = DIFF(1+(J-1)*2.,I)

745 CONTINUE

C

C

C

DO 755 I=1,(NPOIN-NUMA),(NUMA+1)

DO 760 IROW=1,(NUMA+1)

X(IROW) = 2*A*(IROW - 1)

FX(IROW,1) = SL((I+(IROW-1))*5-4)

760 CONTINUE

M = NUMA+1

DO 765 ICOL=2,NUMA+1

M = M-1

DO 770 IROW=1,M

FX(IROW,ICOL) = FX(IROW+1,ICOL-1)-FX(IROW,ICOL-1)

FX(IROW,ICOL) = FX(IROW,ICOL)/(X(IROW+ICOL-1)-X(IROW))

770 CONTINUE

765 CONTINUE

NO = 2.*NUMA+1

H = AT/(NO-1)

XX = 0.

DO 775 K=1,NO

FF = FX(1,1)

FAC = 1.

DO 780 I1=2,(NUMA+1)

FAC = FAC*(XX-X(I1-1))

FF = FF+FX(1,I1)*FAC

780 CONTINUE

FXD(K) = FF

XX = XX + H

775 CONTINUE

DIFF(1,I) = (-FXD(3)+4*FXD(2)-3*FXD(1))/2./H

DIFF(2,I) = (-FXD(4)+4*FXD(3)-3*FXD(2))/2./H

DO 785 I2=3,NO-2

DIFF(I2,I) = (-FXD(I2+2)+8*FXD(I2+1)-8*FXD(I2-1)+FXD(I2-2))
*(12.*H)

785 CONTINUE

DIFF(NO-1,I) = (3*FXD(NO-1)-4*FXD(NO-2)+FXD(NO-3))/2./H

DIFF(NO,I) = (3*FXD(NO)-4*FXD(NO-1)+FXD(NO-2))/2./H

755 CONTINUE

C

C

DO 780 I=1,(NPOIN-NUMA),(NUMA+1)

DO 790 J=1,NUMA+1

UX(I+(J-1)) = DIFF(1+(J-1)*2.,I)

790 CONTINUE

C

C

DO 810 I=1,(NPOIN-NUMA),(NUMA+1)

DO 815 IROW=1,(NUMA+1)

X(IROW) = 2*A*(IROW - 1)

FX(IROW,1) = SL((I+(IROW-1))*5-3)

815 CONTINUE

M = NUMA+1

DO 820 ICOL=2,NUMA+1

M = M-1

DO 825 IROW=1,M

FX(IROW,ICOL) = FX(IROW+1,ICOL-1)-FX(IROW,ICOL-1)

FX(IROW,ICOL) = FX(IROW,ICOL)/X(IROW+ICOL-1)-X(IROW)

825 CONTINUE

820 CONTINUE

NO = 2.*NUMA+1

H = AT/(NO-1)

XX = 0.

DO 830 K=1,NO

FF = FX(1,1)

FAC = 1.

DO 835 I1=2,(NUMA+1)

FAC = FAC*(XX-X(I1-1))

FF = FF+FX(1,I1)*FAC

835 CONTINUE


```

FXD(K) = FF
XX = XX + H
830 CONTINUE
DIFF(1,I) = (-FXD(3)+4*FXD(2)-3*FXD(1))/2./H
DIFF(2,I) = (-FXD(4)+4*FXD(3)-3*FXD(2))/2./H
DO 840 I2=3,NO-2
DIFF(I2,I) = (-FXD(I2+2)+8*FXD(I2+1)-8*FXD(I2-1)+FXD(I2-2))
*(12.*H)
840 CONTINUE
DIFF(NO-1,I) = (3*FXD(NO-1)-4*FXD(NO-2)+FXD(NO-3))/2./H
DIFF(NO,I) = (3*FXD(NO)-4*FXD(NO-1)+FXD(NO-2))/2./H
810 CONTINUE
C
C
DO 845 I=1,(NPOIN-NUMA),(NUMA+1)
DO 845 J=1,NUMA+1
VX(I+(J-1)) = DIFF(1+(J-1)*2.,I)
845 CONTINUE
C
C FIND Mxx Myy Mxy Nxx Nyx Nxy
C
DO 855 I=1,NPOIN
XXM(I) = -1./PLOAD/(12*(1-R**2))*(1./SIZE*WXXM(I)+R*SIZE*WYYM(I))
YYM(I) = -1./PLOAD/(12*(1-R**2))*(SIZE*WYYM(I)+R*1./SIZE*WXXM(I))
XYM(I) = -1./PLOAD*(1-R)/(12*(1-R**2))*WXY(I)
855 CONTINUE
C
DO 860 I=1,NPOIN
XXN(I) = UX(I)+R*VY(I)
YYN(I) = VY(I)+R*UX(I)
XYN(I) = (1-R)/2*(SIZE*UY(I)+1./SIZE*VX(I)-2.*RISE*W(I))
860 CONTINUE
C
C PREPARE DATA FILE FOR DISPLAY PROGRAM
C
K=0
DO 865 I=1,NUMA*NUMB
DO 870 J=0,1
K=K+1
INTMAT(1,K) = NA(I,1)
INTMAT(2,K) = NA(I,2+J)
INTMAT(3,K) = NA(I,3+J)
870 CONTINUE
865 CONTINUE

```

C

```

XX=0.
YY=0.
DO 875 I=1,NPOIN-NUMA,NUMA+1
DO 880 J=0,NUMA
  XY(1,I+J) = XX
  XY(2,I+J) = YY
  XX = XX + 2.*A
880 CONTINUE
  XX = 0.
  YY = YY + 2.*B
875 CONTINUE

```

C

C

```

WRITE(8,*) 'NUMA NUMB AT NPOIN NELEM NVAR'
WRITE(8,*) NUMA,NUMB,AT,NPOIN,2*(NUMA*NUMB),' 7'
WRITE(8,*) 'NODAL COORDINATES & SOLUTIONS'
WRITE(8,*) '  NODE XCOORD YCOORD w(h/AB) Nxx
* Nyy Nxy Mxx Myy Mxy '
DO 885 IA=1,NPOIN
  WRITE(8,*) IA,XY(1,IA),XY(2,IA),W(IA),XXN(IA),YYN(IA),
* XYN(IA),XXM(IA),YYM(IA),XYM(IA)
885 CONTINUE
  WRITE(8,*) 'ELEMENT NODAL CONNECTION'
DO 890 I=1,2*(NUMA*NUMB)
  WRITE(8,*) I,INTMAT(1,I),INTMAT(2,I),INTMAT(3,I)
890 CONTINUE

```

C

```

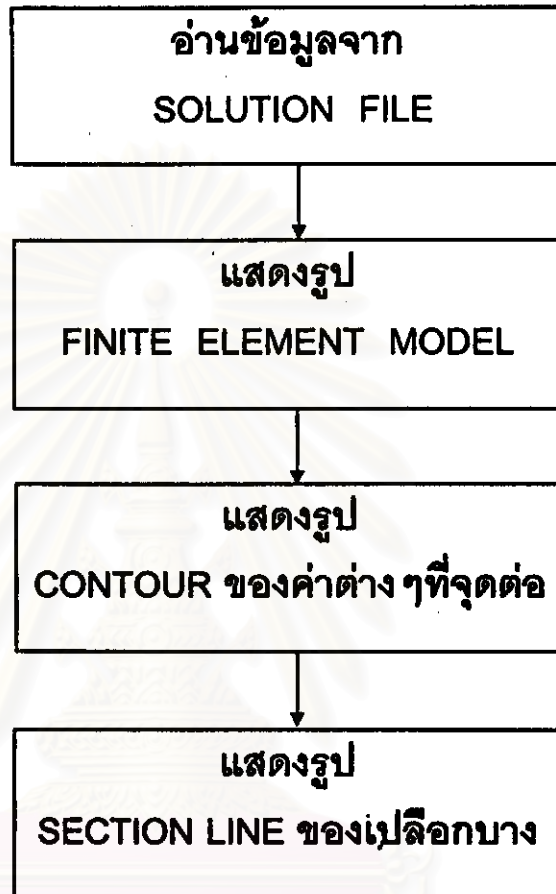
STOP
END

```

สถาบันวิทยบริการ
จุฬาลงกรณ์มหาวิทยาลัย

โปรแกรมแสดงผล FEPLLOT1

ขั้นตอนโดยรวมของโปรแกรมนี้คือ



C PROGRAM FEPLLOT

C

C A GRAPHIC PROGRAM FOR DISPLAYING FINITE ELEMENT MODELS AND
C SOLUTION CONTOURS ON PERSONAL COMPUTERS.

C DR. PRAMOTE DECHAUMPHAI

C FACULTY OF ENGINEERING

C CHULALONGKORN UNIVERSITY

INCLUDE 'FGRAPH.FI'

INCLUDE 'FGRAPH.FD'

C

C SET MAXIMUM NUMBERS OF NODES AND ELEMENTS:

C

PARAMETER (MXPOI=300, MXELE=800)

DIMENSION XY(2,MXPOI), SOL(7,MXPOI), TEXT(20)

DIMENSION INTMAT(3,MXELE), ISIDE(2,3*MXELE)

```

DIMENSION LA(MXPOI), LB(MXPOI), LC(3*MXELE)
COMMON X(80),FXPLOT(80,80),FFPLOT(80),NUM,NUMA,NUMB,AT
CHARACTER*25 NAME
C
C
INTEGER*2 DUMMY
RECORD/VIDEOCONFIG/SCREEN
CALL GETVIDEOCONFIG(SCREEN)
DUMMY = SETVIDEOMODE($VRES16COLOR)
C
9 CALL CLEARSCREEN($GCLEARSCREEN)
WRITE(6,*) 'DISPLAY GRAPHIC RESULTS ?'
WRITE(6,*) '1.YES'
WRITE(6,*) '2.NO'
WRITE(*,*)
READ(5,*) CHOO
IF(CHOO.NE.1..AND.CHOO.NE.2.) GOTO 9
IF(CHOO.EQ.1.) GOTO 10
IF(CHOO.EQ.2.) STOP
10 WRITE(6,15)
15 FORMAT(/, ' PLEASE ENTER THE SOLUTION FILE NAME: ')
READ(5, '(A) ,ERR=10) NAME
OPEN(UNIT=1, FILE=NAME, STATUS='OLD',ERR=10)
C
READ(1,20) TEXT
20 FORMAT(20A4)
READ(1,*) NUMA,NUMB,AT,NPOIN, NELEM, NVAR
IF(NPOIN.GT.MXPOI) WRITE(6,30) NPOIN
30 FORMAT(' PLEASE INCREASE MXPOI TO', I6)
IF(NPOIN.GT.MXPOI) STOP
IF(NELEM.GT.MXELE) WRITE(6,35) NELEM
35 FORMAT(' PLEASE INCREASE MXELE TO', I6)
IF(NELEM.GT.MXELE) STOP
C WRITE(6,40) NVAR
C 40 FORMAT(/, ' TOTAL OF', I2, ' VARIABLE(S) FOR CONTOUR PLOT')
C
READ(1,20) TEXT
READ(1,20) TEXT
DO 50 I=1,NPOIN
READ(1,*) N, (XY(J,I), J=1,2), (SOL(K,I), K=1,NVAR)
IF(I.NE.N) WRITE(6,55) I
55 FORMAT(/, ' NODE NO.', I5, ' IN DATA FILE IS MISSING')
IF(I.NE.N) STOP
50 CONTINUE
READ(1,20) TEXT

```

```

DO 60 IE=1,NELEM
  READ(1,*) JE, (INTMAT(J,IE), J=1,3)
  IF(IE.NE.JE) WRITE(6,85) IE
65 FORMAT(/, 'ELEMENT NO.', I5, ' IN DATA FILE IS MISSING')
  IF(IE.NE.JE) STOP
60 CONTINUE

C
C   DETERMINE SIDES THAT REPRESENT ELEMENT EDGES:
C
  CALL SIDE(NELEM, NPOIN, INTMAT, ISIDE, LS, LA, LB, LC,
    *      MXPOI, MXELE
    )

C
C   DETERMINE MIN AND MAX COORDINATES FOR SCREEN PLOTTING:
C
  XXMIN = 1.E20
  YYMIN = XXMIN
  DO 70 IP=1,NPOIN
    IF(XY(1,IP).LT.XXMIN) XXMIN = XY(1,IP)
    IF(XY(2,IP).LT.YYMIN) YYMIN = XY(2,IP)
70 CONTINUE
  DO 75 IP=1,NPOIN
    XY(1,IP) = XY(1,IP) - XXMIN
    XY(2,IP) = XY(2,IP) - YYMIN
75 CONTINUE
  SCX = 0.
  SCY = 0.
  DO 80 IP=1,NPOIN
    IF(XY(1,IP).GT.SCX) SCX = XY(1,IP)
    IF(XY(2,IP).GT.SCY) SCY = XY(2,IP)
80 CONTINUE
  SC = SCX
  IF(SCY.GT.SC) SC = SCY
  DO 85 IP=1,NPOIN
    XY(1,IP) = XY(1,IP)/SC
    XY(2,IP) = XY(2,IP)/SC
85 CONTINUE
  XMIN = 0.
  YMIN = 0.
  XMAX = SCX/SC
  YMAX = SCY/SC
  DO 90 IP=1,NPOIN
    XY(1,IP) = XY(1,IP) - XMAX/2.
    XY(2,IP) = XY(2,IP) - YMAX/2.
90 CONTINUE
  CMIN = 0.
  CMAX = XMAX

```

```

IF(YMAX.GT.CMAX) CMAX = YMAX
XMIN =-CMAX/2.
YMIN = XMIN
XMAX = CMAX/2.
YMAX = XMAX

```

C

```

100 CONTINUE
101 CALL CLEARSCREEN($GCLEARSCREEN)
WRITE(6,110)
110 FORMAT(//,' PLEASE SELECT AN OPTION: ',/,
*      ' 1. DRAW FINITE ELEMENT MODEL',/,
*      ' 2. DRAW COLOR CONTOUR LINES ',/,
*      ' 3. QUIT ' )
READ(5,*) IOPT
IF(IOPT.NE.1.AND.IOPT.NE.2.AND.IOPT.NE.3) GOTO 101
IF(IOPT.EQ.3) GO TO 201
IF((IOPT.EQ.1).OR.(IOPT.EQ.2)) THEN
CALL DRAW(NELEM, NPOIN, XY, SOL, ISIDE, LS, IOPT,
*      MXPOI, MXELE, XMIN, XMAX, YMIN, YMAX, INTMAT)
CALL CLEARSCREEN($GCLEARSCREEN)
GO TO 100
ENDIF

```

```

201 CALL CLEARSCREEN($GCLEARSCREEN)
WRITE(*,*) ' DISPLAY GRAPHICS OF ANOTHER CASE? '
WRITE(*,*) '1.YES'
WRITE(*,*) '2.NO'
WRITE(*,*)
READ(5,*) CHO
IF(CHO.NE.1..AND.CHO.NE.2.) GOTO 201
IF(CHO.EQ.1.) THEN
CLOSE(UNIT=1,STATUS='KEEP')
GOTO 10
ENDIF
IF(CHO.EQ.2.) GOTO 200
200 DUMMY = SETVIDEOMODE($DEFAULTMODE)
STOP
END

```

C

C

C

```

SUBROUTINE CNTOUR(NELEM, INTMAT, XY, SOL, IVAR,
*      CONLIN, AMAX, AMIN, MXPOI, MXELE)

```

C

```

INCLUDE 'FGRAPH.FD'
DIMENSION XY(2,MXPOI), SOL(7,MXPOI)

```

```

DIMENSION INTMAT(3,MXELE), CONLIN(1000)
COMMON STR1
C
INTEGER*2 DUMMY, COLOR
CHARACTER*12 STR
C CHARACTER*2 STR1
CHARACTER*15 STR1
RECORD/WXYCOORD/WXY
RECORD/RCCOORD /CURPOS
C
DUMMY = SETTEXTCOLOR(13)
CALL SETTEXTPOSITION(8, 85, CURPOS)
CALL OUTTEXT('CONTOURS')
CALL SETTEXTPOSITION(4, 84, CURPOS)
IF (IVAR.EQ.1) WRITE(STR1,(A10)) ' w(h/AB) '
IF (IVAR.EQ.2) WRITE(STR1,(A10)) ' Nbx/K '
IF (IVAR.EQ.3) WRITE(STR1,(A10)) ' Nyy/K '
IF (IVAR.EQ.4) WRITE(STR1,(A10)) ' Nxy/K '
IF (IVAR.EQ.5) WRITE(STR1,(A10)) ' Mbx/(PAB)'
IF (IVAR.EQ.6) WRITE(STR1,(A10)) ' Myy/(PAB)'
IF (IVAR.EQ.7) WRITE(STR1,(A10)) ' Mxy/(PAB)'
CALL OUTTEXT(STR1)
DUMMY = SETTEXTCOLOR(15)
CALL SETTEXTPOSITION(11, 60, CURPOS)
CALL OUTTEXT('COLOR CONTOUR LEVELS')
CALL SETTEXTPOSITION(12, 60, CURPOS)
CALL OUTTEXT('_____')
CALL SETVIEWPORT(5, 5, 465, 465)
C
DO 1000 IE=1,NELEM
IP = INTMAT(1,IE)
RX = SOL(IVAR,IP)
R1 = RX
R3 = RX
IP1 = IP
IP3 = IP
IPX = INTMAT(2,IE)
IP = IP + IPX
RA = SOL(IVAR,IPX)
RX = RX + RA
IF(RA.LT.R1) THEN
IP1 = IPX
R1 = RA
ENDIF
IF(RA.GT.R3) THEN
IP3 = IPX

```

```

R3 = RA
ENDIF
IPX = INTMAT(3,IE)
IP = IP + IPX
RA = SOL(IVAR,IPX)
RX = RX + RA
IF(RA.LT.R1) THEN
  IP1 = IPX
  R1 = RA
ENDIF
IF(RA.GT.R3) THEN
  IP3 = IPX
  R3 = RA
ENDIF
ENDIF

```

C

```

IF(IP1.EQ.IP3) GO TO 1000
IP2 = IP - IP1 - IP3
R1 = SOL(IVAR,IP1)
R2 = SOL(IVAR,IP2)
R3 = SOL(IVAR,IP3)
XC1 = XY(1,IP1)
YC1 = XY(2,IP1)
XC2 = XY(1,IP2)
YC2 = XY(2,IP2)
XC3 = XY(1,IP3)
YC3 = XY(2,IP3)
X12 = XC2 - XC1
Y12 = YC2 - YC1
X23 = XC3 - XC2
Y23 = YC3 - YC2
X13 = XC3 - XC1
Y13 = YC3 - YC1
R12 = R2 - R1
R23 = R3 - R2
R13 = R3 - R1
TOL = 1.E-10
DO 500 IC=1,200
RC = CONLIN(IC)
IF((RC.LT.R1).OR.(RC.GT.R3)) GO TO 500
IF(ABS(R13).LT.TOL) GO TO 500
A2 = (RC - R1)/R13
X2 = XC1 + A2*X13
Y2 = YC1 + A2*Y13
IF(RC.LT.R2) THEN
  IF(ABS(R12).LT.TOL) GO TO 500
  A1 = (RC - R1)/R12

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      X1 = XC1 + A1*X12
      Y1 = YC1 + A1*Y12
ELSE
      IF(ABS(R23).LT.TOL) GO TO 500
      A1 = (RC - R2)/R23
      X1 = XC2 + A1*X23
      Y1 = YC2 + A1*Y23
ENDIF
DIFF = AMAX - AMIN
RC1 = RC - AMIN
RANGE = RC1/DIFF
RANGE = 13*RANGE
COLOR = INT2(RANGE) + 1
DUMMY = SETCOLOR(COLOR)
CALL MOVETO_W(X1, Y1, WXY)
DUMMY = LINETO_W(X2, Y2)
JJ = COLOR + 13
CALL SETTEXTPOSITION(JJ, 84, CURPOS)
DUMMY = SETTEXTCOLOR(COLOR)
WRITE(STR, '(E12.8)') RC
CALL OUTTEXT(STR)
500 CONTINUE
1000 CONTINUE
      RETURN
      END
C
C
C
      SUBROUTINE DRAW(NELEM, NPOIN, XY, SOL, ISIDE, LS, IOPT,
      *             MXPOI, MXELE, XMIN, XMAX, YMIN, YMAX, INTMAT)
C
C   DRAW FINITE ELEMENT MODEL AND SOLUTION COLOR CONTOUR LINES
C
C   INCLUDE 'FGRAPH.FD'
C
C   DIMENSION XY(2,MXPOI), SOL(7,MXPOI), CONLIN(1000)
C   DIMENSION INTMAT(3,MXELE), ISIDE(2,3*MXELE)
C   COMMON X(60),FXPLOT(60,60),FFPLOT(60),NUM,NUMA,NUMB,AT
C   COMMON A(60)
C   COMMON STR1
C
C   INTEGER*2 DUMMY
C   INTEGER*1 CH
C   CHARACTER*5 STR
C   CHARACTER*25 STR1
C   CHARACTER*8 STR2

```

```

CHARACTER*4 STR3
RECORD/RCCOORD /CURPOS
RECORD/WXYCOORD/WXY
CALL SETVIEWPORT(0, 0, 830, 470)
DUMMY = SETWINDOW(.TRUE., XMIN, YMIN, XMAX, YMAX)

C
C  DRAW FINITE ELEMENT MESH:
C
IF(IOPT.EQ.2) GO TO 100
CALL CLEARSCREEN($GCLEARSCREEN)
DUMMY = SETTEXTCOLOR(13)
CALL SETTEXTPOSITION(4, 68, CURPOS)
CALL OUTTEXT(' F I N I T E ')
CALL SETTEXTPOSITION(6, 68, CURPOS)
CALL OUTTEXT('E L E M E N T')
CALL SETTEXTPOSITION(8, 68, CURPOS)
CALL OUTTEXT(' M O D E L')
CALL SETTEXTPOSITION(10, 68, CURPOS)
CALL OUTTEXT(' HYPERBOLIC')
CALL SETTEXTPOSITION(12, 61, CURPOS)
CALL OUTTEXT(' PARABOLOIDAL SHELL')
CALL SETTEXTPOSITION(14, 64, CURPOS)
CALL OUTTEXT('_____')
DUMMY = SETTEXTCOLOR(10)
CALL SETTEXTPOSITION(19, 64, CURPOS)
CALL OUTTEXT('MODEL CONSISTS OF')
CALL SETTEXTPOSITION(21, 63, CURPOS)
WRITE(STR, '(I5)') NPOIN
CALL OUTTEXT(STR // ' NODES')
CALL SETTEXTPOSITION(23, 63, CURPOS)
WRITE(STR, '(I5)') NELEM
CALL OUTTEXT(STR // ' TRIANGLES ')
CALL SETVIEWPORT(40, 40, 440, 440)
DO 10 IS=1,LS
N1 = ISIDE(1,IS)
N2 = ISIDE(2,IS)
X1 = XY(1,N1)
Y1 = XY(2,N1)
X2 = XY(1,N2)
Y2 = XY(2,N2)
C  MESH IN BRIGHT YELLOW:
DUMMY = SETCOLOR(15)
CALL MOVETO_W(X1, Y1, WXY)
DUMMY = LINETO_W(X2, Y2)
10 CONTINUE
DELTA1 = 400./NUMA

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```

DELTA2 = 400./NUMB
DO I=1,NUMA+1
  CALL SETTEXTPOSITION(29,(I-1)*DELTA1/8.+4,CURPOS)
  WRITE(STR3,'(I3)') (I-1)
  CALL OUTTEXT(STR3)
END DO
DO I=1,NUMB+1
  CALL SETTEXTPOSITION((I-1)*DELTA2/16.+3,2,CURPOS)
  WRITE(STR3,'(I3)') (NUMB+1-I)
  CALL OUTTEXT(STR3)
END DO
C  WAIT FOR 'ENTER' KEY TO BE PRESSED:
  READ(*,*)
  GO TO 1000
100 CONTINUE
C
C  DRAW COLOR CONTOUR LINES:
C
  CALL CLEARSCREEN($GCLEARSCREEN)
  WRITE(6,*) ' NO.  VARIABLE'
  WRITE(6,*) ' 1  w/(VAB)  '
  WRITE(6,*) ' 2  Nxx/K   '
  WRITE(6,*) ' 3  Nyy/K   '
  WRITE(6,*) ' 4  Nxy/K   '
  WRITE(6,*) ' 5  Mxx/(PAB) '
  WRITE(6,*) ' 6  Myy/(PAB) '
  WRITE(6,*) ' 7  Mxy/(PAB) '
  WRITE(6,110)
110 FORMAT(//,' PLEASE ENTER THE VARIABLE NUMBER FOR CONTOUR PLOT,
*      /,' (OR ENTER ZERO TO QUIT)
      )
  READ(5,*) IVAR
  IF(IVAR.EQ.0) GO TO 1000
  IF(IVAR.GT.7) GO TO 100
  AMIN = 1.E+20
  AMAX = -AMIN
  DO 120 IP=1,NPOIN
    IF(SOL(IVAR,IP).LT.AMIN) AMIN = SOL(IVAR,IP)
    IF(SOL(IVAR,IP).GT.AMAX) AMAX = SOL(IVAR,IP)
120 CONTINUE
  DO 150 IC=1,50
    CONLIN(IC) = AMIN + (IC-1)*(AMAX-AMIN)/50.
150 CONTINUE
C
  CALL CLEARSCREEN($GCLEARSCREEN)
  DUMMY = SETWINDOW(.TRUE., XMIN, YMIN, XMAX, YMAX)
C

```

```

CALL CNTOUR(NELEM, INTMAT, XY, SOL, IVAR,
*      CONLIN, AMAX, AMIN, MXPOI, MXELE)
C
C SUPERIMPOSED BY MESH IN BRIGHT WHITE:
C
DO 200 IS=1,L8
N1 = ISIDE(1,IS)
N2 = ISIDE(2,IS)
X1 = XY(1,N1)
Y1 = XY(2,N1)
X2 = XY(1,N2)
Y2 = XY(2,N2)
DUMMY = SETCOLOR(15)
CALL MOVETO_W(X1, Y1, WXY)
DUMMY = LINETO_W(X2, Y2)
200 CONTINUE
C WAIT FOR 'ENTER' KEY TO BE PRESSED:
READ(*,*)
201 CALL CLEARSCREEN($GCLEARSCREEN)
1010 WRITE(8,*) 'PLEASE SELECT THE DIRECTION OF SECTION LINE'
WRITE(8,*) ' 1. X DIRECTION '
WRITE(8,*) ' 2. Y DIRECTION '
WRITE(8,*) ' 3. QUIT '
READ(5,*) CH
IF(CH.NE.1..AND.CH.NE.2..AND.CH.NE.3.) GOTO 201
IF (CH.EQ.3) GOTO 1050
IF (CH.EQ.1) THEN
111 WRITE(8,1) NUMB
1 FORMAT(' PLEASE ENTER POINT OF Y/B CONSTANT 0 -.I3, '(SEE FROM FI
*NITE ELEMENT MODEL))
READ(5,*) PS
IF(PS.GT.NUMB.OR.PS.LT.0) GOTO 111
NUM = NUMA + 1
DO 1025 J=1,NUMA+1
A(J) = SOL(IVAR,PS*(NUMA+1)+J)
X(J) = XY(1,PS*(NUMA+1)+J)
FXPLOT(J,1) = A(J)
1025 CONTINUE
GOTO 1015
ENDIF
IF (CH.EQ.2) THEN
126 WRITE(8,2) NUMA
2 FORMAT(' PLEASE ENTER POINT OF X/A CONSTANT 0 -.I3, '(SEE FROM FI
*NITE ELEMENT MODEL))
READ(5,*) PS
IF(PS.GT.NUMA.OR.PS.LT.0) GOTO 126

```

```

NUM = NUMB + 1
DO 1020 I=1,NUMB+1
  A(I) = SOL(IVAR,PS+(I-1)*(NUMA+1)+1)
  X(I) = XY(2,PS+(I-1)*(NUMA+1)+1)
  FXPLOT(I,1) = A(I)
1020 CONTINUE
  GOTO 1015
ENDIF
GOTO 1010
1015 CONTINUE
  M = NUM
  DO 1030 ICOL = 2, NUM
    M = M - 1
    DO 1035 IROW = 1, M
      FXPLOT(IROW,ICOL) = FXPLOT(IROW+1,ICOL-1)-FXPLOT(IROW,ICOL-1)
      FXPLOT(IROW,ICOL) = FXPLOT(IROW,ICOL)/(X(IROW+ICOL-1)-X(IROW))
1035 CONTINUE
1030 CONTINUE
  IF(CH.EQ.1) THEN
    IF (IVAR.EQ.1) WRITE(6,*) ' X/A          w(h/VAB) '
    IF (IVAR.EQ.2) WRITE(6,*) ' X/A          Nxx/K '
    IF (IVAR.EQ.3) WRITE(6,*) ' X/A          Nyy/K '
    IF (IVAR.EQ.4) WRITE(6,*) ' X/A          Nxy/K '
    IF (IVAR.EQ.5) WRITE(6,*) ' X/A          Mxx/PAB '
    IF (IVAR.EQ.6) WRITE(6,*) ' X/A          Myy/PAB '
    IF (IVAR.EQ.7) WRITE(6,*) ' X/A          Mxy/PAB '
  ENDIF
  IF(CH.EQ.2) THEN
    IF (IVAR.EQ.1) WRITE(6,*) ' Y/B          w(h/VAB) '
    IF (IVAR.EQ.2) WRITE(6,*) ' Y/B          Nxx/K '
    IF (IVAR.EQ.3) WRITE(6,*) ' Y/B          Nyy/K '
    IF (IVAR.EQ.4) WRITE(6,*) ' Y/B          Nxy/K '
    IF (IVAR.EQ.5) WRITE(6,*) ' Y/B          Mxx/PAB '
    IF (IVAR.EQ.6) WRITE(6,*) ' Y/B          Myy/PAB '
    IF (IVAR.EQ.7) WRITE(6,*) ' Y/B          Mxy/PAB '
  ENDIF
C
  XPLOT = -0.5
  DO 1040 I= 1, 21
    FFPLLOT(I) = FXPLOT(1,1)
    FAC = 1.
    DO 1045 J= 2, NUM
      FAC = FAC*(XPLOT - X(J-1))
      FFPLLOT(I) = FFPLLOT(I) + FXPLOT(1,J)*FAC
1045 CONTINUE
    WRITE(6,*) (XPLOT+0.5)*AT,FFPLLOT(I)

```

```

XPLOT = XPLOT + 1./20.
1040 CONTINUE
1055 READ(*,*)
DELTA = (AMAX-AMIN)/20.
CALL CLEARSCREEN($GCLEARSCREEN)
CALL SETVIEWPORT( 80, 80, 480, 400 )
DUMMY = SETWINDOW(TRUE,,-0.5,AMIN-DELTA,0.5,AMAX+DELTA)
XPLOT = -0.5
DO I = 1, 20
DUMMY = SETCOLOR(2)
CALL MOVETO_W(XPLOT, AMIN , WXY)
DUMMY = LINETO_W( XPLOT, AMAX)
CALL MOVETO_W(-0.5,AMIN+DELTA*(I-1), WXY)
DUMMY = LINETO_W(0.5,AMIN+DELTA*(I-1))
DUMMY = SETCOLOR(12)
CALL MOVETO_W(XPLOT, FFLOT(I), WXY)
DUMMY = LINETO_W(XPLOT+1./20., FFLOT(I+1))
XPLOT = XPLOT + 1./20.
END DO
DUMMY = SETTEXTCOLOR(13)
IF((ABS(AMAX).LT.(0.001)).AND.(ABS(AMIN).LT.(0.001))) THEN
MUL=1000
ELSE
MUL=1
ENDIF
DO I = 1, 5
DUMMY = SETCOLOR(15)
CALL MOVETO_W(-0.5,AMIN+DELTA*(I-1)*5, WXY)
DUMMY = LINETO_W(0.5,AMIN+DELTA*(I-1)*5)
CALL SETTEXTPOSITION(7+4.5*(I-1), 2, CURPOS)
T1 = (AMAX-DELTA*(I-1)*5)*MUL
WRITE(STR2,(F8.4)) T1
CALL OUTTEXT( STR2 )
END DO
XPLOT = -0.5
DO I = 1, 8
DUMMY = SETCOLOR(15)
CALL MOVETO_W(XPLOT+(I-1)*4./20., AMIN, WXY)
DUMMY = LINETO_W(XPLOT+(I-1)*4./20., AMAX)
CALL SETTEXTPOSITION(28, 10+10*(I-1), CURPOS)
T2 = (I-1)*0.2*AT
WRITE(STR3,(F3.1)) T2
CALL OUTTEXT( STR3 )
END DO
DUMMY = SETCOLOR(15)
DUMMY = RECTANGLE_W($GBORDER,-0.5,AMIN,0.5,AMAX)

```

```

IF(((AMAX+DELTA).GT.0).AND.((AMIN-DELTA).LT.0)) THEN
  DUMMY = SETCOLOR(9)
  CALL MOVETO_W(-0.5, 0, WXY)
  DUMMY = LINETO_W(0.5, 0)
ENDIF
DUMMY = SETTEXTCOLOR(13)
CALL SETTEXTPOSITION(4, 55, CURPOS)
CALL OUTTEXT('SECTION')
CALL SETTEXTPOSITION(4, 64, CURPOS)
IF (CH.EQ.1) WRITE(STR3,(A4)) 'Y/B='
IF (CH.EQ.2) WRITE(STR3,(A4)) 'X/A='
CALL OUTTEXT(STR3)
AA = PS/(NUM-1)*AT
CALL SETTEXTPOSITION(4, 68, CURPOS)
WRITE(STR,(F5.3)) AA
CALL OUTTEXT(STR)
CALL SETTEXTPOSITION(28, 70, CURPOS)
IF (CH.EQ.1) WRITE(STR3,(A4)) 'X/A '
IF (CH.EQ.2) WRITE(STR3,(A4)) 'Y/B '
CALL OUTTEXT(STR3)
CALL SETTEXTPOSITION(4, 3, CURPOS)
IF(ABS(AMAX).LT.0.001.AND.ABS(AMIN).LT.0.001) THEN
  IF (IVAR.EQ.1) WRITE(STR1,(A20)) ' w(t/AB) x1000 '
  IF (IVAR.EQ.2) WRITE(STR1,(A20)) ' Nxx/K x1000 '
  IF (IVAR.EQ.3) WRITE(STR1,(A20)) ' Nyy/K x1000 '
  IF (IVAR.EQ.4) WRITE(STR1,(A20)) ' Nxy/K x1000 '
  IF (IVAR.EQ.5) WRITE(STR1,(A20)) ' Mxx/PAB x1000 '
  IF (IVAR.EQ.6) WRITE(STR1,(A20)) ' Myy/PAB x1000 '
  IF (IVAR.EQ.7) WRITE(STR1,(A20)) ' Mxy/PAB x1000 '
ELSE
  IF (IVAR.EQ.1) WRITE(STR1,(A10)) ' w(t/AB) '
  IF (IVAR.EQ.2) WRITE(STR1,(A10)) ' Nxx/K '
  IF (IVAR.EQ.3) WRITE(STR1,(A10)) ' Nyy/K '
  IF (IVAR.EQ.4) WRITE(STR1,(A10)) ' Nxy/K '
  IF (IVAR.EQ.5) WRITE(STR1,(A10)) ' Mxx/PAB '
  IF (IVAR.EQ.6) WRITE(STR1,(A10)) ' Myy/PAB '
  IF (IVAR.EQ.7) WRITE(STR1,(A10)) ' Mxy/PAB '
ENDIF
CALL OUTTEXT(STR1)
READ(,"")
CALL CLEARSCREEN($GCLEARSCREEN)
GO TO 1010
1050 GO TO 100
1000 CONTINUE
RETURN
END

```

```

C
C-----
C
SUBROUTINE SIDE(NELEM, NPOIN, INTMAT, ISIDE, LS, LA, LB, LC,
*             MXPOI, MXELE )
C
C DETERMINE THE TWO NODE NUMBERS OF AN ELEMENT SIDE
C
DIMENSION INTMAT(3,MXELE), ISIDE(2,3*MXELE)
DIMENSION LA(MXPOI), LB(MXPOI), LC(3*MXELE)
C
DO 10 IP=1,NPOIN
  LB(IP) = 0
10 CONTINUE
DO 20 IE=1,NELEM
  DO 20 IN=1,3
    IP = INTMAT(IN,IE)
    LB(IP) = LB(IP) + 1
20 CONTINUE
  LA(1) = 0
  DO 30 IP=2,NPOIN
    LA(IP) = LA(IP-1) + LB(IP-1)
30 CONTINUE
  DO 40 IP=1,NPOIN
    LB(IP) = 0
40 CONTINUE
  DO 50 IE=1,NELEM
    DO 50 IN=1,3
      IP = INTMAT(IN,IE)
      LB(IP) = LB(IP) + 1
      JJ = LA(IP) + LB(IP)
      LC(JJ) = IE
50 CONTINUE
C
  LS = 0
  DO 100 IP=1,NPOIN
    LI = LS
    IELE = LB(IP)
    IF(IELE.EQ.0) GO TO 100
    IA = LA(IP)
    IP1 = IP
    DO 120 IEL=1,IELE
      IE = LC(IA+IEL)
    DO 130 IN=1,3
      IN1 = IN
      IPT = INTMAT(IN,IE)

```



```
IF(IPT.EQ.IP) GO TO 140
130 CONTINUE
140 CONTINUE
DO 150 J=1,2
  IN2 = IN1 + J
  IF(IN2.GT.3) IN2 = IN2 - 3
  IP2 = INTMAT(IN2,IE)
  IF(IP2.LT.IP1) GO TO 150
  IF(LS .EQ.LI) GO TO 170
DO 160 IS=LI+1,LS
  JJ = IS
  IF(ISIDE(2,IS),EQ.IP2) GO TO 190
160 CONTINUE
170 CONTINUE
  LS = LS + 1
  ISIDE(1,LS) = IP1
  ISIDE(2,LS) = IP2
190 CONTINUE
150 CONTINUE
120 CONTINUE
100 CONTINUE
  RETURN
  END
C
C _____
C
```

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ภาคผนวก ข.

รายละเอียดและวิธีการใช้โปรแกรมสำเร็จรูป

รายละเอียดของโปรแกรมสำเร็จรูปประกอบด้วย 2 ส่วนคือ โปรแกรมคำนวณผล และ โปรแกรมแสดงผล ซึ่งจะเชื่อมด้วยคำสั่งของ DOS (Disk Operating System) โดยการเขียน Batch File ซึ่งมีรายละเอียดดังต่อไปนี้

```
@ECHO OFF
FACE
MD SOLUTION
CLS
ECHO *****
ECHO PLEASE LABEL DATA FILE NAME IN FORMAT D*.DAT
ECHO PLEASE LABEL SOLUTION FILE NAME IN FORMAT S*.DAT
ECHO *****
PAUSE
CLS
:SET
EDIT DATA.DAT
ECHO *****
ECHO *** LIST OF DATA FILE ***
ECHO *****
DIR D*.DAT
PAUSE
CLS
AOD4421
CLS
ECHO *****
ECHO *** LIST OF SOLUTION FILE ***
ECHO *****
DIR S*.DAT
PAUSE
FEPLOT1
```

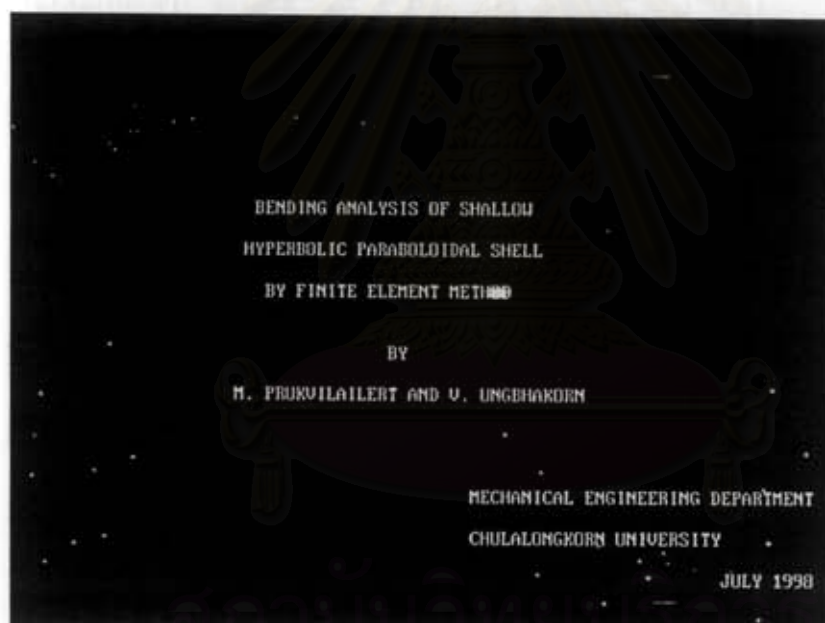
```

MODE CO80
ECHO *****
ECHO *** PRESS "CTRL-BREAK" TO QUIT ***
ECHO *** OR TO RUN ANOTHER CASE BY ***
PAUSE
CLS
GOTO SET

```

โดยโปรแกรมสำเร็จรูปจะมีลำดับขั้นตอนการทำงานตามลำดับดังนี้

ขั้นตอนที่ 1 เริ่มด้วยการ Run โปรแกรม Face.exe แสดงถึง ชื่อโปรแกรม และคณะผู้วิจัย ดังรูป



ขั้นตอนที่ 2 จากนั้นจึงให้ผู้ใช้ตั้งชื่อไฟล์ที่ใช้เก็บข้อมูลป้อนเข้า (Data File) ในรูปแบบ D*.DAT และข้อมูลผลลัพธ์ (Solution File) ในรูปแบบ S*.DAT โดยชื่อต้นสามารถยาวได้จำนวน 8 อักขระ ดังรูป



ขั้นตอนที่ 3 เข้าคำสั่ง Edit ของ DOS เพื่อป้อนข้อมูลเข้า Data File ดังรูป

HYPAR SHELL SUBJECT TO UNIFORM VERTICAL LOAD
WITH VARIOUS EDGED CONDITIONS.

PLEASE INPUT DATA

NUMX : : UMY
12 12


RISE SIZE LOAD RATIO POIS
5.0 1.0 1. 1. 0.3

E1 E2 E3 E4
S S S S

* README BEFORE INPUT DATA *

1. WANT TO CHANGE VALUES OF VARIABLE. TYPE IT AT THE SAME PLACE.
2. NUMX IS NUMBER OF ELEMENTS AT THE EDGE ALONG X DIRECTION.
3. NUMY IS NUMBER OF ELEMENTS AT THE EDGE ALONG Y DIRECTION.
4. RISE RATIO IS f/h , f IS RISE OF HYPAR AND h IS THICKNESS OF SHELL.
5. SIZE RATIO IS A/B , A IS LENGTH IN X DIRECTION OF SHELL,
B IS LENGTH IN Y DIRECTION OF SHELL.
6. LOAD IS PAB/Eh^2 , P IS VERTICAL UNIFORM LOAD,
E IS YOUNG'S MODULUS.
7. RATIO IS (LENGTH IN X DIRECTION OF SHELL)/A OR
(LENGTH IN Y DIRECTION OF SHELL)/B (USUALLY EQUAL ONE)
8. POIS IS POISSON'S RATIO.
9. E1...E4 ARE EDGE CONDITION :TYPE S FOR SIMPLY-SUPPORTED
TYPE C FOR CLAMPED
TYPE F FOR FREE

E4



E1 E3

E2

ขั้นตอนที่ 4 แสดงรายชื่อของ Data File ทั้งหมด ดังรูป

```

*****
*** LIST OF DATA FILE ***
*****

Volume in drive C has no label
Volume Serial Number is 28 1B-1ED5

Directory of C:\AOD

DATA  DAT      1,563 06-22-98 12:55p DATA.DAT
      1 file(s)  1,563 bytes
      0 dir(s)  25,722,880 bytes free

Press any key to continue . . .

```

ขั้นตอนที่ 5 ให้ป้อนชื่อของ Data File ที่ต้องการคำนวณ ดังรูป

```

PLEASE ENTER THE INPUT DATA FILE NAME USING FORMAT  D*.DAT:
DATA.DAT

```

ขั้นตอนที่ 6 มีคำสั่งให้เลือก 2 อย่าง คือ 1.ให้โปรแกรมทำการคำนวณ 2.ไม่ต้องคำนวณ เลือกโดยการพิมพ์ ตัวเลข 1. หรือ 2. เท่านั้น

```

DO YOU WANT TO RUN PROGRAM?(only type number)
1.YES
2.NO

```

ขั้นตอนที่ 7 ถ้าเลือกข้อ 1. โปรแกรมจะให้ป้อนชื่อ Solution File ถ้าเป็นไฟล์ใหม่ โปรแกรมเริ่มทำการคำนวณ

```
PLEASE ENTER THE NEW SOLUTION FILE NAME USING FORMAT S*.DAT:
```

```
SOLU1.DAT
```

```
PROGRAM IS RUNNING
```

ขั้นตอนที่ 8 ถ้าเป็นไฟล์ที่มีอยู่แล้วโปรแกรมจะถามว่าจะให้เขียนทับหรือไม่ มีตัวเลือก 2 ข้อ

```
THIS FILE NAME ALREADY EXISTS
```

```
REPLACE?
```

```
1.YES
```

```
2.NO
```

ขั้นตอนที่ 9 แสดงรายชื่อของ Solution File ทั้งหมด ดังรูป

```
*** LIST OF SOLUTION FILE ***
```

```
Volume in drive D has no label
```

```
Volume Serial Number is 3E5B-0CDF
```

```
Directory of D:\graduated\Aod
```

```
SOLU1  DAT      39,863  07-14-98 12:29p SOLU1.DAT
```

```
1 file(s)      39,863 bytes
```

```
0 dir(s)      334,577,664 bytes free
```

```
Press any key to continue . . .
```

ขั้นตอนที่ 10 เมื่อโปรแกรมคำนวณเสร็จจึงเริ่มเข้าสู่โปรแกรมแสดงผล โดยมีตัวเลือก 2 ข้อ ว่า ต้องการแสดงผล หรือไม่ต้องการ ซึ่งจากขั้นตอนที่ 6 ถ้าเลือกข้อ 2. ก็จะข้ามเข้าสู่ขั้นตอนนี้ทันที จากขั้นตอนนี้ได้เลือก 1. โปรแกรมจะให้ป้อนชื่อของ Solution File ที่ต้องการแสดงผล

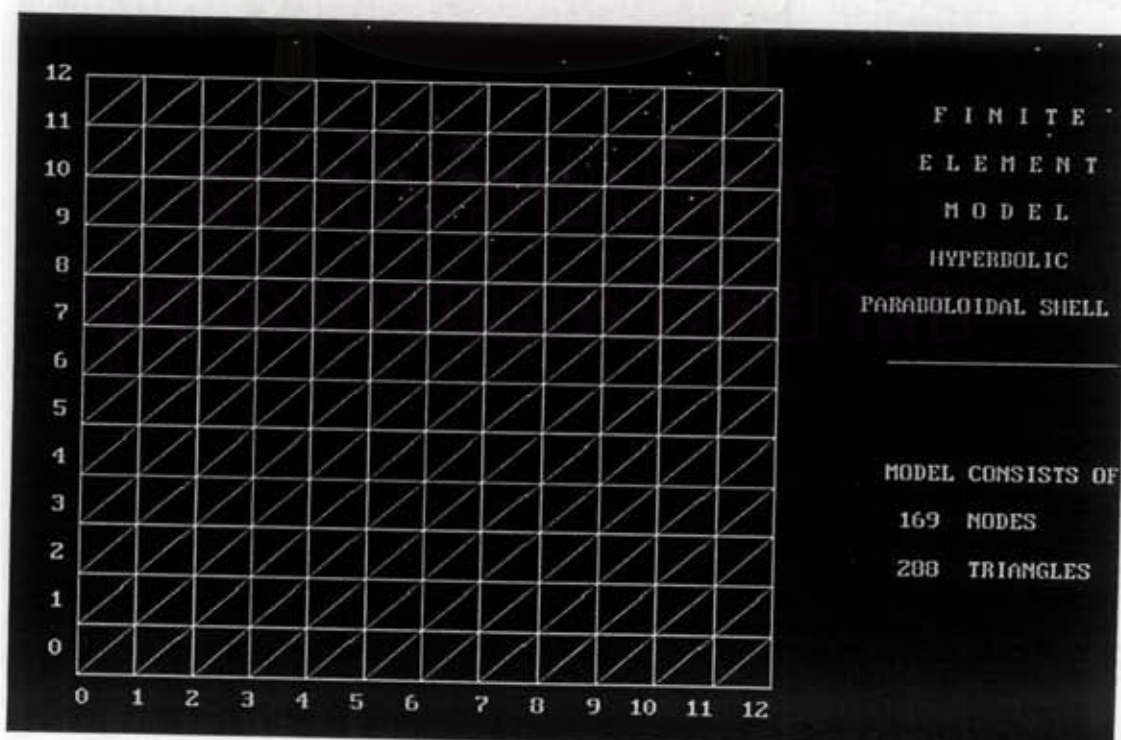


ขั้นตอนที่ 11 เข้าสู่โปรแกรมแสดงผล มีตัวเลือก 3 ข้อ ดังนี้

```

PLEASE SELECT AN OPTION:
1. DRAW FINITE ELEMENT MODEL
2. DRAW COLOR CONTOUR LINES
3. QUIT
  
```

ขั้นตอนที่ 11.1 แสดงเปลือกที่ถูกแบ่งเป็นเอลิเมนต์ ดังรูป



ขั้นตอนที่ 11.2 แสดง contour lines ของค่าต่างๆ ซึ่งมีให้เลือก 7 ค่า

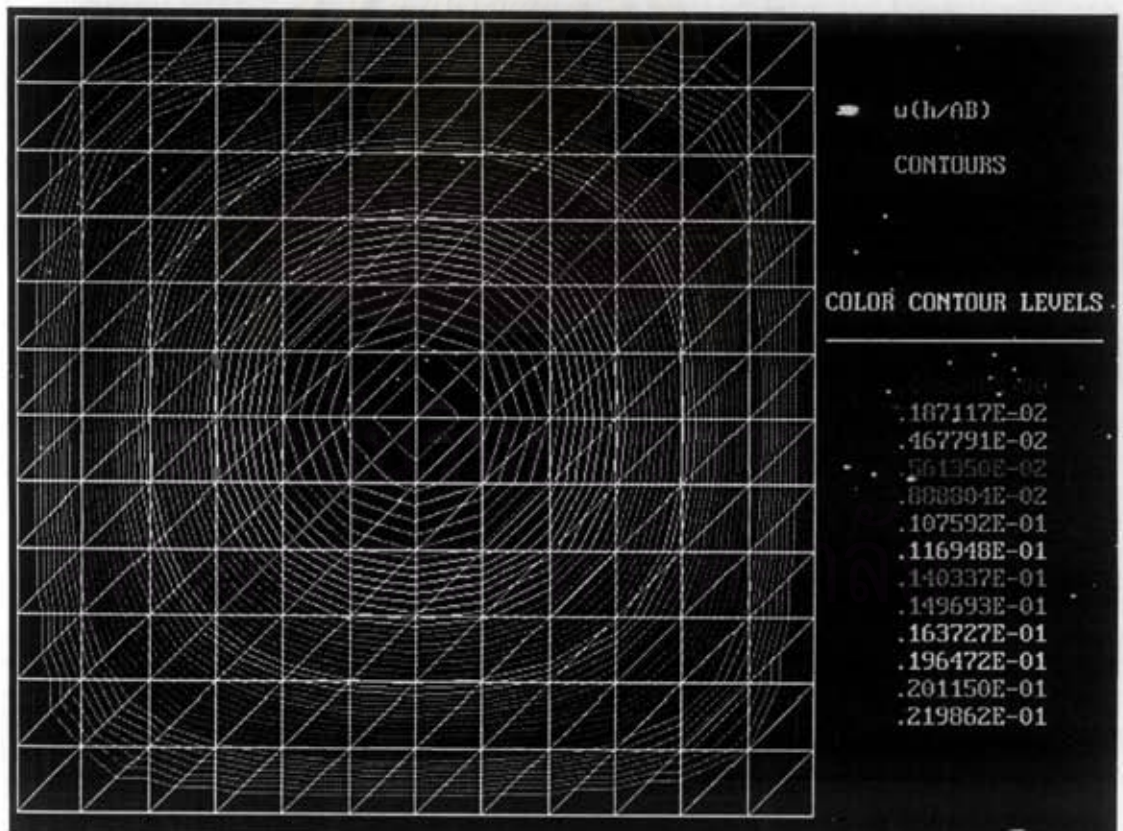
```

NO.    VARIABLE
1      u(h/AB)
2      Nxx/K
3      Nyy/K
4      Nxy/K
5      Mxx/(PAB)
6      Myy/(PAB)
7      Mxy/(PAB)

PLEASE ENTER THE VARIABLE NUMBER FOR CONTOUR PLOT
(OOR ENTER ZERO TO QUIT)

```

ขั้นตอนที่ 11.2.1 ยกตัวอย่างถ้าเลือกแสดงข้อ 1. คือค่า $w(h/AB)$ จะได้ดังรูป แต่ถ้าเลือก 0 โปรแกรมจะกลับไปขั้นตอนที่ 11



ขั้นตอนที่ 11.2.2 จะแสดง Section lines เริ่มต้นโดยเลือกทิศทางการตัด จากนั้นจึงเลือกตำแหน่งที่จะตัด เช่นในตัวอย่างนี้ เลือกตัดที่ทิศทางขนานกับแกน x ที่ตำแหน่ง Y/B ที่ 6 (ดูจาก Finite element model) จากนั้นโปรแกรมจะแสดงค่าของ X/A และ $w(h/AB)$ ถ้าต้องการข้ามขั้นตอนนี้ไปเลือก 3 แล้วโปรแกรมจะเข้าสู่ขั้นตอนที่ 11.2 อีกครั้ง

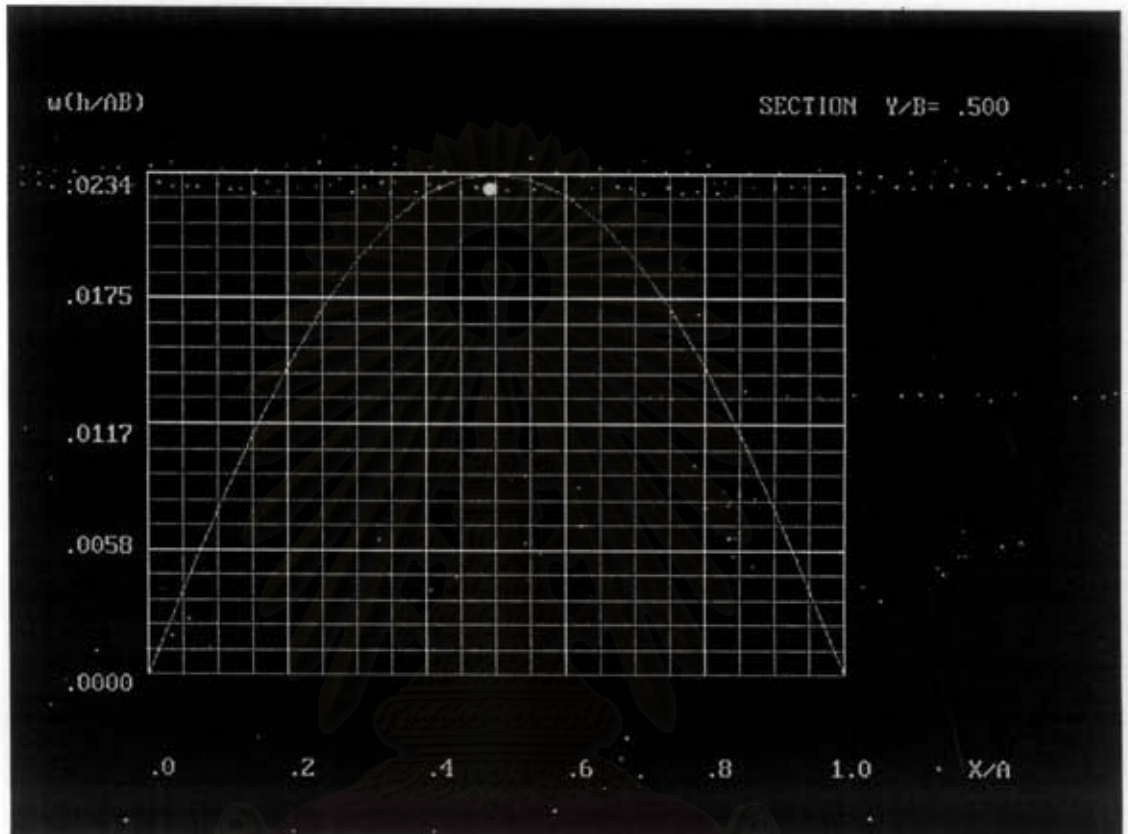
```
PLEASE SELECT THE DIRECTION OF SECTION LINE.
1. X DIRECTION
2. Y DIRECTION
3. QUIT
1
PLEASE ENTER POINT OF Y/B CONSTANT 0 - 12(SEE FROM FINITE ELEMENT MODEL)
6

```

X/A	w(h/AB)
0.000000E+00	0.000000E+00
5.000001E-02	3.942916E-03
1.000000E-01	7.727808E-03
1.500000E-01	1.123410E-02
2.000000E-01	1.437465E-02
2.500001E-01	1.708996E-02
3.000000E-01	1.934179E-02
3.500000E-01	2.110724E-02
4.000000E-01	2.237380E-02
4.500000E-01	2.313540E-02
5.000001E-01	2.338957E-02
5.500000E-01	2.313568E-02
6.000000E-01	2.237434E-02
6.500000E-01	2.110803E-02
7.000000E-01	1.934274E-02
7.500000E-01	1.709100E-02
8.000001E-01	1.437570E-02
8.500000E-01	1.123508E-02
9.000001E-01	7.728583E-03
9.500000E-01	3.943298E-03
1.000000	-4.356287E-03

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ขั้นตอนที่ 11.2.3 แสดง Section line ของค่า $w(h/AB)$ ที่ตำแหน่ง $Y/B = 0.5$



ขั้นตอนที่ 12 จากขั้นตอนที่ 11 ถ้าเลือกข้อ 3 โปรแกรมจะออกจากการแสดงผลของไฟล์ผลลัพธ์ Solu1.dat จากนั้นโปรแกรมจะให้เลือกว่าต้องการแสดงผลของไฟล์ผลลัพธ์ตัวอื่นหรือไม่ ถ้าเลือก 1. โปรแกรมจะเข้าสู่ขั้นตอนที่ 10 อีกครั้ง

DISPLAY GRAPHICS OF ANOTHER CASE?
1. YES
2. NO

ขั้นตอนที่ 13 **ตัวเลือก 2.** โปรแกรมจะออกจากโปรแกรมแสดงผล โดยมีทางเลือกว่าจะออกจากโปรแกรมรวม หรือจะเข้าสู่ขั้นตอนเริ่มต้นซึ่งคือ **ขั้นตอนที่ 3**



เนื่องจากโปรแกรมนี้อยู่บนสมมติฐานของ Shallow shell ดังนั้นปัญหาที่จะนำมาวิเคราะห์ด้วยโปรแกรมนี้อาจจะอยู่บนสมมติฐานนี้ด้วย จากการกำหนดของ ไรซ์เนอร์ [19] ค่า f/A และ ค่า f/B ควรมีค่าน้อยกว่าหรือเท่ากับ $1/6$ A/B ไม่ควรเกิน 5 และไม่ควรถ่ำกว่า 0.2 เนื่องจากรูปร่างของเปลือกจะเข้าใกล้รูปร่างคานเกินไป และค่าพารามิเตอร์ $\frac{P_3 AB}{Eh^2}$ ควรมีค่าไม่เกิน 0.03 เพื่อไม่ให้เกิดการโก่งงอ (Buckling) ของเปลือกบางขึ้น จำนวนเอลิเมนต์ไม่ควรต่ำกว่า 4 เอลิเมนต์ต่อแกน แต่จำนวนเอลิเมนต์ต่อแกนไม่ควรเกิน 16 เอลิเมนต์ และจำนวนเอลิเมนต์รวมไม่ควรเกิน 256 เอลิเมนต์ เนื่องจากการจำกัดหน่วยความจำของโปรแกรมแสดงผลที่ไม่เกิน 640 KB

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ภาคผนวก ค.

ตัวอย่างผลการคำนวณ

ในภาคผนวกนี้จะแสดงตัวอย่างผลการคำนวณที่ได้ ที่สภาพขอบ 4 ชนิด คือ

- กรณีที่1 รongรับแบบธรรมดาทั้ง 4 ด้าน
- กรณีที่2 รongรับแบบยึดแน่นทั้ง 4 ด้าน
- กรณีที่3 รongรับแบบธรรมดา 2 ด้านที่อยู่ตรงข้ามกัน
ด้านที่เหลือเป็นรongรับแบบอิสระ
- กรณีที่4 รongรับแบบยึดแน่น 2 ด้านที่อยู่ตรงข้ามกัน
ด้านที่เหลือเป็นรongรับแบบอิสระ

โดยแสดงเป็นกราฟของ Section lines ที่ตำแหน่ง $X/A = 0 \ 0.25 \ 0.5 \ 0.75$ และ 1.0
และที่ $Y/B = 0 \ 0.25 \ 0.5 \ 0.75$ และ 1.0 ซึ่งมีค่าพารามิเตอร์

A/B	เท่ากับ	0.5	1.0	และ	2.0
t/h	เท่ากับ	2.0	4.0	และ	6.0
$P_{sAB}/(Eh^2)$	เท่ากับ	0.001	0.005	และ	0.01

โดยมีค่า $\nu = 0.3$

แทนเส้นตัดที่ X/A และ Y/B เท่ากับ 0 ด้วยเส้น

แทนเส้นตัดที่ X/A และ Y/B เท่ากับ 0.25 ด้วยเส้น

แทนเส้นตัดที่ X/A และ Y/B เท่ากับ 0.5 ด้วยเส้น

แทนเส้นตัดที่ X/A และ Y/B เท่ากับ 0.75 ด้วยเส้น

แทนเส้นตัดที่ X/A และ Y/B เท่ากับ 1.0 ด้วยเส้น

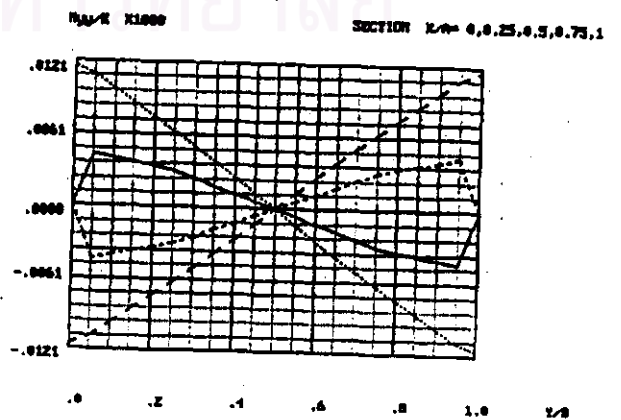
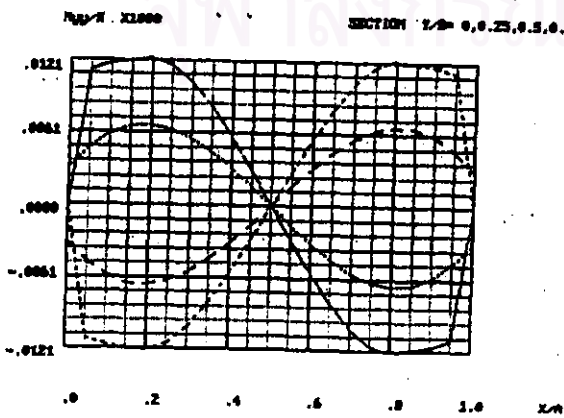
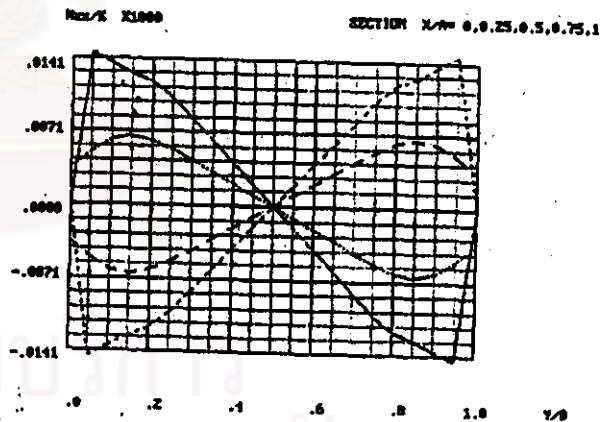
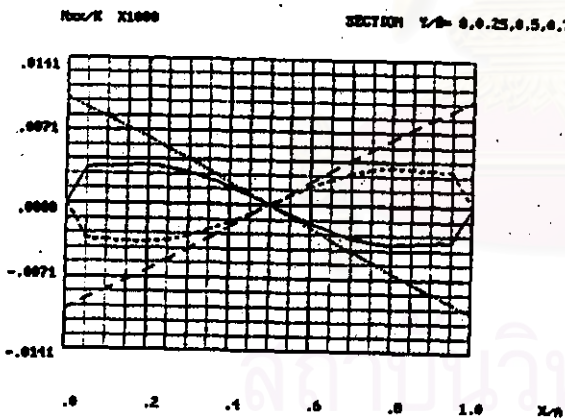
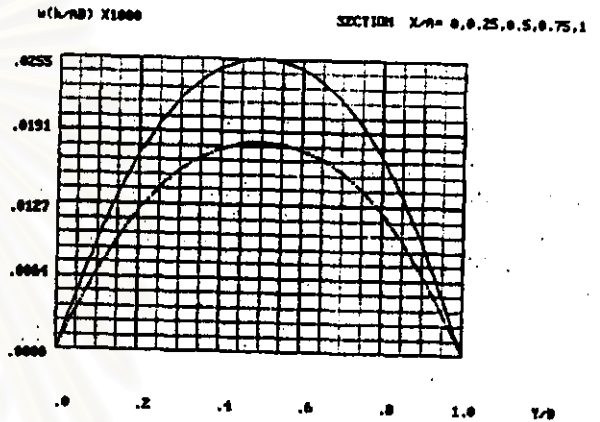
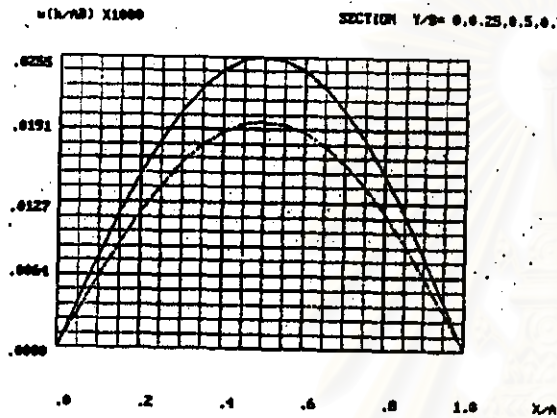
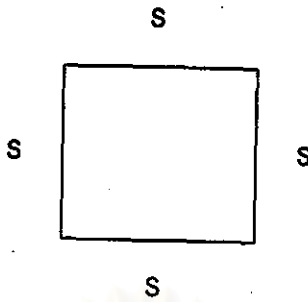
ผลของกรณีที่ 1 :

$$\frac{A}{B} = 0.5$$

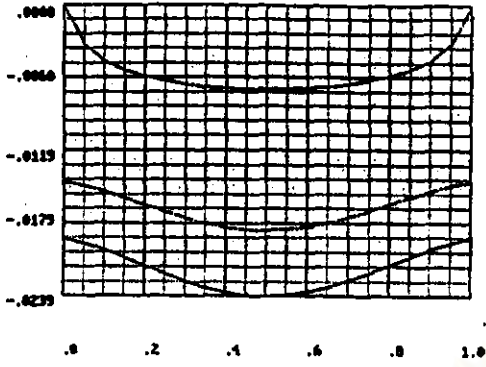
$$\frac{f}{h} = 2.0$$

$$\frac{P_3 AB}{Eh^2} = 0.001$$

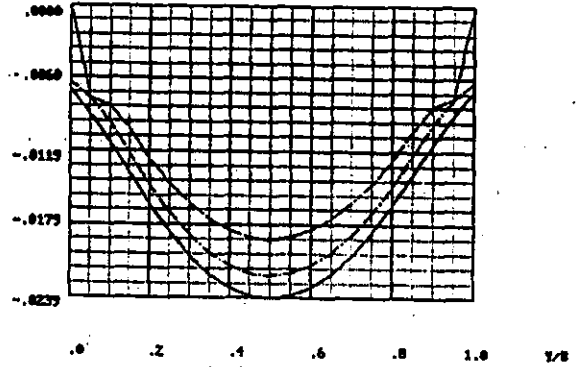
$$\nu = 0.3$$



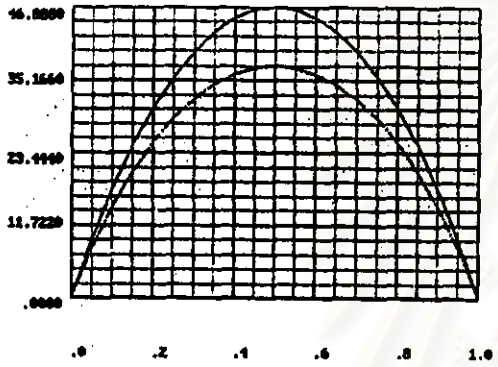
$R_{xy}/K \times 1000$ SECTION $Y/B = 0, 0.25, 0.5, 0.75, 1$



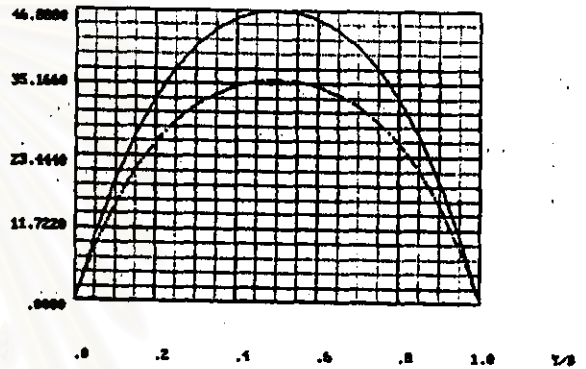
$R_{xy}/K \times 1000$ SECTION $X/a = 0, 0.25, 0.5, 0.75, 1$



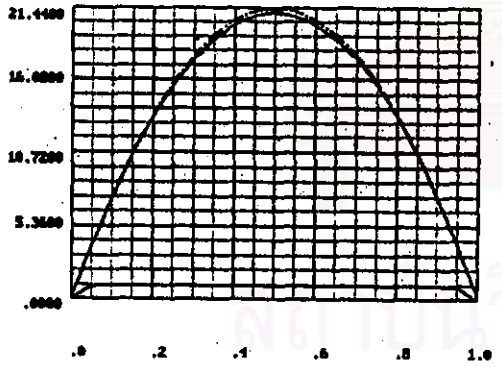
$R_{xz}/PAB \times 1000$ SECTION $Y/B = 0, 0.25, 0.5, 0.75, 1$



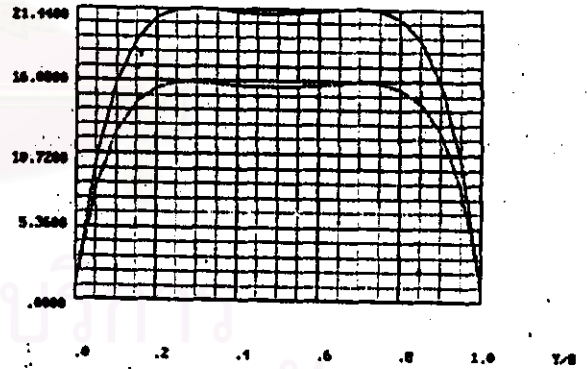
$R_{xz}/PAB \times 1000$ SECTION $X/a = 0, 0.25, 0.5, 0.75, 1$



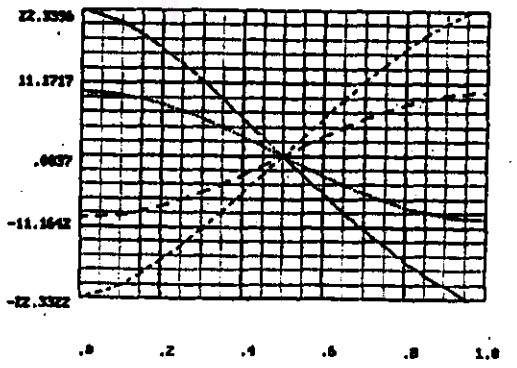
$R_{yz}/PAB \times 1000$ SECTION $Y/B = 0, 0.25, 0.5, 0.75, 1$



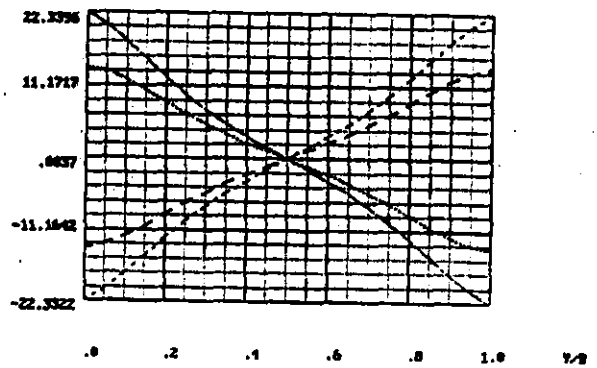
$R_{yz}/PAB \times 1000$ SECTION $X/a = 0, 0.25, 0.5, 0.75, 1$



$R_{xy}/PAB \times 1000$ SECTION $Y/B = 0, 0.25, 0.5, 0.75, 1$



$R_{xy}/PAB \times 1000$ SECTION $X/a = 0, 0.25, 0.5, 0.75, 1$



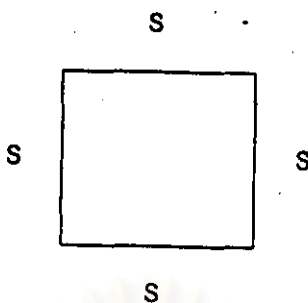
ผลของกรณีที่ 1 :

$$\frac{A}{B} = 0.5$$

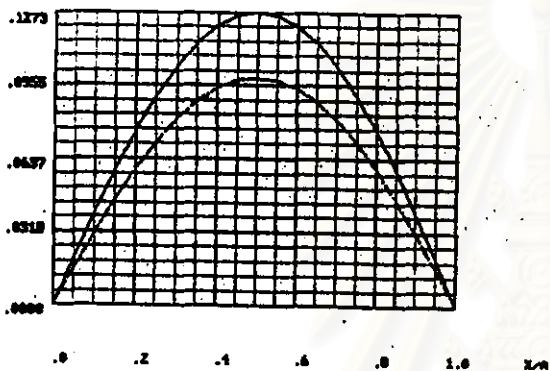
$$\frac{f}{h} = 2.0$$

$$\frac{P_3 AB}{Eh^2} = 0.005$$

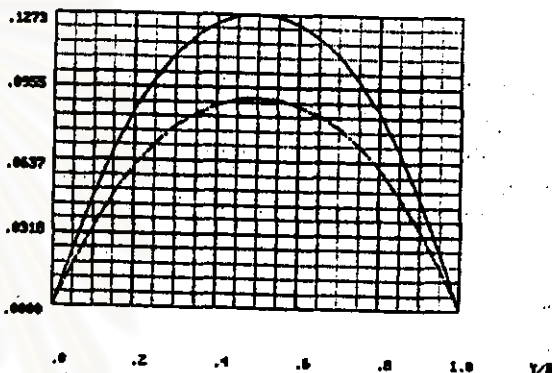
$$\nu = 0.3$$



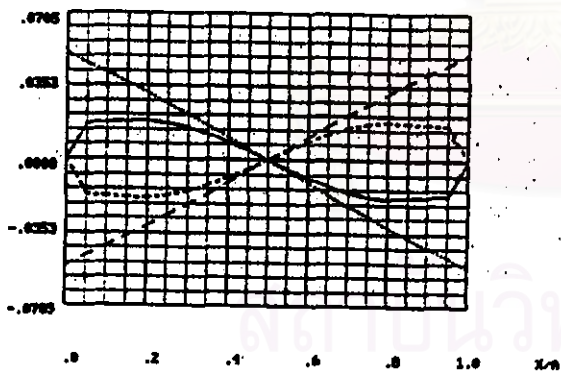
$v(h/AB) \times 1000$ SECTION $Y/B = 0.0, 0.25, 0.5, 0.75, 1$



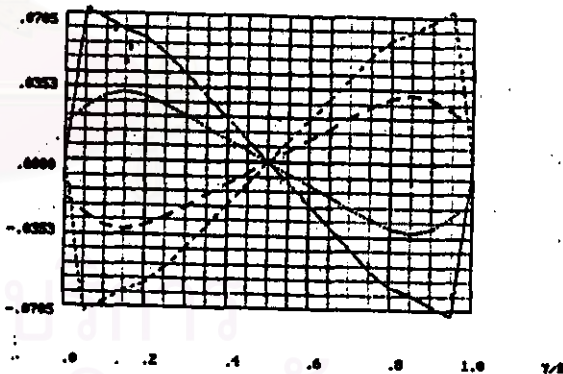
$v(h/AB) \times 1000$ SECTION $X/h = 0.0, 0.25, 0.5, 0.75, 1$



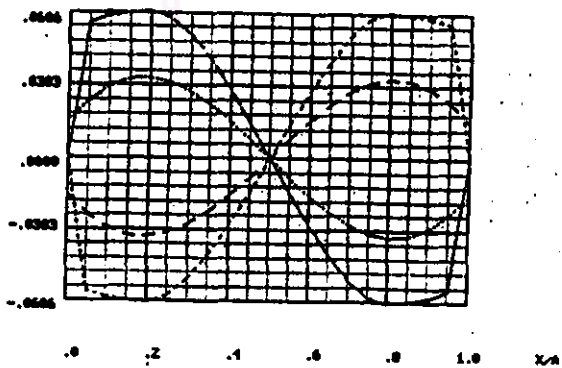
$w_{10}/K \times 1000$ SECTION $Y/B = 0.0, 0.25, 0.5, 0.75, 1$



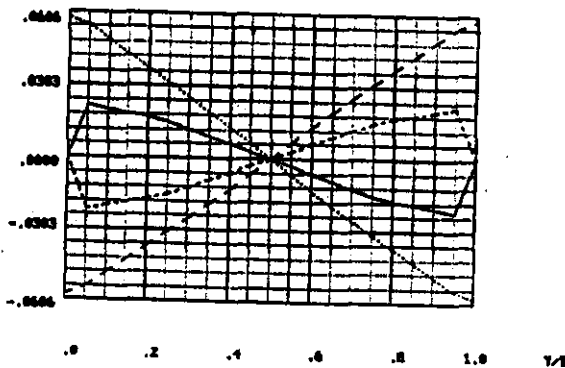
$w_{10}/K \times 1000$ SECTION $X/h = 0.0, 0.25, 0.5, 0.75, 1$

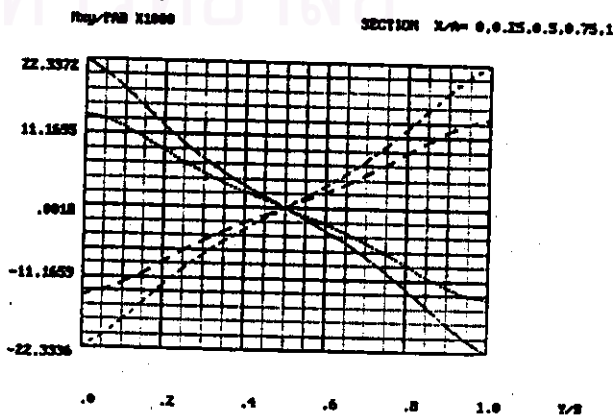
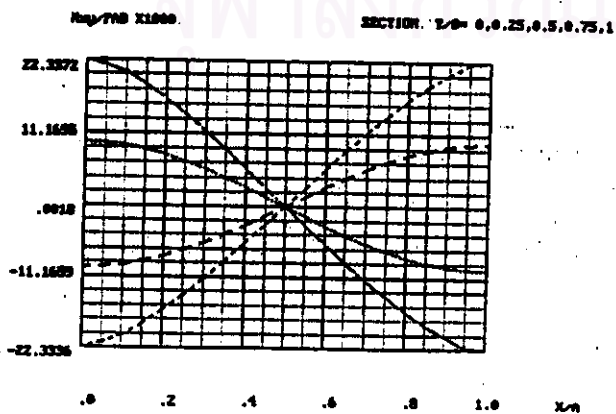
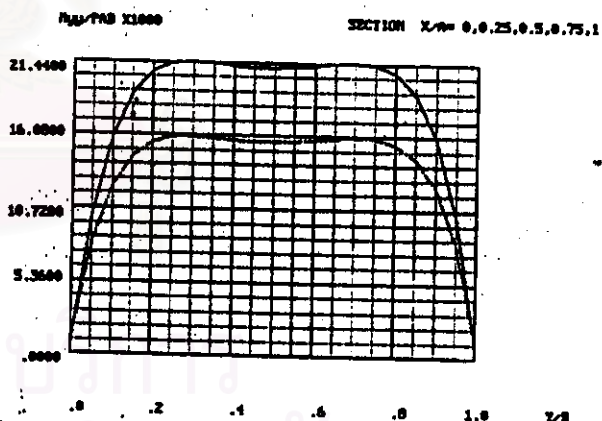
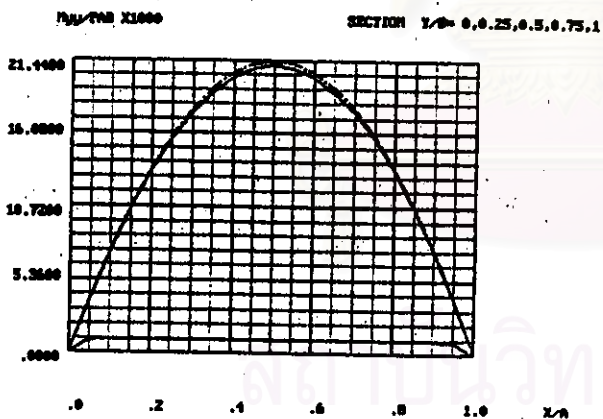
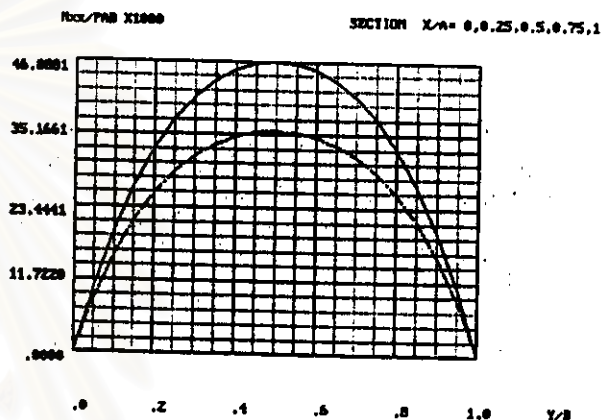
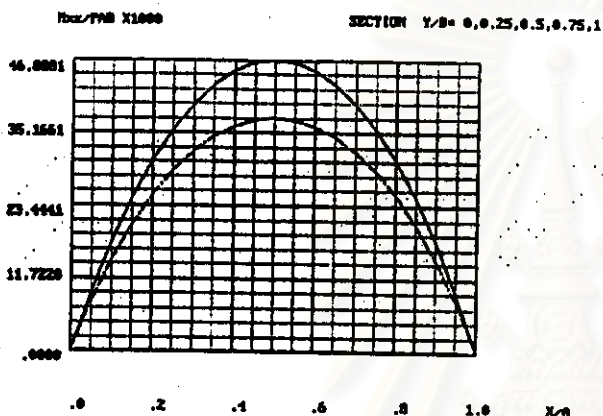
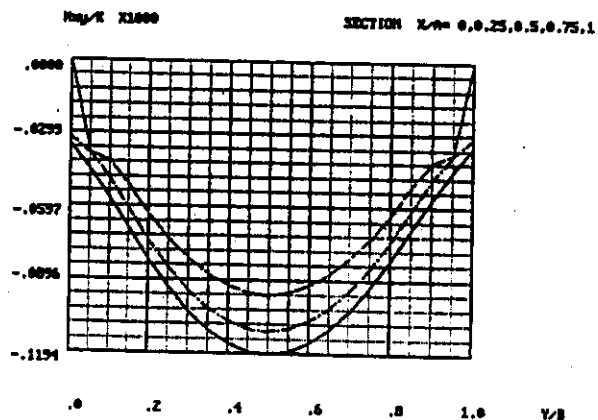
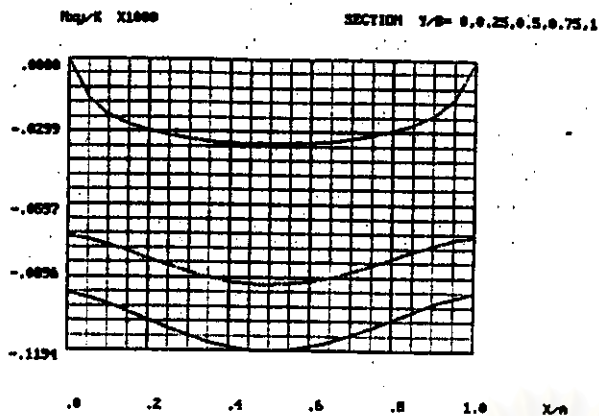


$w_{20}/K \times 1000$ SECTION $Y/B = 0.0, 0.25, 0.5, 0.75, 1$



$w_{20}/K \times 1000$ SECTION $X/h = 0.0, 0.25, 0.5, 0.75, 1$





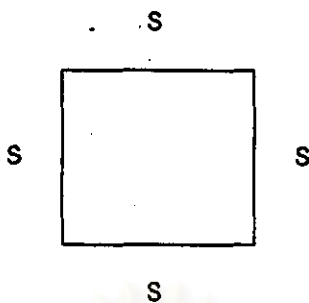
ผลของกรณีที่ 1 :

$$\frac{A}{B} = 0.5$$

$$\frac{f}{h} = 2.0$$

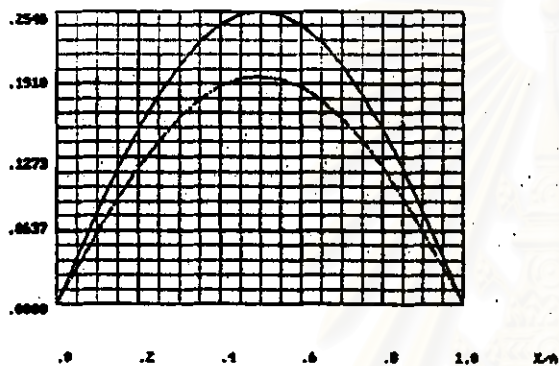
$$\frac{P_3 AB}{Eh^2} = 0.01$$

$$\nu = 0.3$$



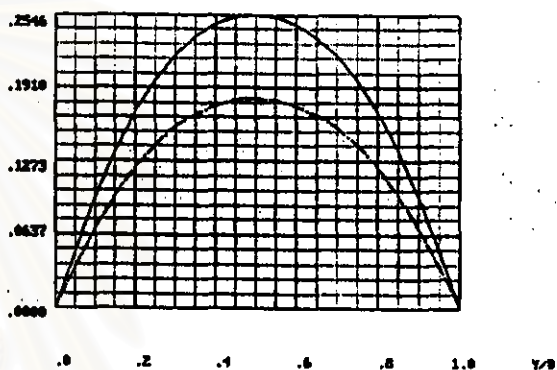
$w(h/8) \times 1000$

SECTION $Y/B = 0.0, 0.25, 0.5, 0.75, 1$



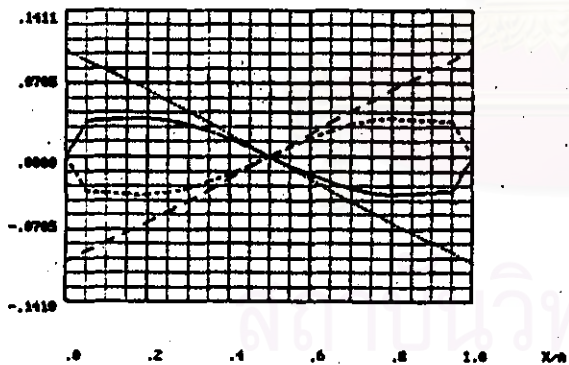
$w(h/8) \times 1000$

SECTION $X/R = 0.0, 0.25, 0.5, 0.75, 1$



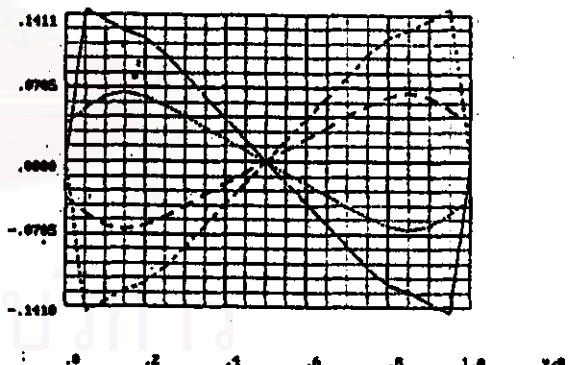
$M_{XX}/K \times 1000$

SECTION $Y/B = 0.0, 0.25, 0.5, 0.75, 1$



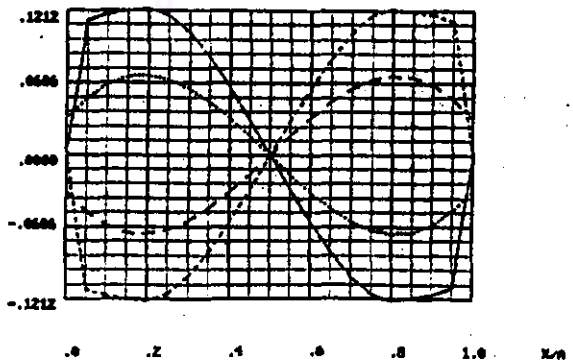
$M_{XX}/K \times 1000$

SECTION $X/R = 0.0, 0.25, 0.5, 0.75, 1$



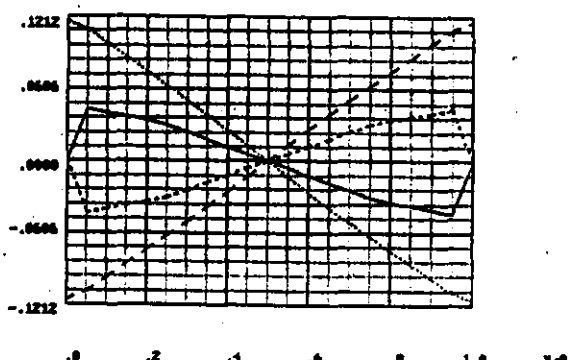
$M_{YY}/K \times 1000$

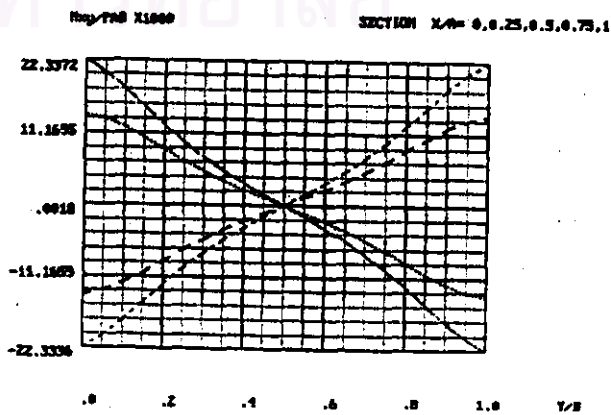
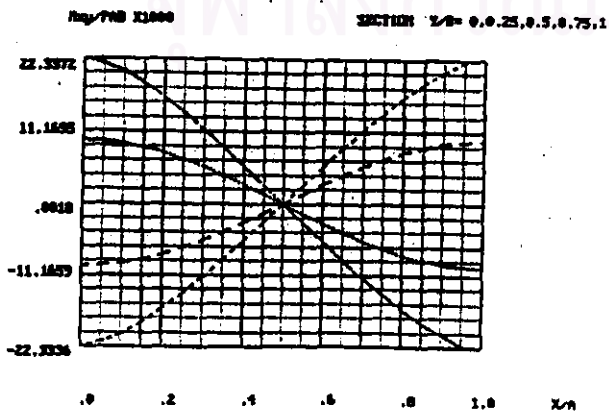
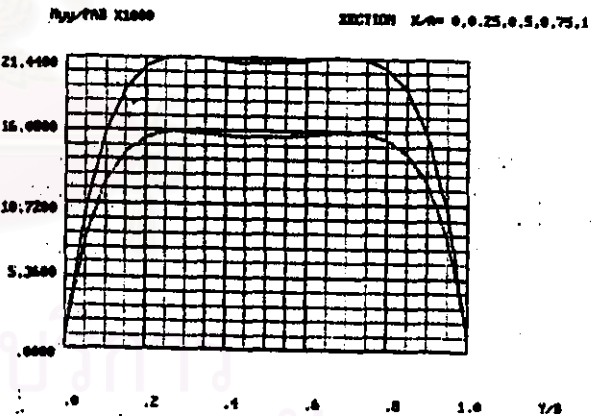
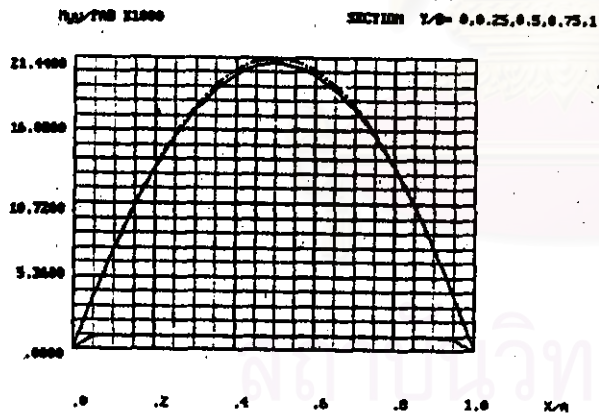
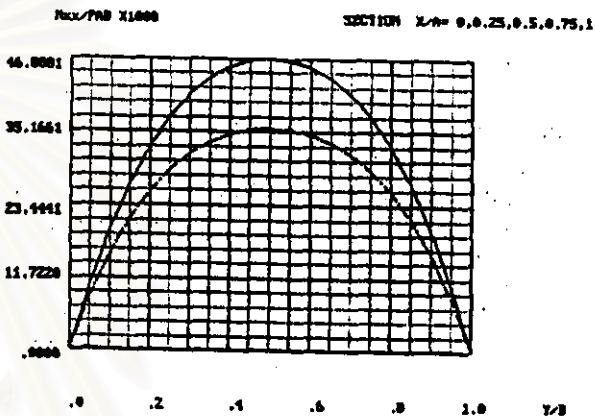
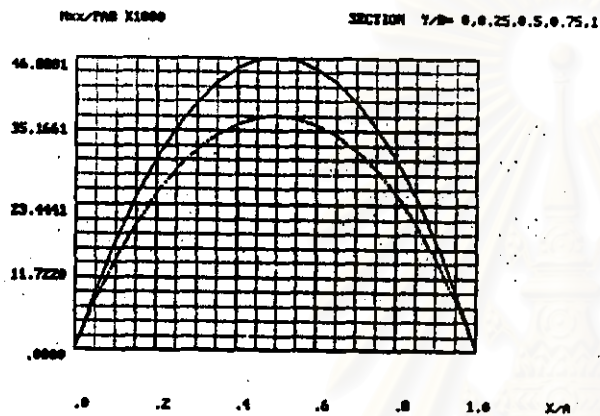
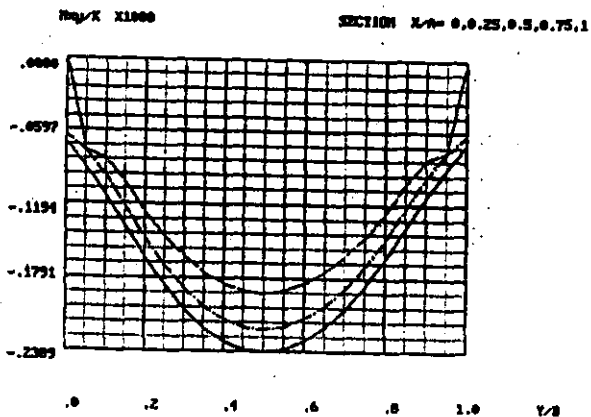
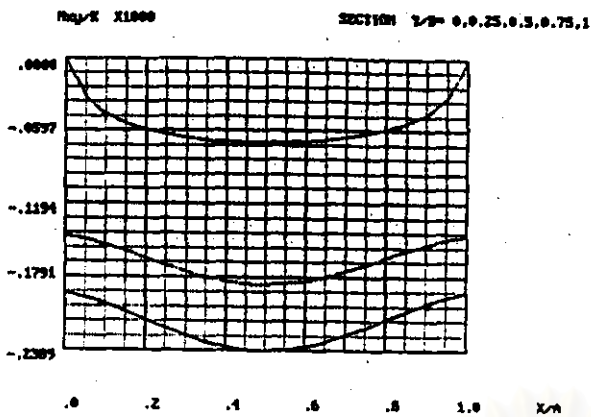
SECTION $Y/B = 0.0, 0.25, 0.5, 0.75, 1$



$M_{YY}/K \times 1000$

SECTION $X/R = 0.0, 0.25, 0.5, 0.75, 1$





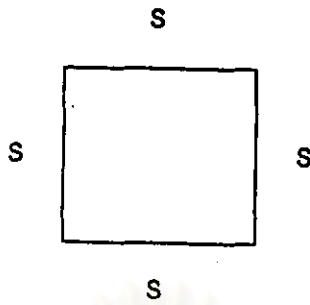
ผลของกรณีที่ 1 :

$$\frac{A}{B} = 0.5$$

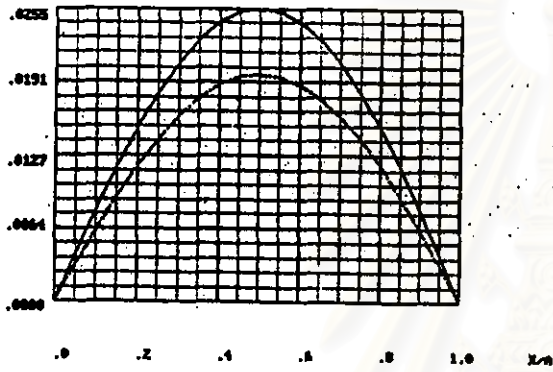
$$\frac{f}{h} = 4.0$$

$$\frac{P_0 AB}{Eh^2} = 0.001$$

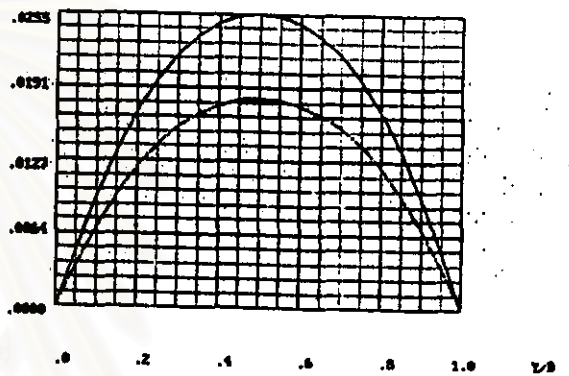
$$\nu = 0.3$$



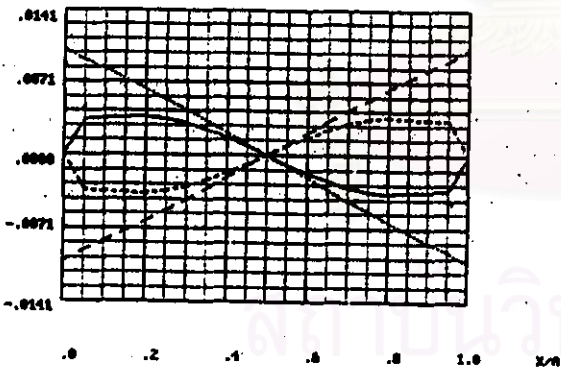
$w(h/AB) \times 1000$ SECTION $x/a = 0, 0.25, 0.5, 0.75, 1$



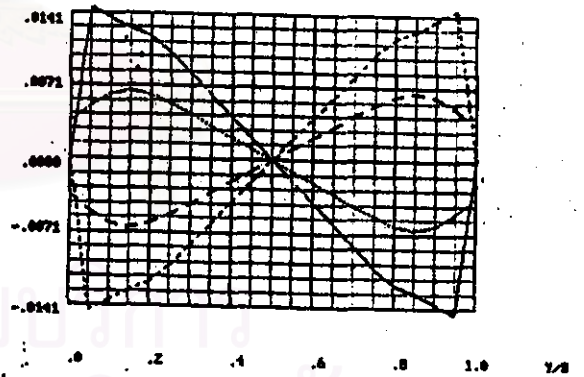
$w(h/AB) \times 1000$ SECTION $x/a = 0, 0.25, 0.5, 0.75, 1$



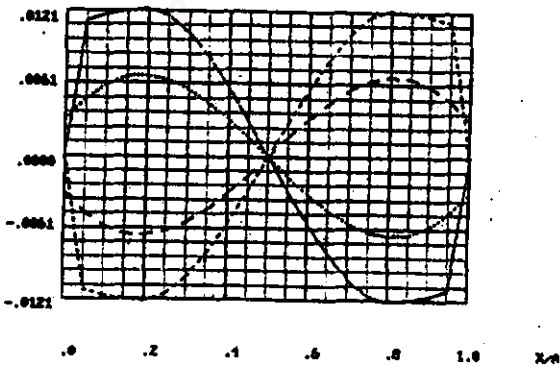
$\theta(x/a) \times 1000$ SECTION $x/a = 0, 0.25, 0.5, 0.75, 1$



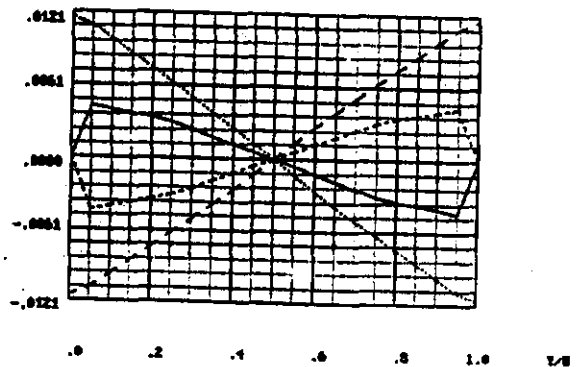
$\theta(x/a) \times 1000$ SECTION $x/a = 0, 0.25, 0.5, 0.75, 1$

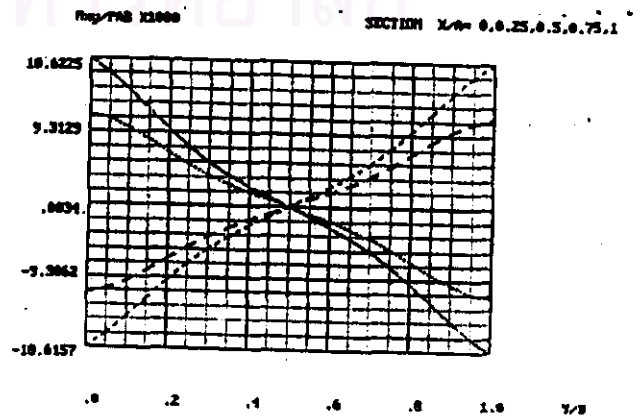
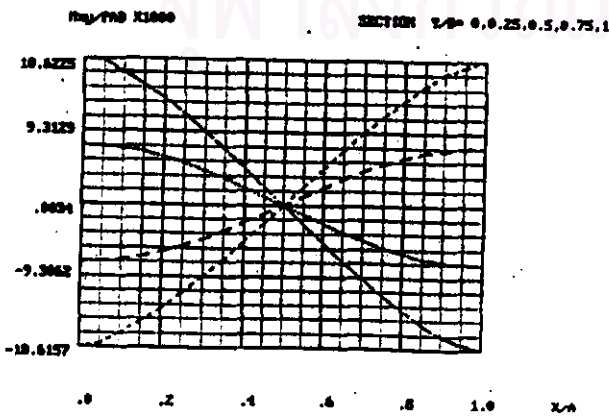
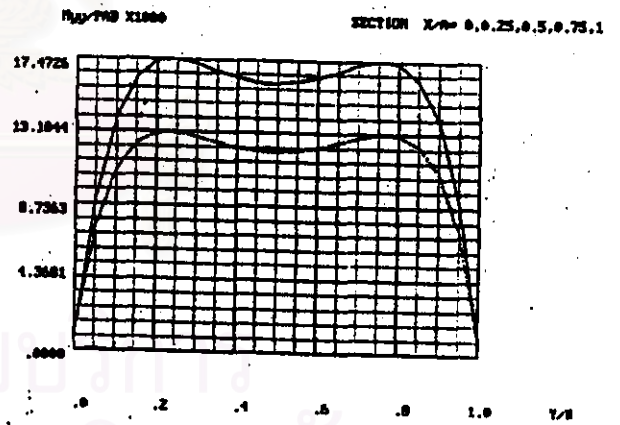
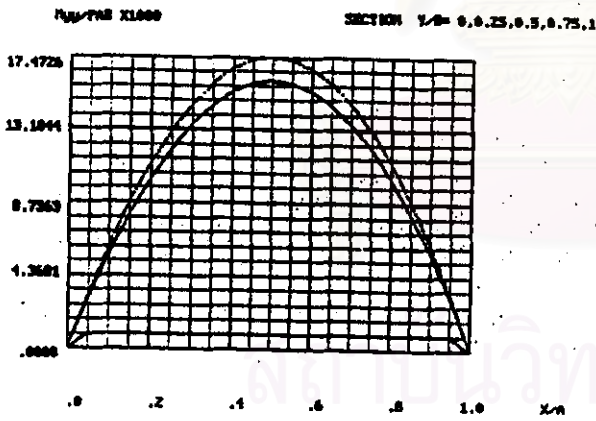
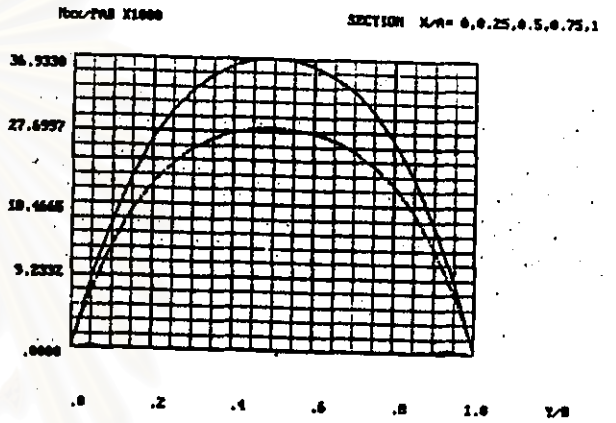
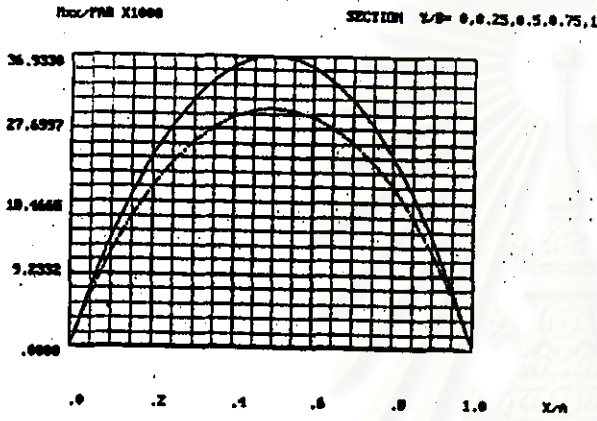
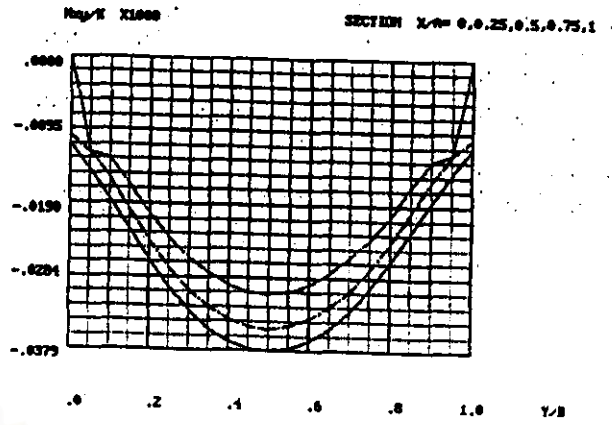
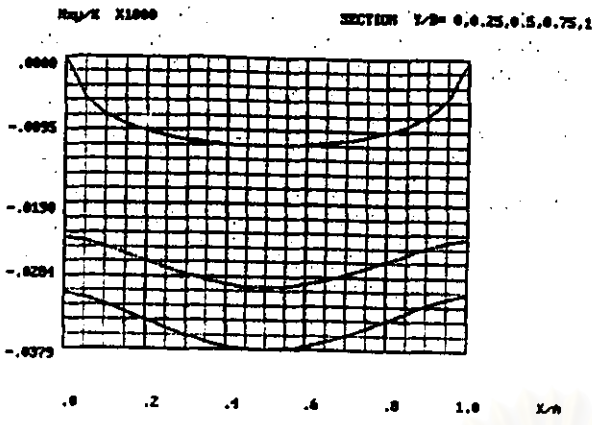


$\theta_0(x/a) \times 1000$ SECTION $x/a = 0, 0.25, 0.5, 0.75, 1$



$\theta_0(x/a) \times 1000$ SECTION $x/a = 0, 0.25, 0.5, 0.75, 1$





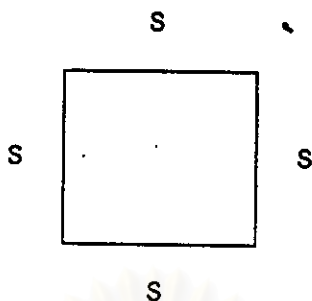
ผลของกรณีที่ 1 :

$$\frac{A}{B} = 0.5$$

$$\frac{f}{h} = 4.0$$

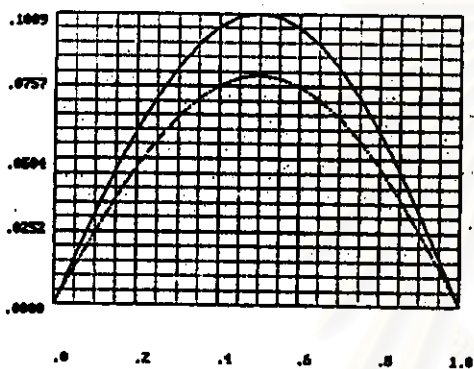
$$\frac{P_3 AB}{Eh^2} = 0.005$$

$$\nu = 0.3$$



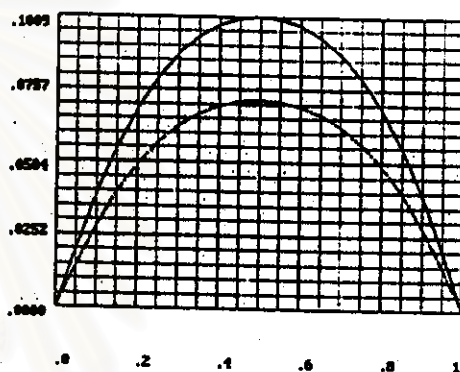
$w(h/AB) \times 1000$

SECTION $Y/B = 0, 0.25, 0.5, 0.75, 1$



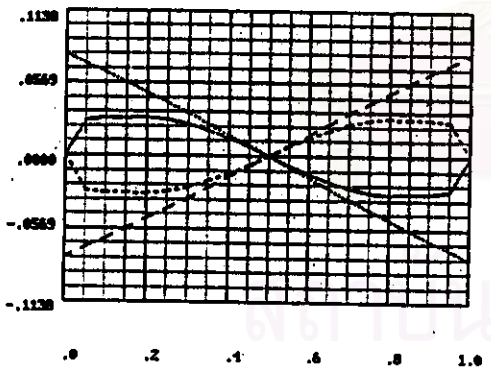
$w(h/AB) \times 1000$

SECTION $X/A = 0, 0.25, 0.5, 0.75, 1$



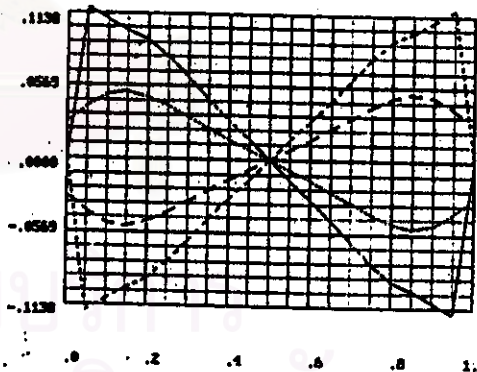
$M_{xx}/K \times 1000$

SECTION $Y/B = 0, 0.25, 0.5, 0.75, 1$



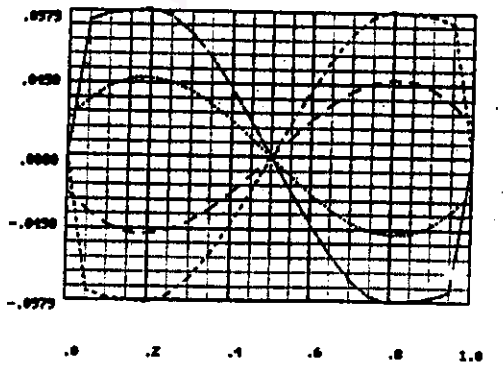
$M_{xx}/K \times 1000$

SECTION $X/A = 0, 0.25, 0.5, 0.75, 1$



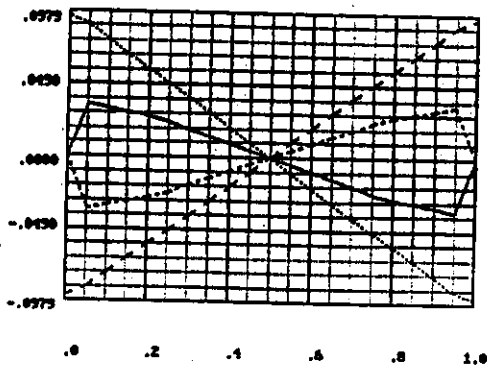
$M_{yy}/K \times 1000$

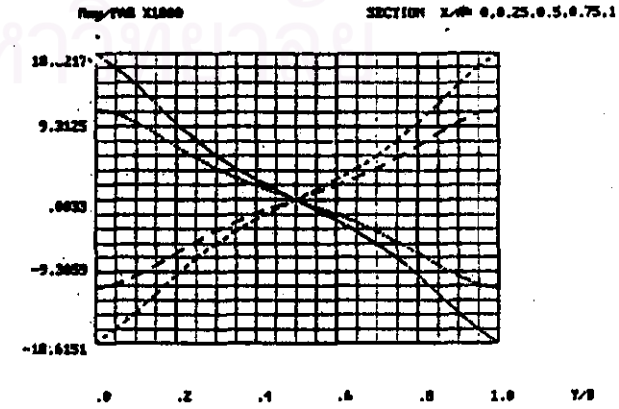
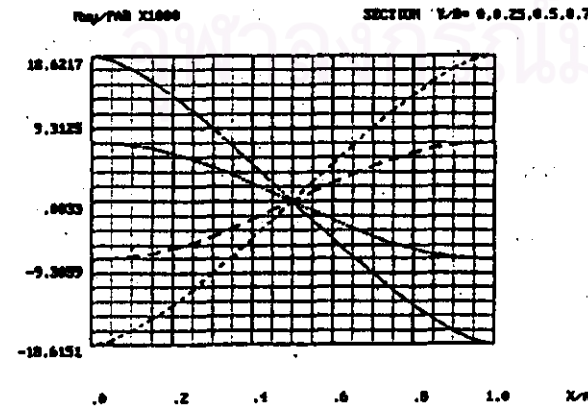
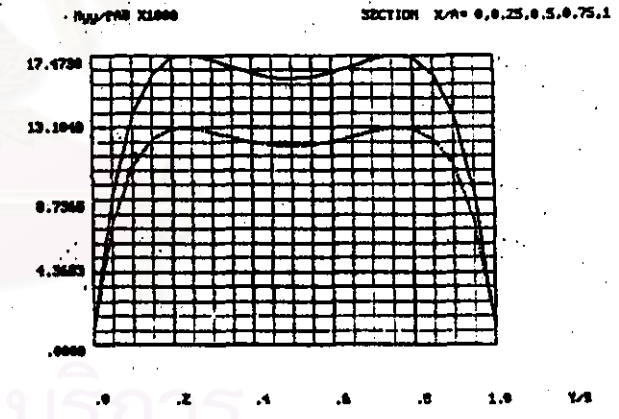
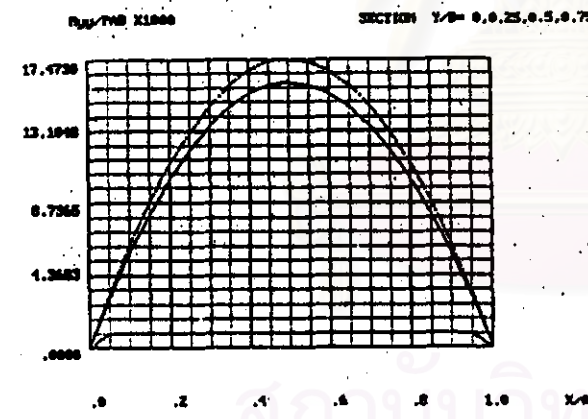
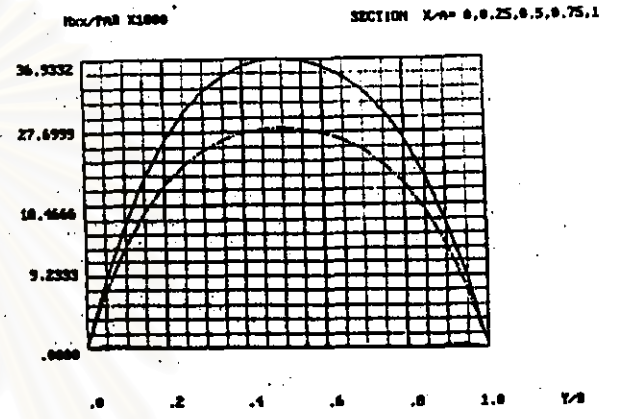
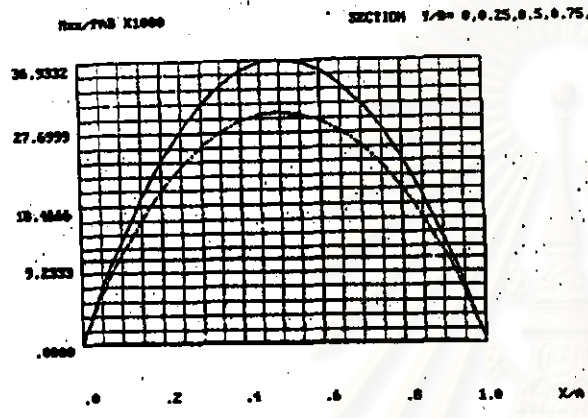
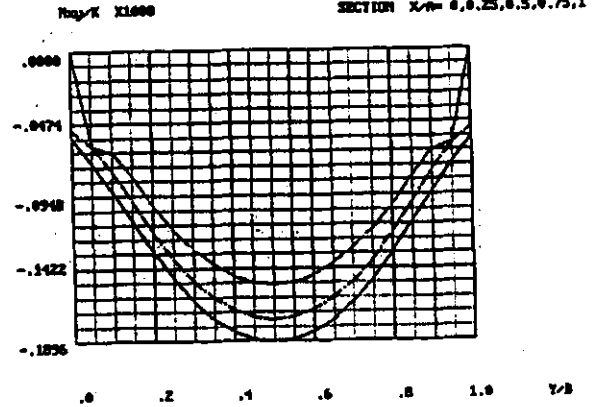
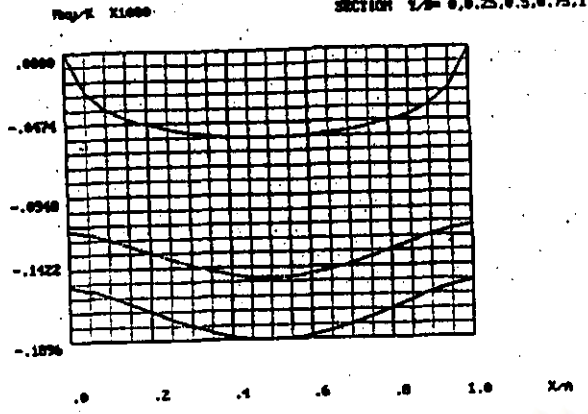
SECTION $Y/B = 0, 0.25, 0.5, 0.75, 1$



$M_{yy}/K \times 1000$

SECTION $X/A = 0, 0.25, 0.5, 0.75, 1$





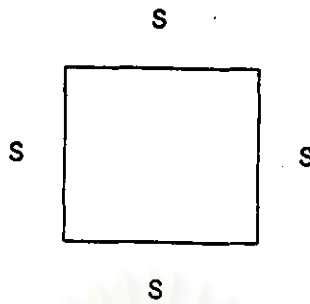
ผลของกรณีที่ 1 :

$$\frac{A}{B} = 0.5$$

$$\frac{f}{h} = 4.0$$

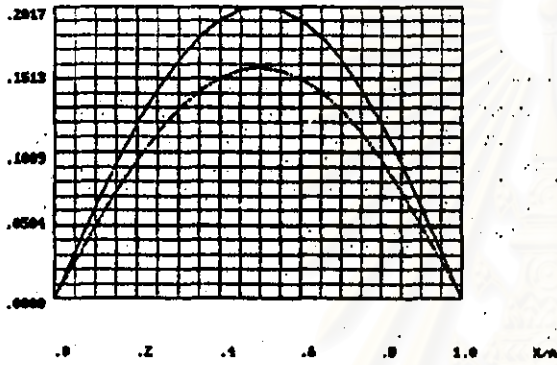
$$\frac{P_3 AB}{Eh^2} = 0.01$$

$$\nu = 0.3$$



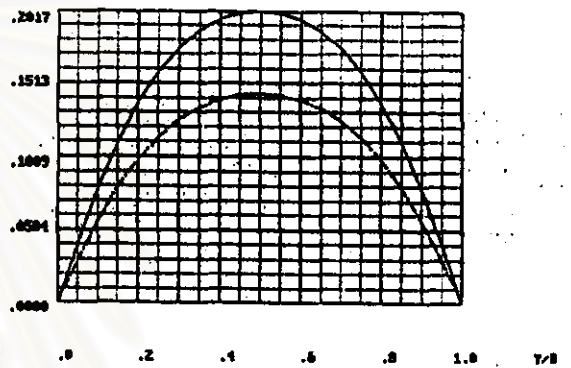
$v(h/AB) \times 1000$

SECTION $\gamma/\theta = 0, 0.25, 0.5, 0.75, 1$



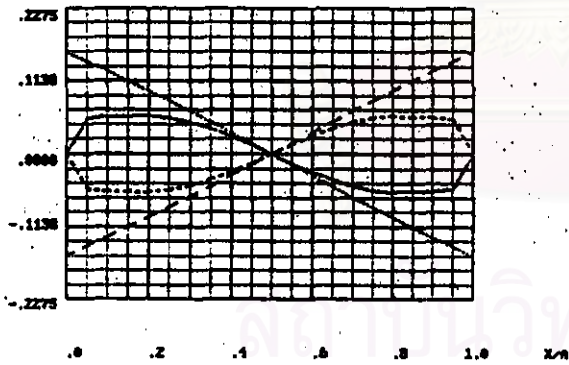
$v(h/AB) \times 1000$

SECTION $X/h = 0, 0.25, 0.5, 0.75, 1$



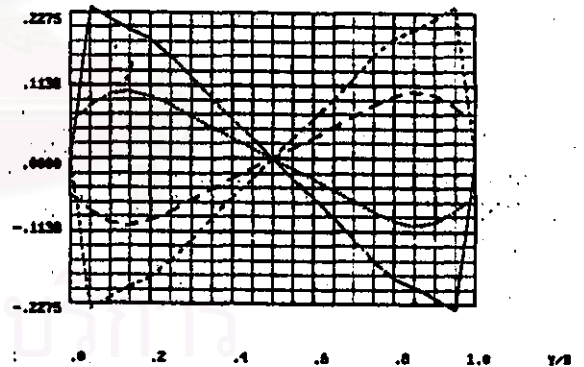
$M_{31}/K \times 1000$

SECTION $\gamma/\theta = 0, 0.25, 0.5, 0.75, 1$



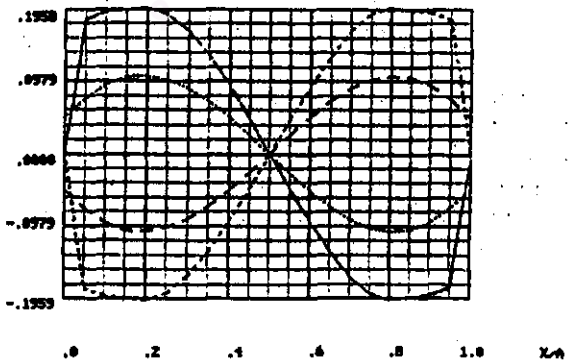
$M_{31}/K \times 1000$

SECTION $\gamma/\theta = 0, 0.25, 0.5, 0.75, 1$



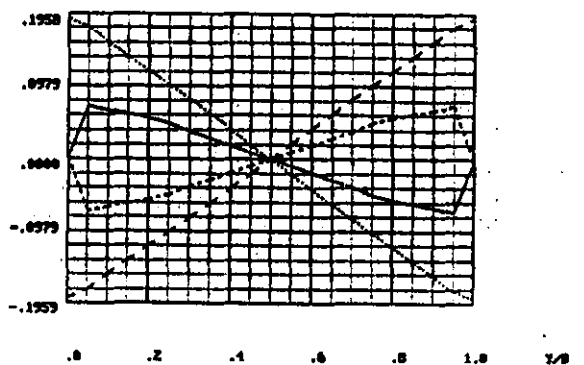
$M_{32}/K \times 1000$

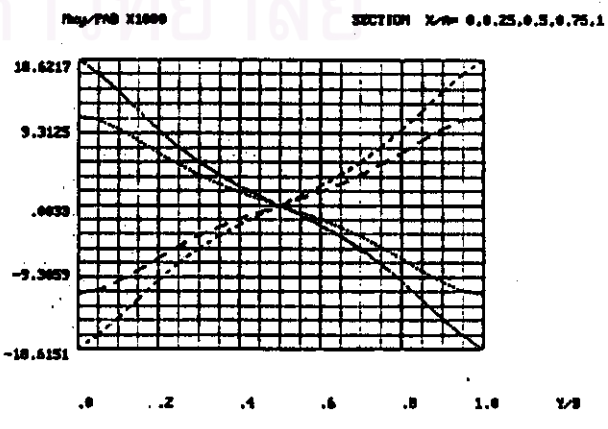
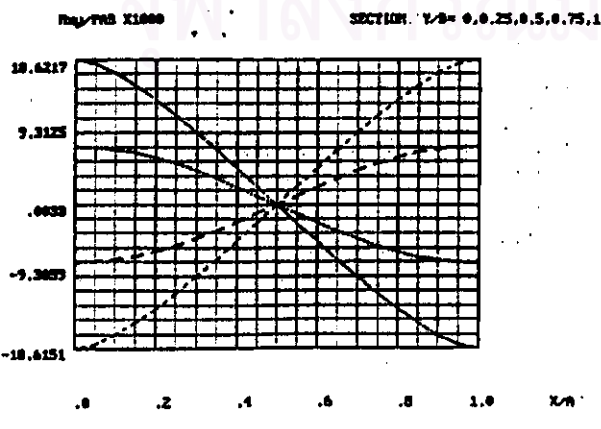
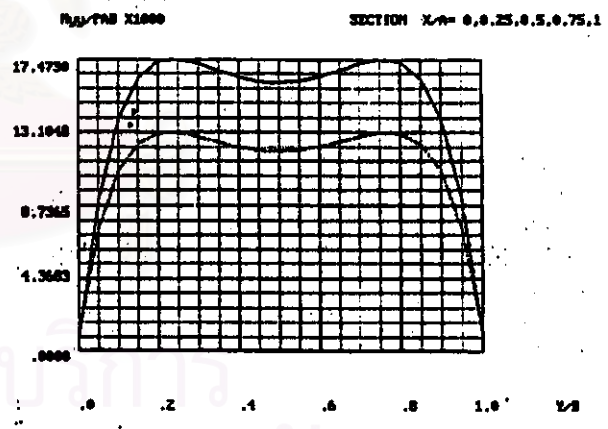
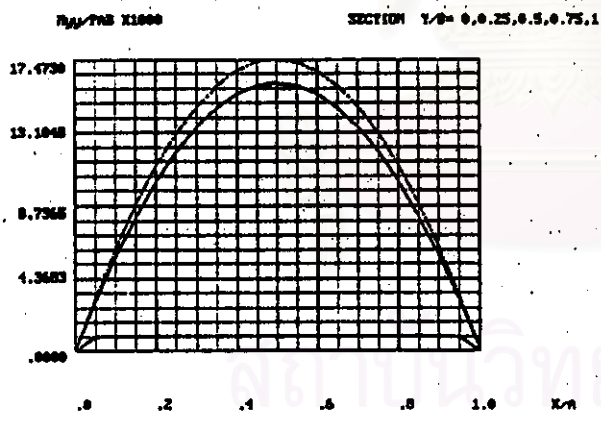
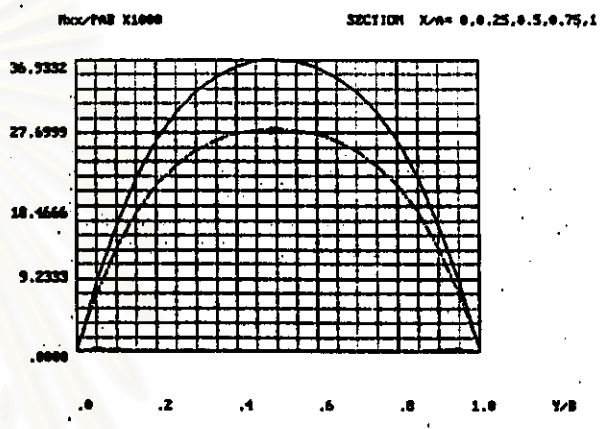
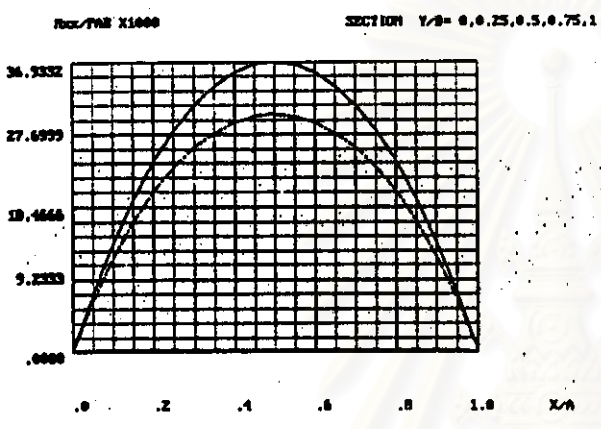
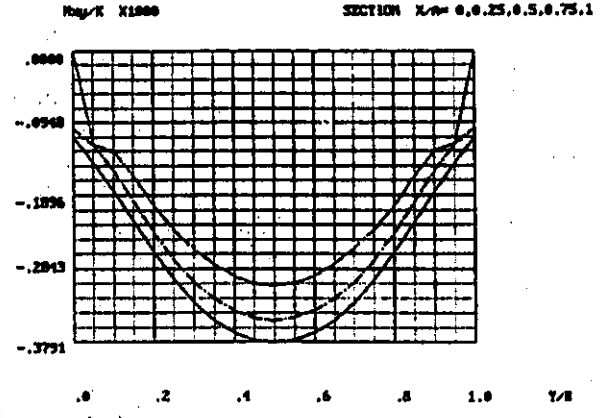
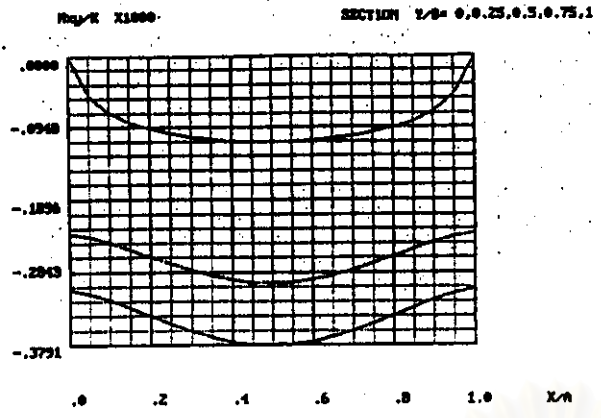
SECTION $\gamma/\theta = 0, 0.25, 0.5, 0.75, 1$



$M_{32}/K \times 1000$

SECTION $X/h = 0, 0.25, 0.5, 0.75, 1$





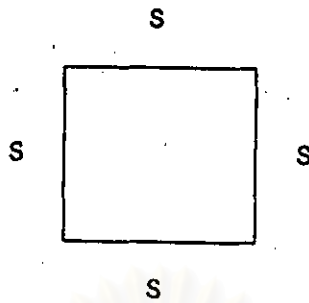
ผลของกรณีที่ 1 :

$$\frac{A}{B} = 0.5$$

$$\frac{f}{h} = 6.0$$

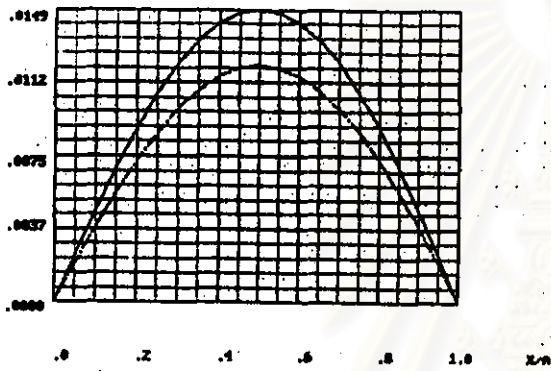
$$\frac{P_3 AB}{Eh^2} = 0.001$$

$$\nu = 0.3$$



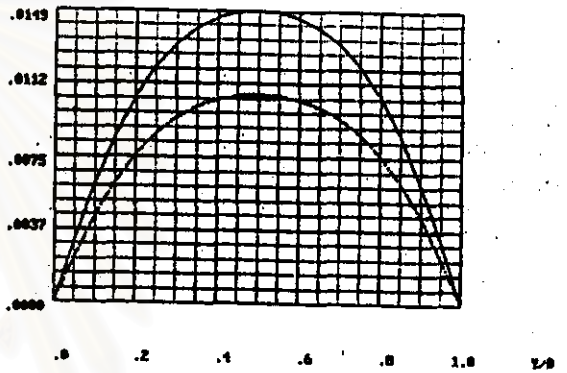
$u(h/AB) \times 1000$

SECTION $Y/B = 0.0, 0.25, 0.5, 0.75, 1$



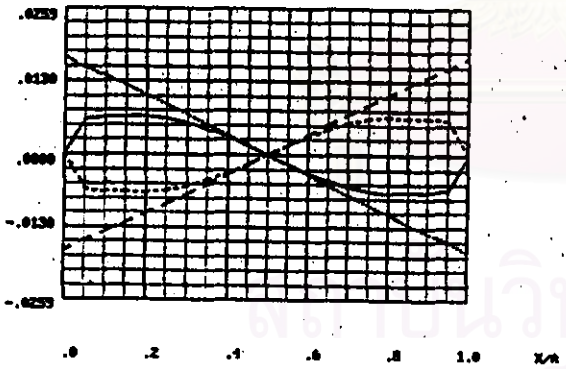
$u(h/AB) \times 1000$

SECTION $X/a = 0.0, 0.25, 0.5, 0.75, 1$



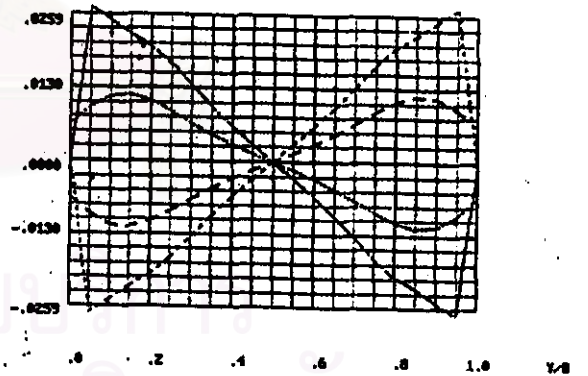
$w_{max}/K \times 1000$

SECTION $Y/B = 0.0, 0.25, 0.5, 0.75, 1$



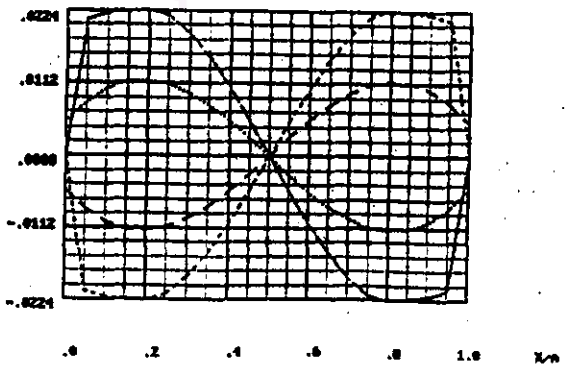
$w_{max}/K \times 1000$

SECTION $X/a = 0.0, 0.25, 0.5, 0.75, 1$



$P_{33}/K \times 1000$

SECTION $Y/B = 0.0, 0.25, 0.5, 0.75, 1$



$P_{33}/K \times 1000$

SECTION $X/a = 0.0, 0.25, 0.5, 0.75, 1$

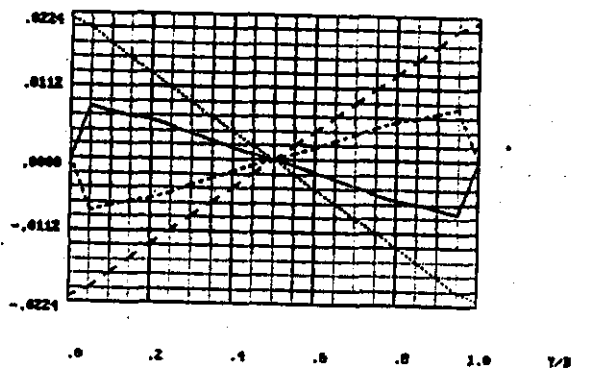


Fig. K X1000 SECTION Y/B= 0,0.25,0.5,0.75,1

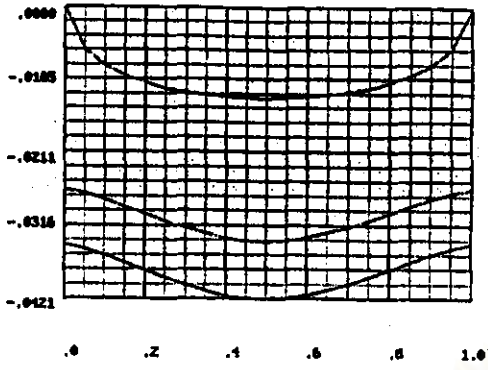


Fig. K X1000 SECTION X/A= 0,0.25,0.5,0.75,1

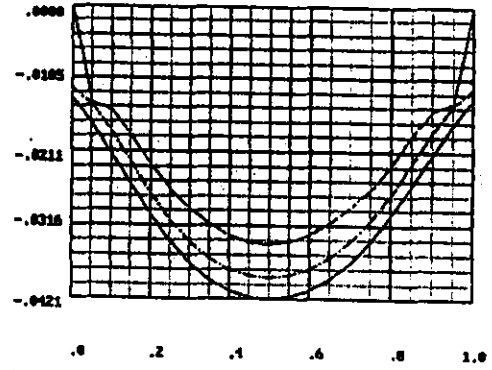


Fig. PAB X1000 SECTION Y/B= 0,0.25,0.5,0.75,1

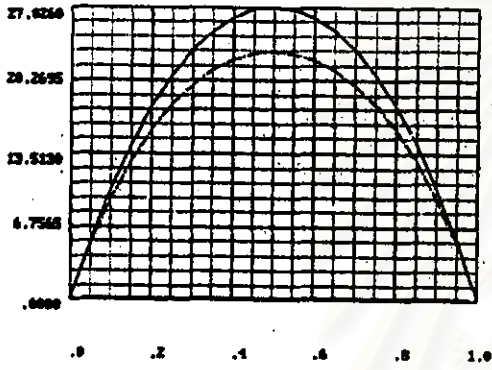


Fig. PAB X1000 SECTION X/A= 0,0.25,0.5,0.75,1

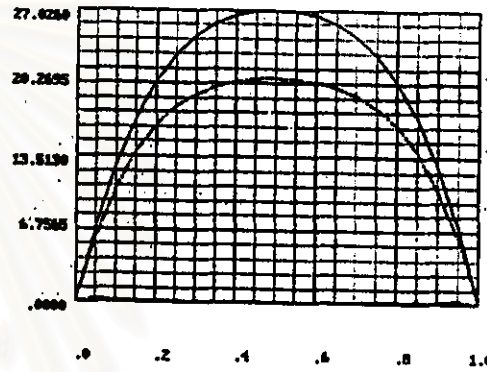


Fig. PAB X1000 SECTION Y/B= 0,0.25,0.5,0.75,1

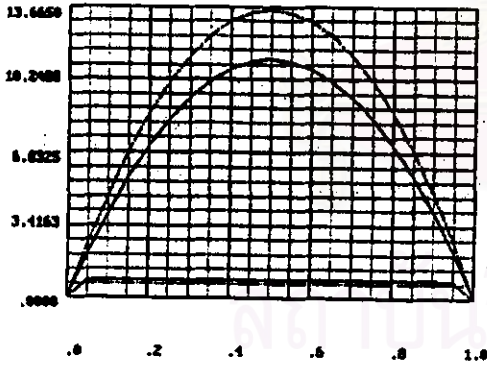


Fig. PAB X1000 SECTION X/A= 0,0.25,0.5,0.75,1

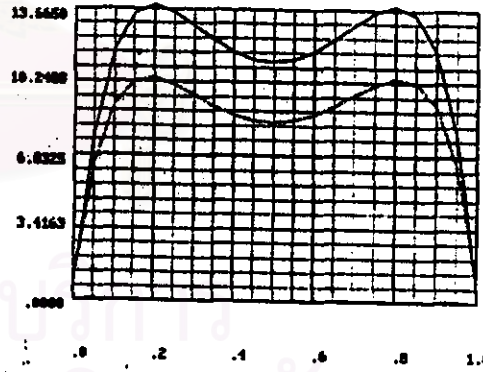


Fig. PAB X1000 SECTION Y/B= 0,0.25,0.5,0.75,1

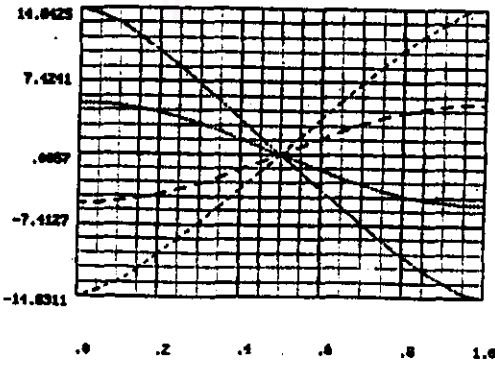
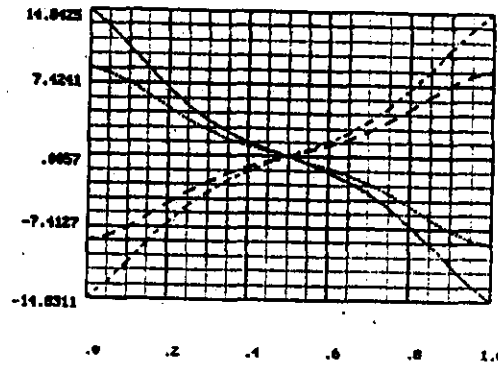


Fig. PAB X1000 SECTION X/A= 0,0.25,0.5,0.75,1



ผลของกรณีที่ 1 :

$$\frac{A}{B} = 0.5$$

$$\frac{f}{h} = 6.0$$

$$\frac{P_3 AB}{Eh^2} = 0.005$$

$$\nu = 0.3$$

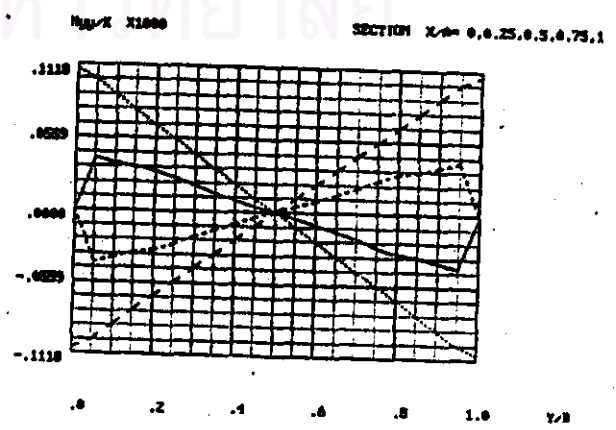
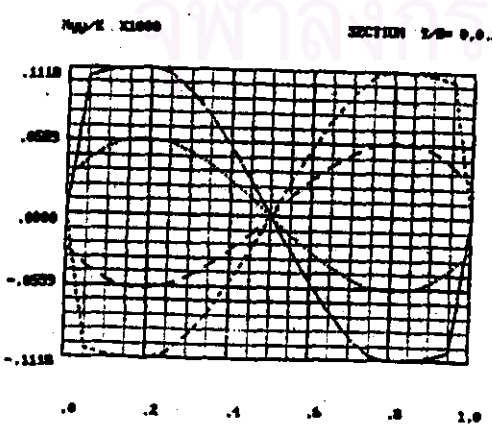
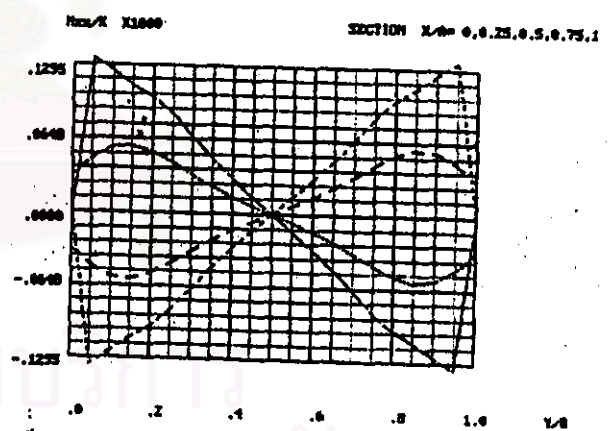
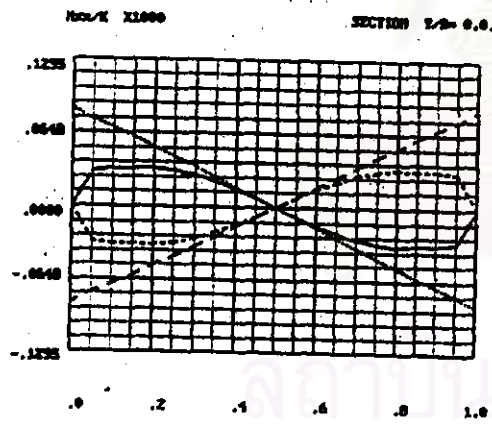
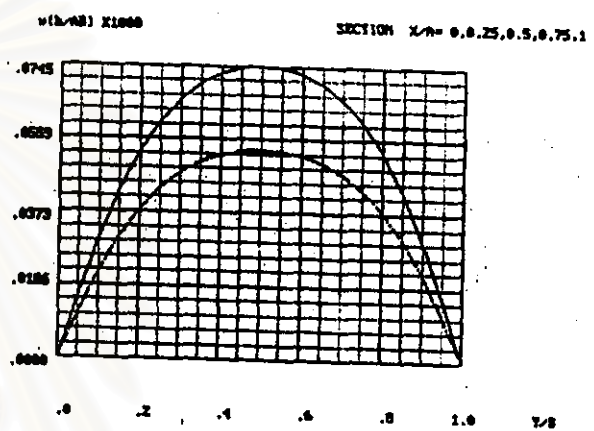
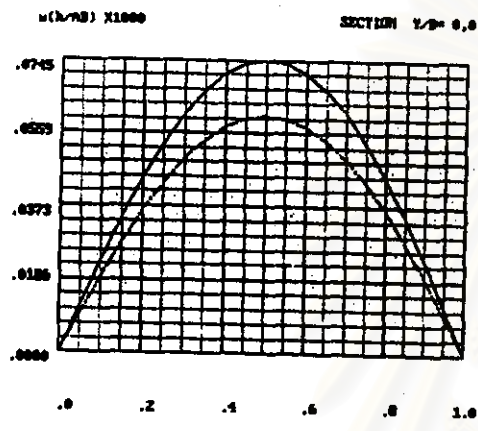
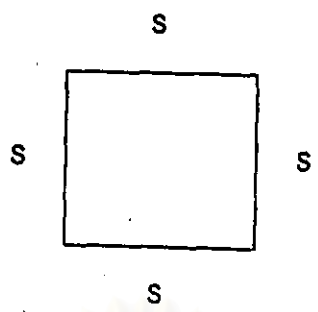


Fig. 1 X1000 SECTION $Y/a = 0, 0.25, 0.5, 0.75, 1$

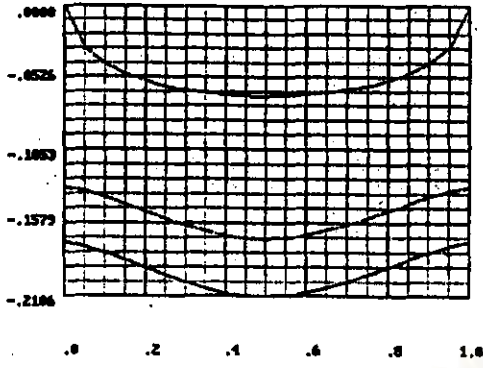


Fig. 2 X1000 SECTION $X/a = 0, 0.25, 0.5, 0.75, 1$

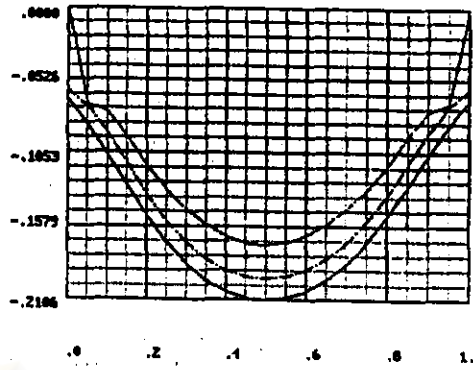


Fig. 3 X1000 SECTION $Y/a = 0, 0.25, 0.5, 0.75, 1$

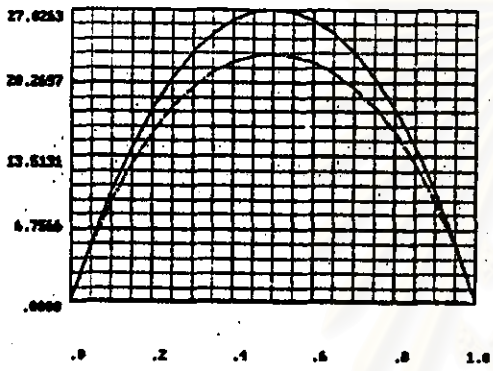


Fig. 4 X1000 SECTION $X/a = 0, 0.25, 0.5, 0.75, 1$

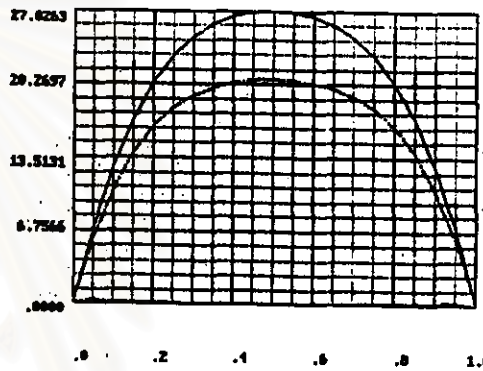


Fig. 5 X1000 SECTION $Y/a = 0, 0.25, 0.5, 0.75, 1$

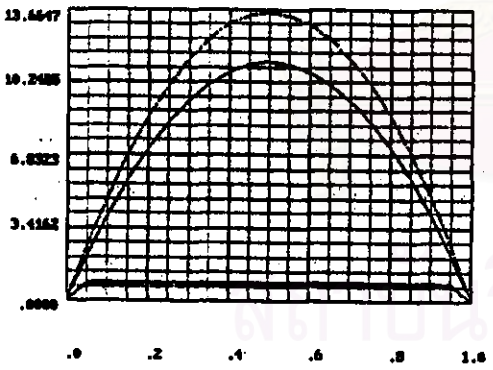


Fig. 6 X1000 SECTION $X/a = 0, 0.25, 0.5, 0.75, 1$

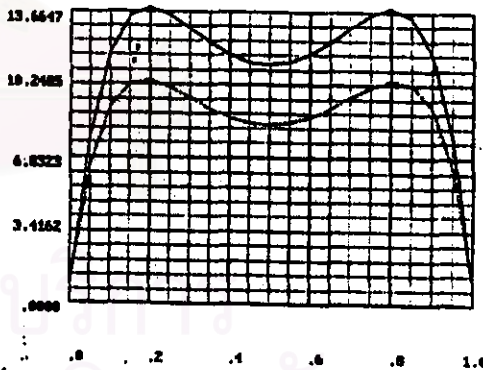


Fig. 7 X1000 SECTION $Y/a = 0, 0.25, 0.5, 0.75, 1$

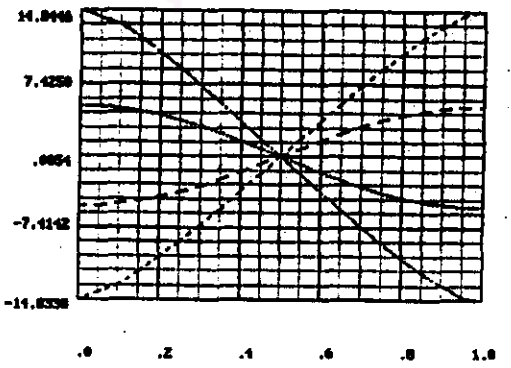
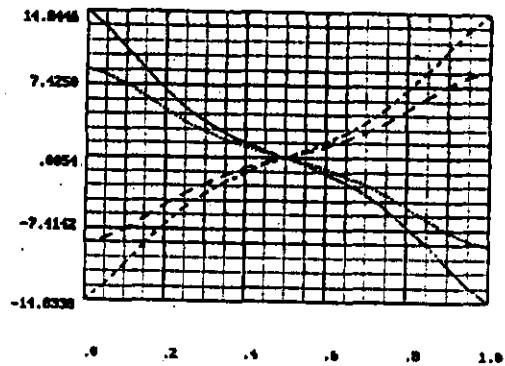


Fig. 8 X1000 SECTION $X/a = 0, 0.25, 0.5, 0.75, 1$



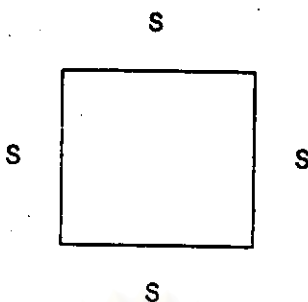
ผลของกรณีที่ 1 :

$$\frac{A}{B} = 0.5$$

$$\frac{f}{h} = 6.0$$

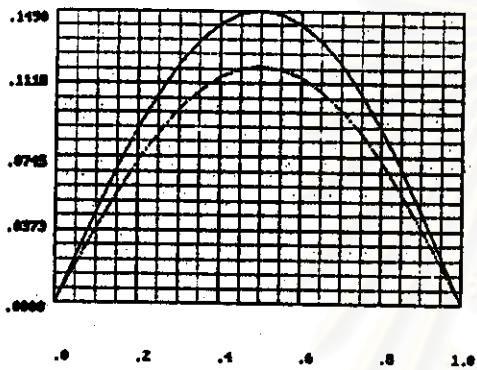
$$\frac{P_3 AB}{Eh^2} = 0.01$$

$$\nu = 0.3$$



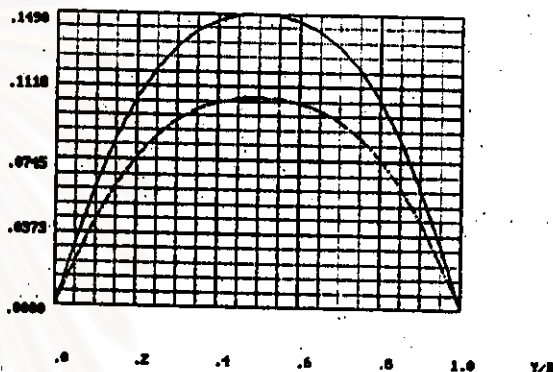
$w(h/AB) \times 1000$

SECTION $Y/B = 0, 0.25, 0.5, 0.75, 1$



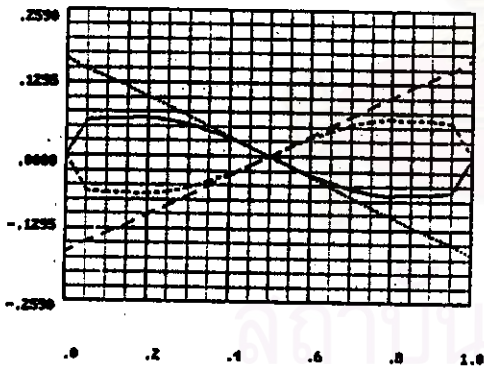
$w(h/AB) \times 1000$

SECTION $X/A = 0, 0.25, 0.5, 0.75, 1$



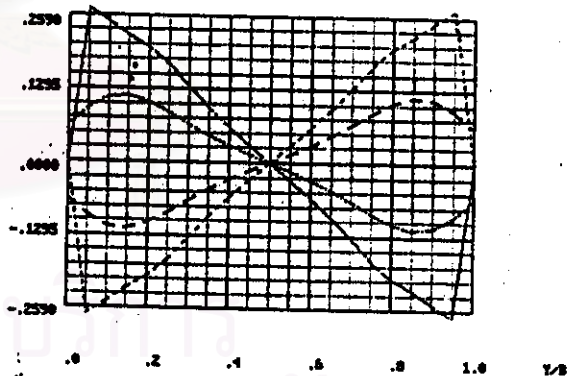
$R_{\theta z}/K \times 1000$

SECTION $Y/B = 0, 0.25, 0.5, 0.75, 1$



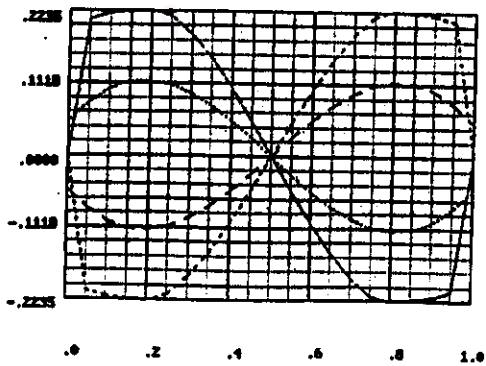
$R_{\theta z}/K \times 1000$

SECTION $X/A = 0, 0.25, 0.5, 0.75, 1$



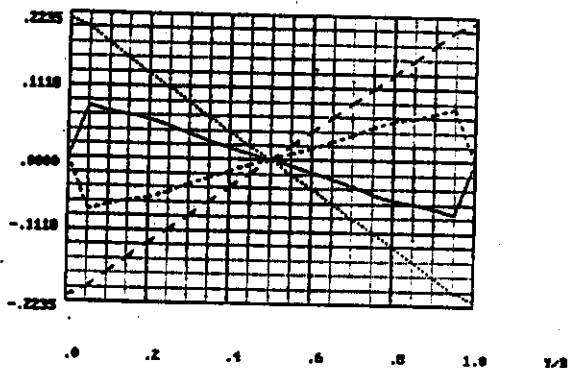
$R_{\theta y}/K \times 1000$

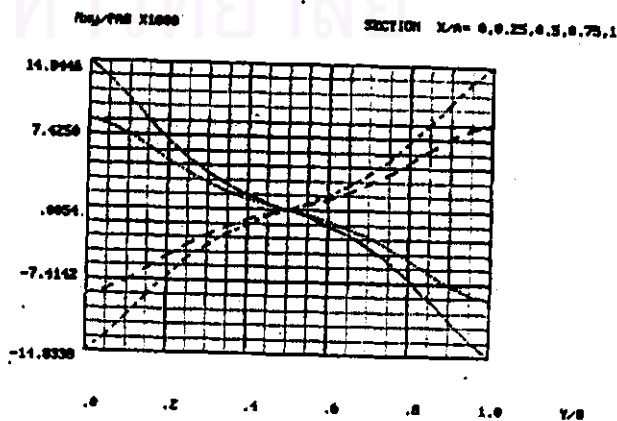
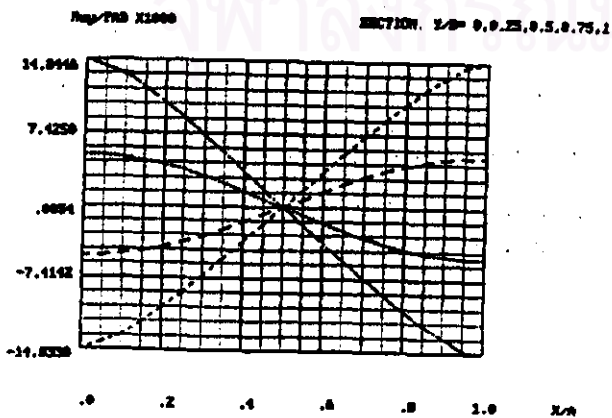
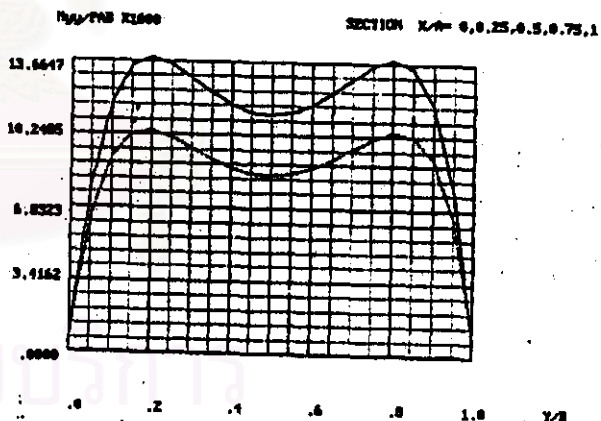
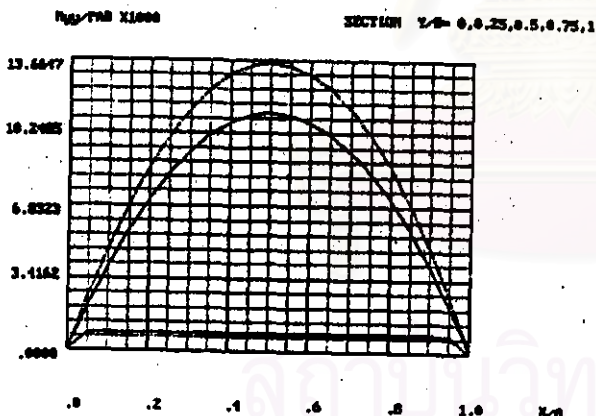
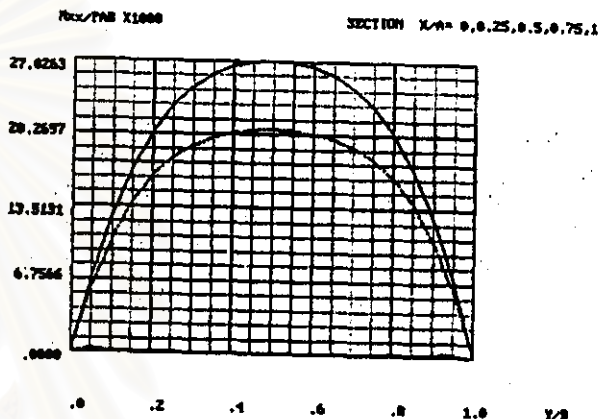
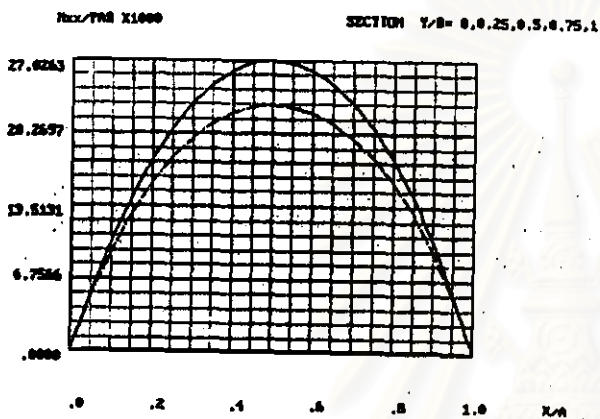
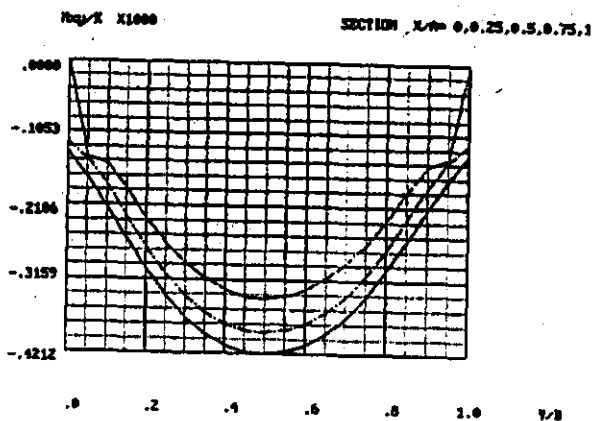
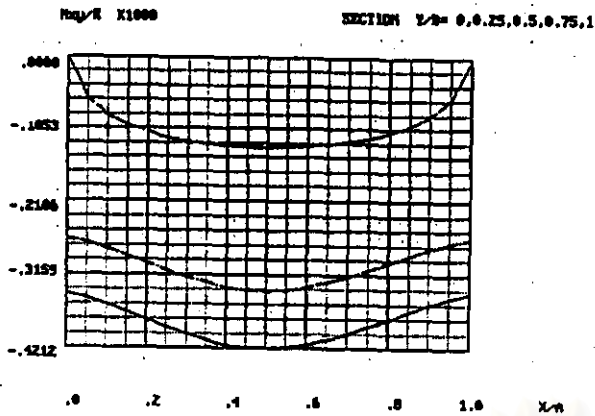
SECTION $Y/B = 0, 0.25, 0.5, 0.75, 1$



$R_{\theta y}/K \times 1000$

SECTION $X/A = 0, 0.25, 0.5, 0.75, 1$





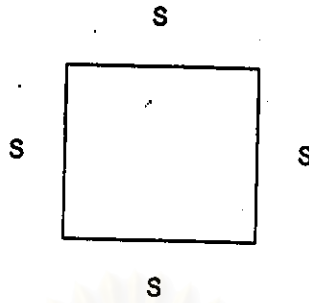
ผลของกรณีที่ 1 :

$$\frac{A}{B} = 1.0$$

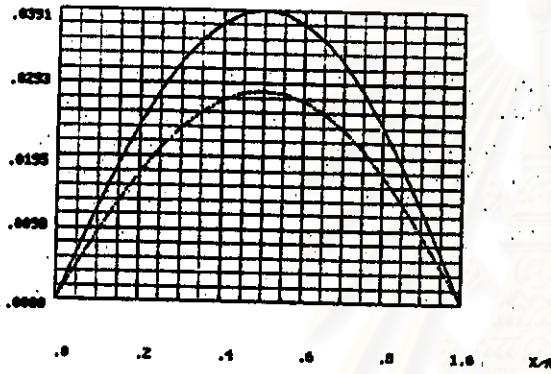
$$\frac{f}{h} = 2.0$$

$$\frac{P_3 AB}{Eh^2} = 0.001$$

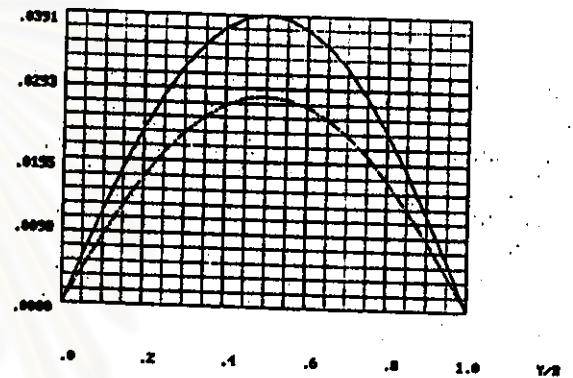
$$\nu = 0.3$$



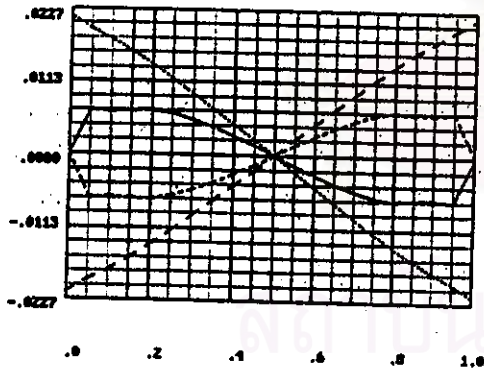
$u(h/AB) \times 1000$ SECTION $Y/B = 0, 0.25, 0.5, 0.75, 1$



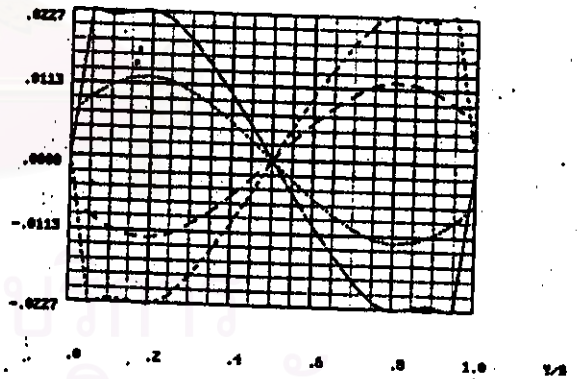
$u(h/AB) \times 1000$ SECTION $X/A = 0, 0.25, 0.5, 0.75, 1$



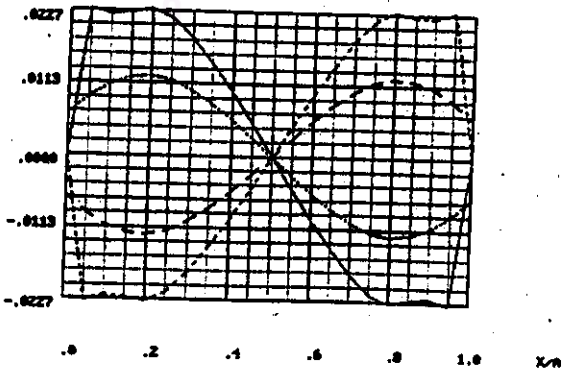
$\theta_{xx}/K \times 1000$ SECTION $Y/B = 0, 0.25, 0.5, 0.75, 1$



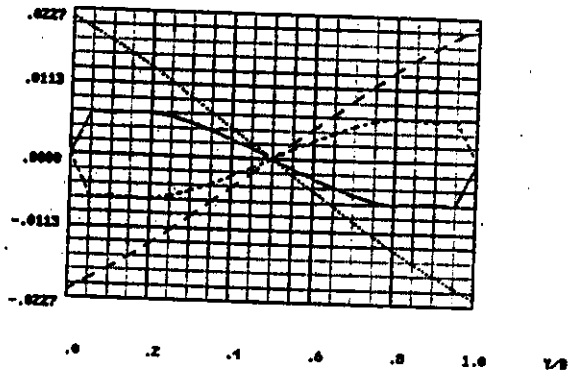
$\theta_{xx}/K \times 1000$ SECTION $X/A = 0, 0.25, 0.5, 0.75, 1$

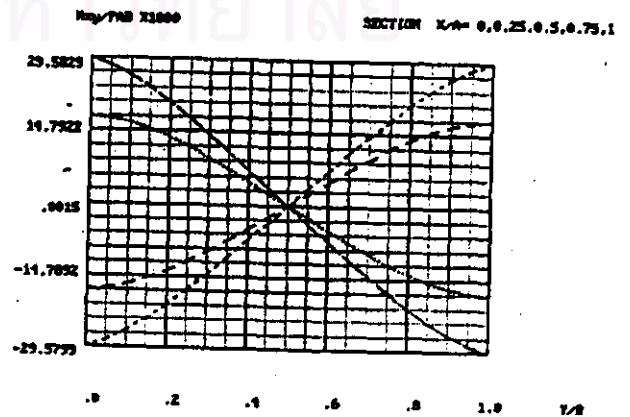
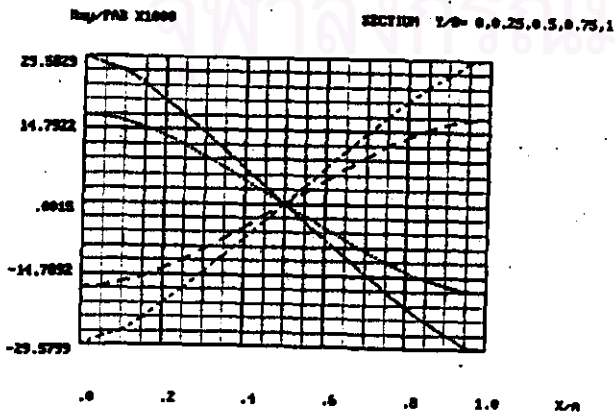
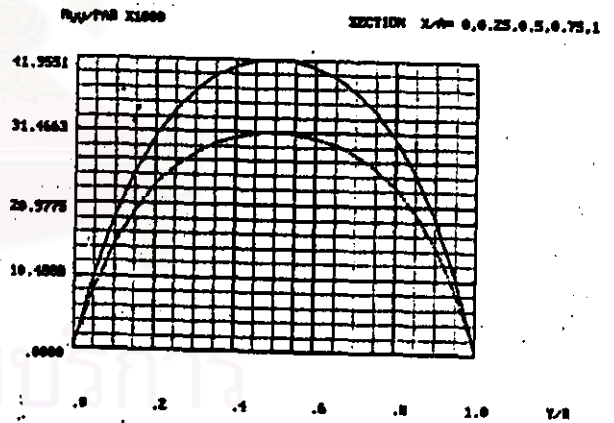
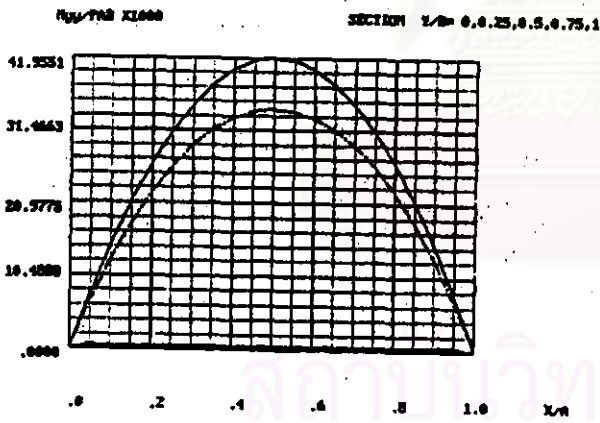
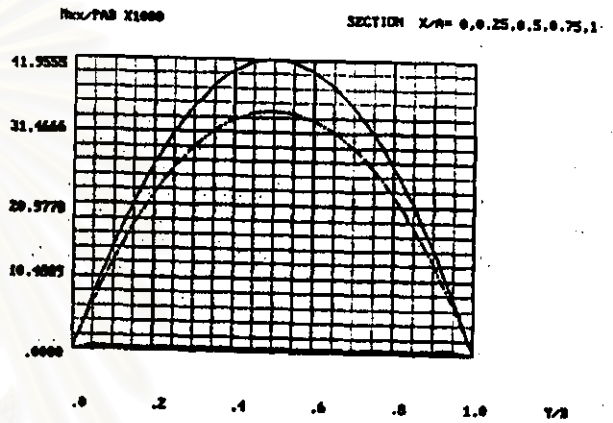
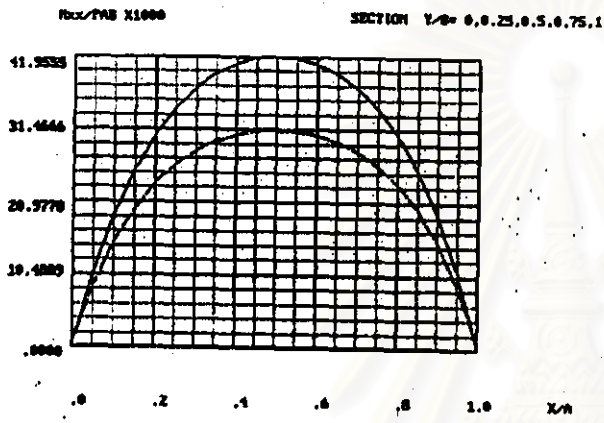
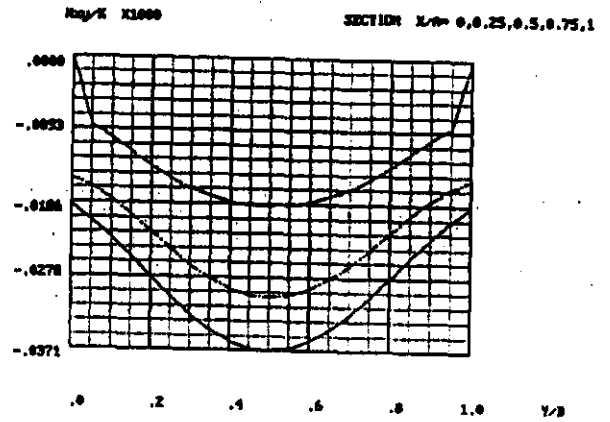
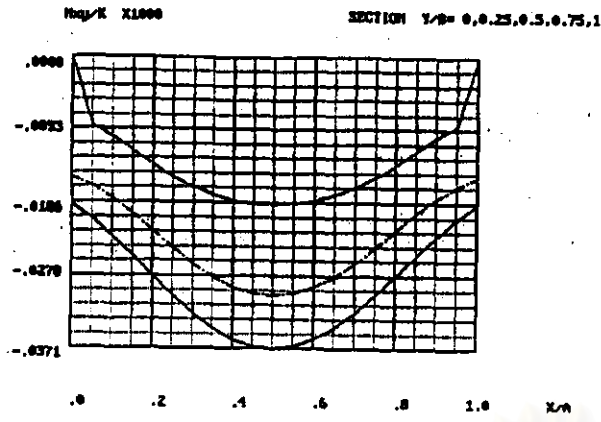


$\theta_{yy}/K \times 1000$ SECTION $Y/B = 0, 0.25, 0.5, 0.75, 1$



$\theta_{yy}/K \times 1000$ SECTION $X/A = 0, 0.25, 0.5, 0.75, 1$





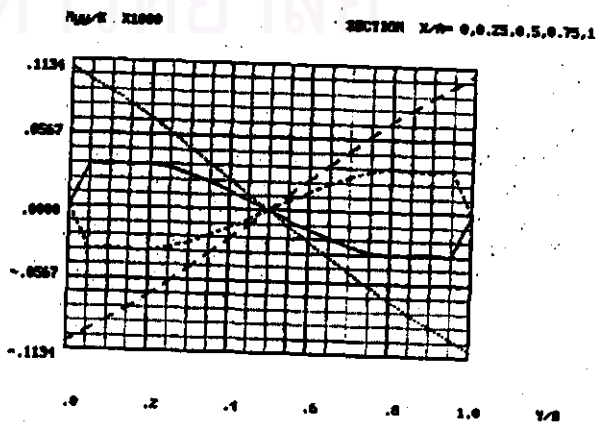
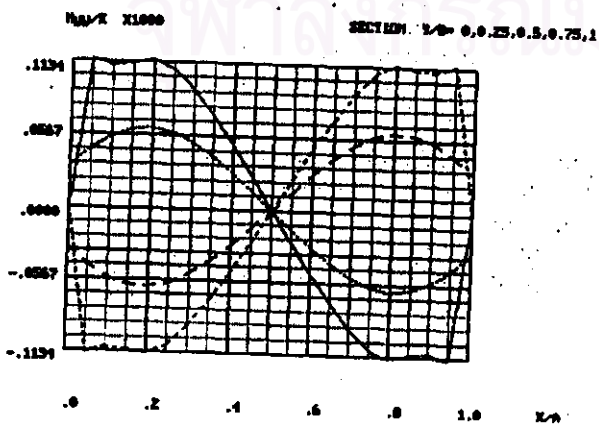
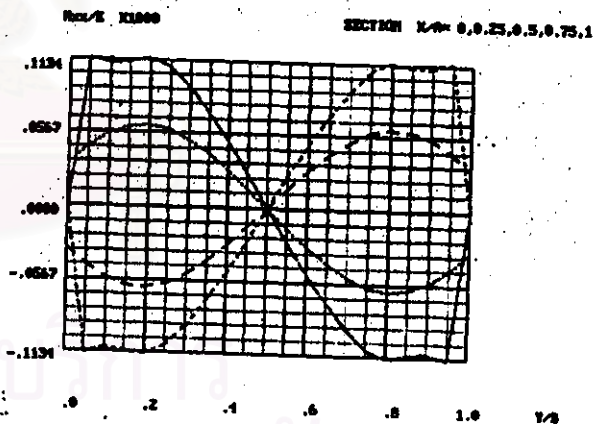
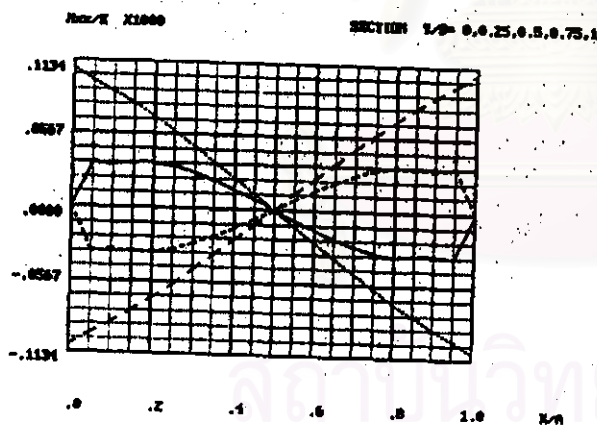
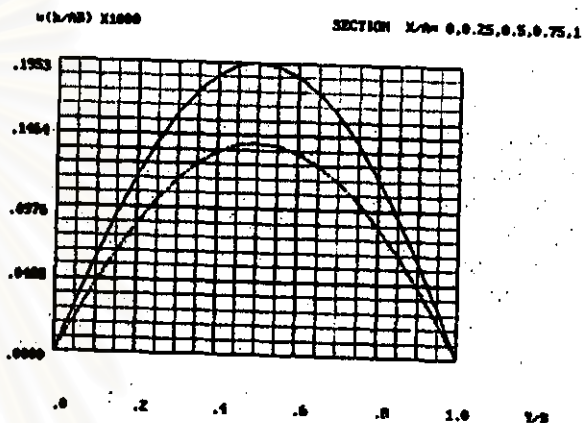
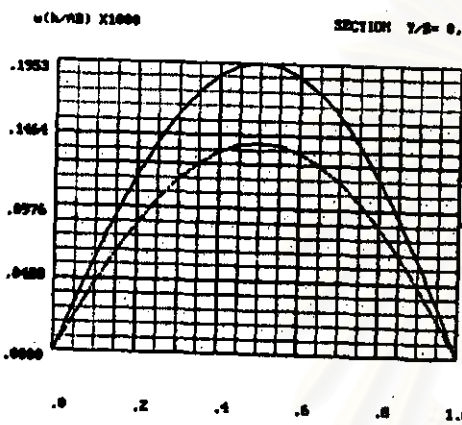
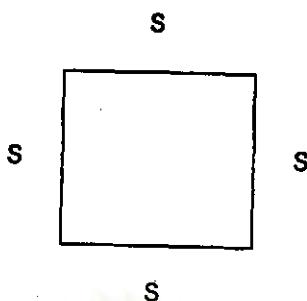
ผลของกรณีที่ 1 :

$$\frac{A}{B} = 1.0$$

$$\frac{f}{h} = 2.0$$

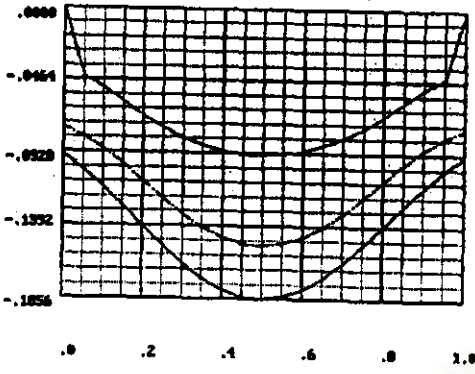
$$\frac{P_3 AB}{Eh^2} = 0.005$$

$$\nu = 0.3$$



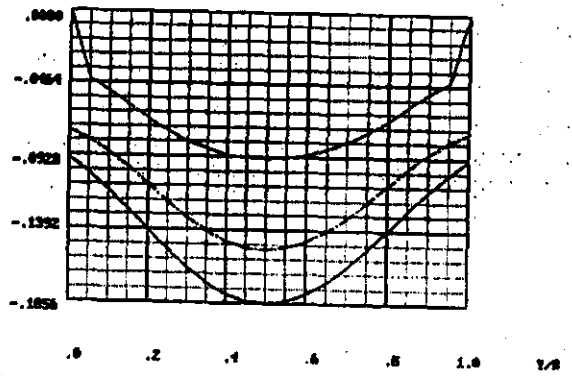
Fig/2 X1000

SECTION 1/2= 0.0,0.25,0.5,0.75,1



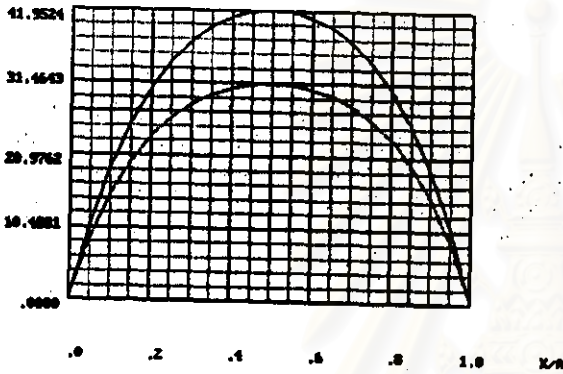
Fig/3 X1000

SECTION 1/4= 0.0,0.25,0.5,0.75,1



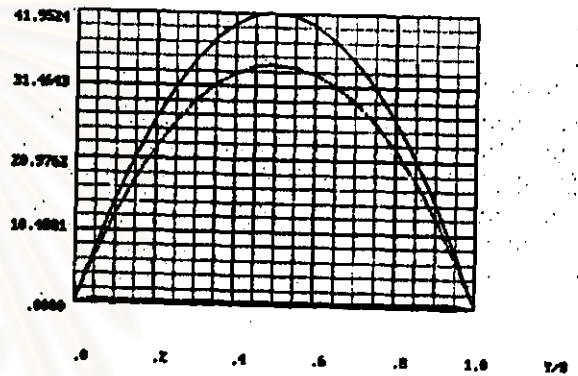
Fig/7A3 X1000

SECTION 1/2= 0.0,0.25,0.5,0.75,1



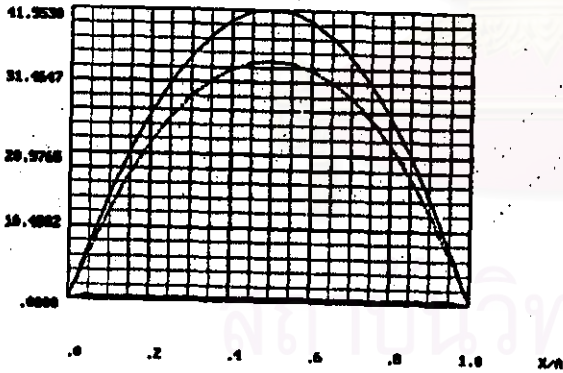
Fig/7A3 X1000

SECTION 1/4= 0.0,0.25,0.5,0.75,1



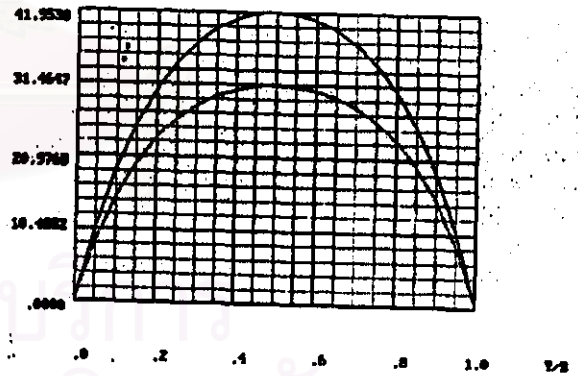
Fig/7A3 X1000

SECTION 1/2= 0.0,0.25,0.5,0.75,1



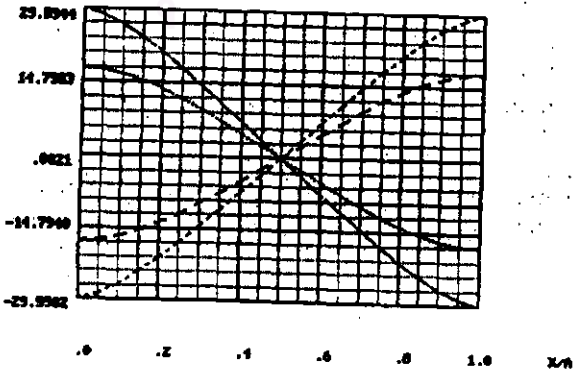
Fig/7A3 X1000

SECTION 1/4= 0.0,0.25,0.5,0.75,1



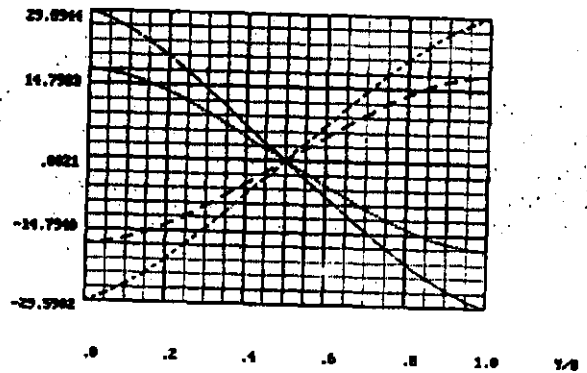
Fig/7A3 X1000

SECTION 1/2= 0.0,0.25,0.5,0.75,1



Fig/7A3 X1000

SECTION 1/4= 0.0,0.25,0.5,0.75,1



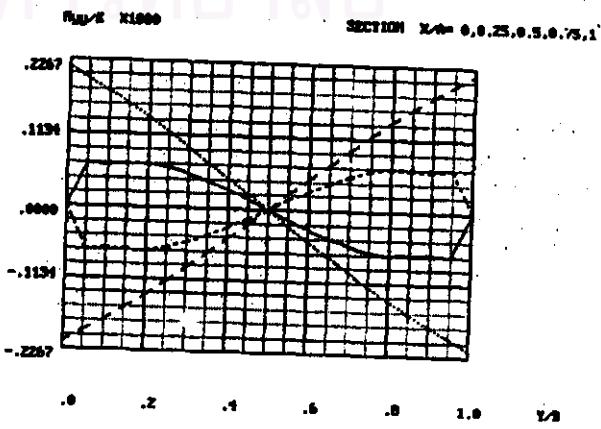
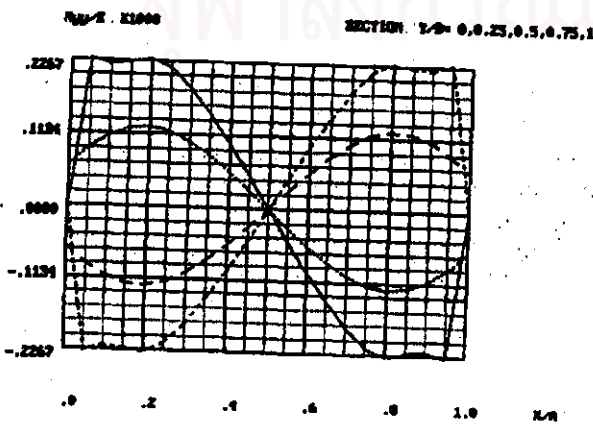
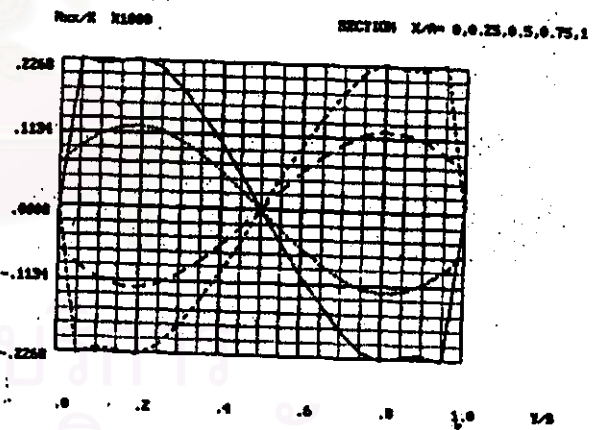
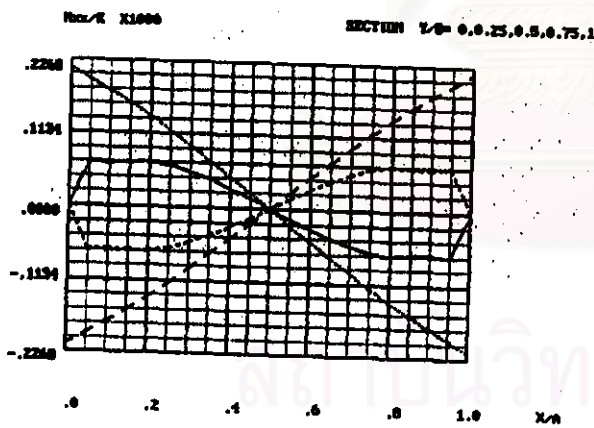
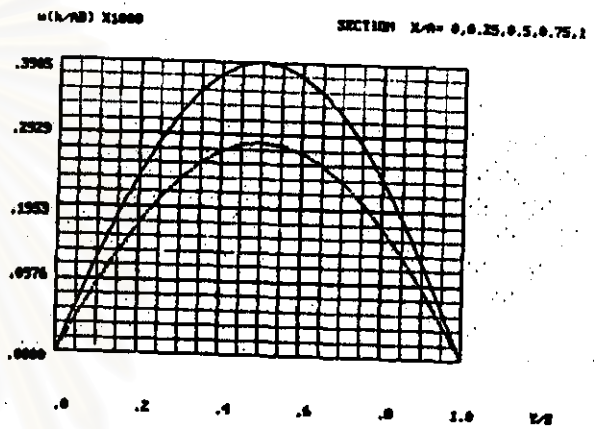
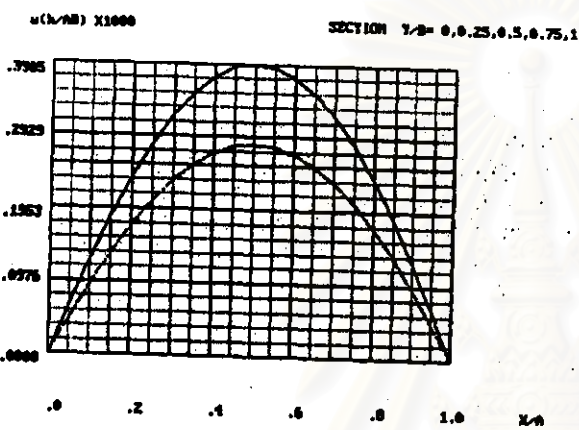
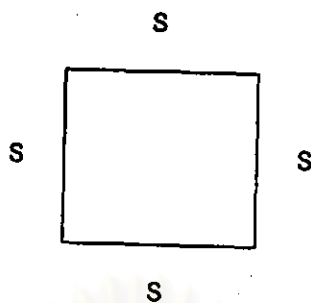
ผลของกรณีที่ 1 :

$$\frac{A}{B} = 1.0$$

$$\frac{f}{h} = 2.0$$

$$\frac{P_3 AB}{Eh^2} = 0.01$$

$$\nu = 0.3$$



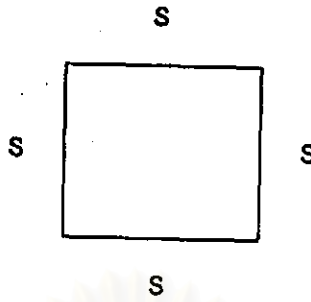
ผลของกรณีที่ 1 :

$$\frac{A}{B} = 1.0$$

$$\frac{f}{h} = 4.0$$

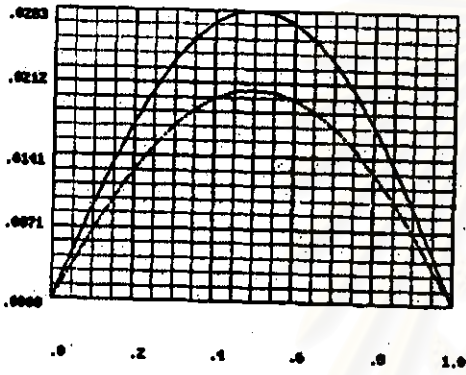
$$\frac{P_{j,AB}}{Eh^2} = 0.001$$

$$\nu = 0.3$$



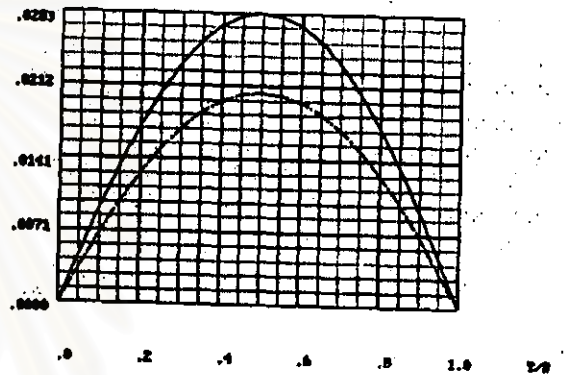
$w(L/AB) \times 1000$

SECTION $X/B = 0, 0.25, 0.5, 0.75, 1$



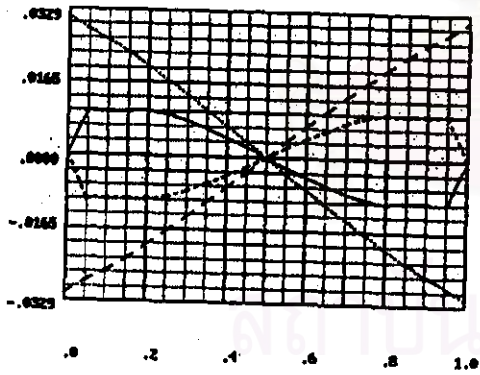
$w(L/AB) \times 1000$

SECTION $X/B = 0, 0.25, 0.5, 0.75, 1$



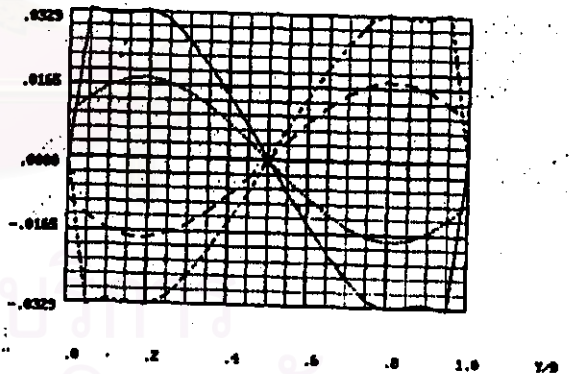
$M_{xx}/K \times 1000$

SECTION $X/B = 0, 0.25, 0.5, 0.75, 1$



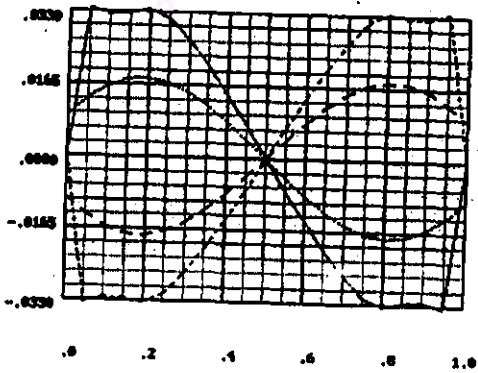
$M_{xx}/K \times 1000$

SECTION $X/B = 0, 0.25, 0.5, 0.75, 1$



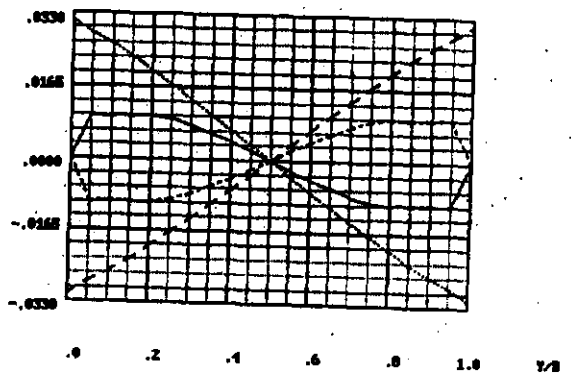
$M_{yy}/K \times 1000$

SECTION $X/B = 0, 0.25, 0.5, 0.75, 1$



$M_{yy}/K \times 1000$

SECTION $X/B = 0, 0.25, 0.5, 0.75, 1$



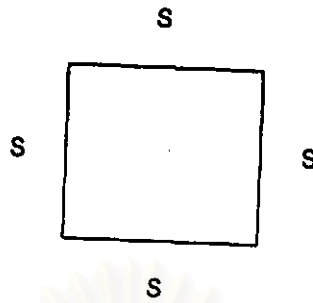
ผลของกรณีที่ 1 :

$$\frac{A}{B} = 1.0$$

$$\frac{f}{h} = 4.0$$

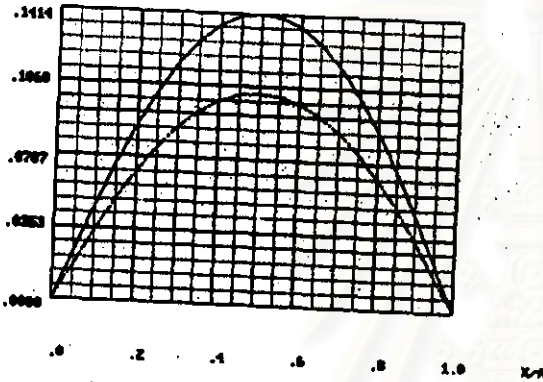
$$\frac{P_3 AB}{Eh^2} = 0.005$$

$$\nu = 0.3$$



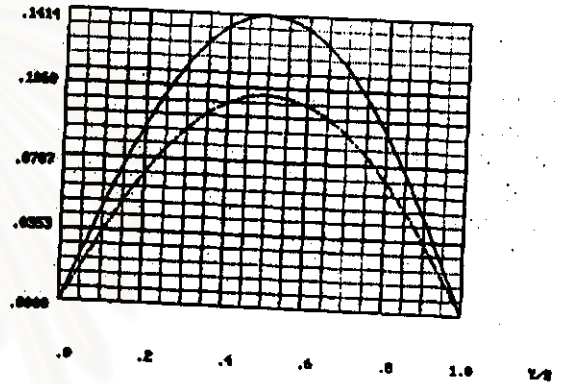
$u(L/AB) \times 1000$

SECTION $Y/B = 0.0, 0.25, 0.5, 0.75, 1$



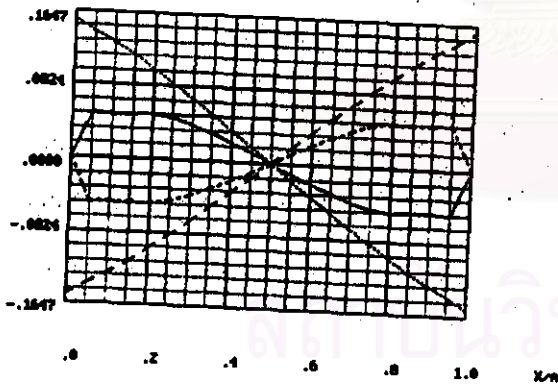
$u(L/AB) \times 1000$

SECTION $X/h = 0.0, 0.25, 0.5, 0.75, 1$



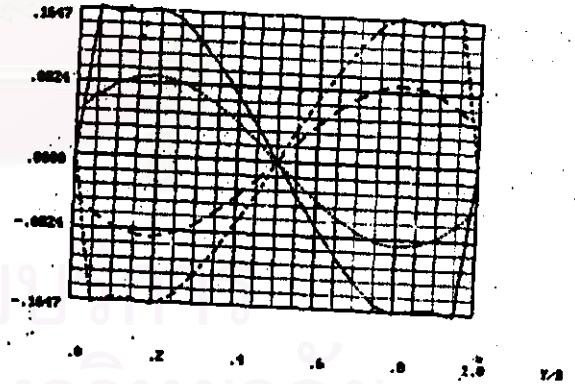
$w(X/K) \times 1000$

SECTION $Y/B = 0.0, 0.25, 0.5, 0.75, 1$



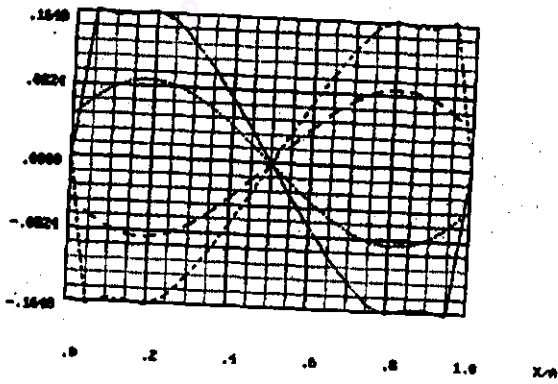
$w(X/K) \times 1000$

SECTION $X/h = 0.0, 0.25, 0.5, 0.75, 1$



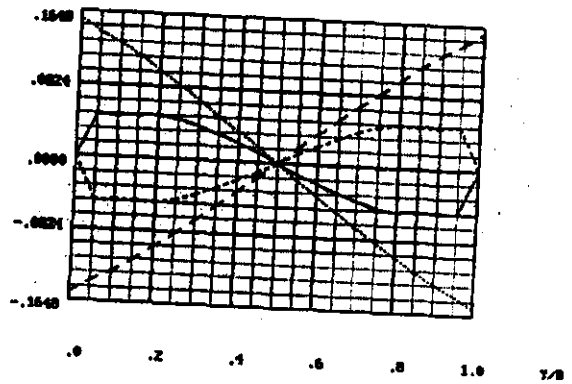
$\psi(X/K) \times 1000$

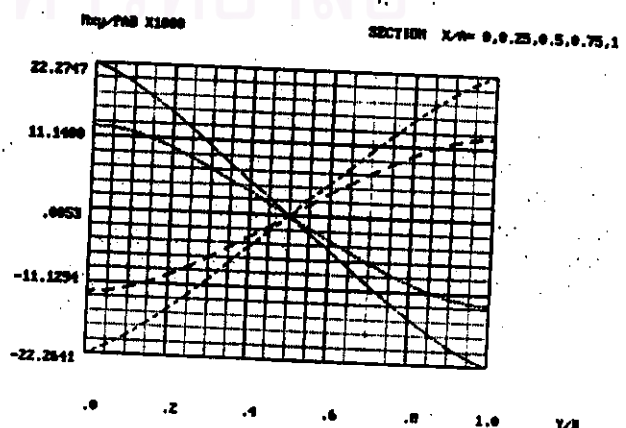
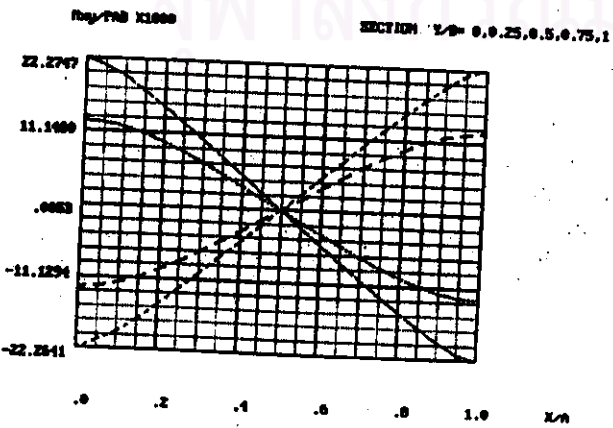
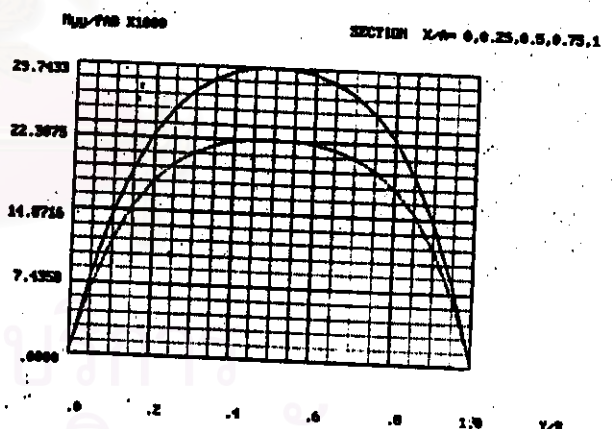
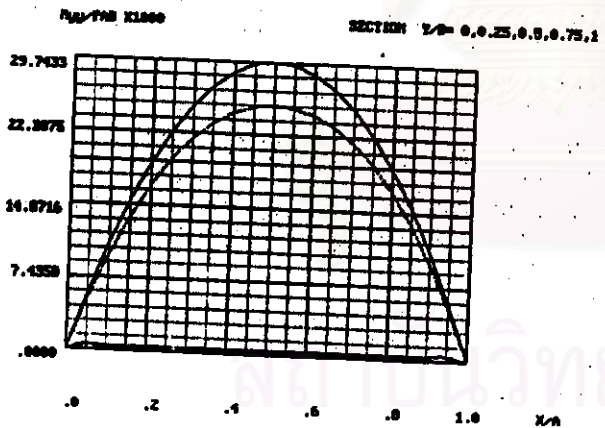
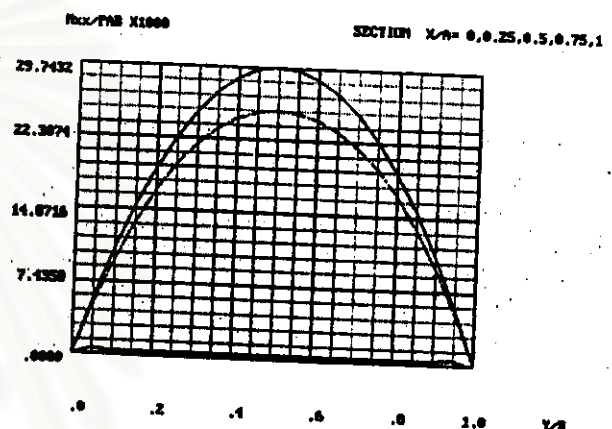
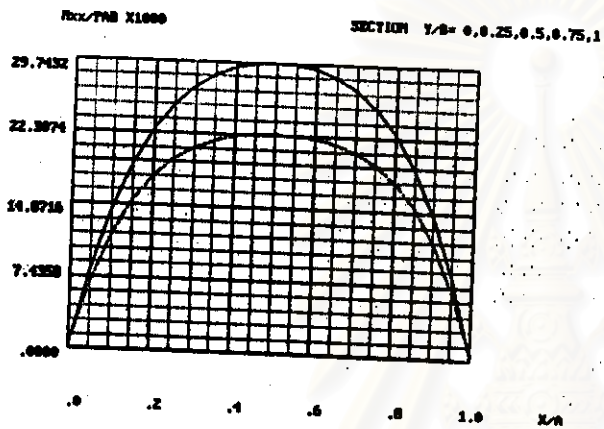
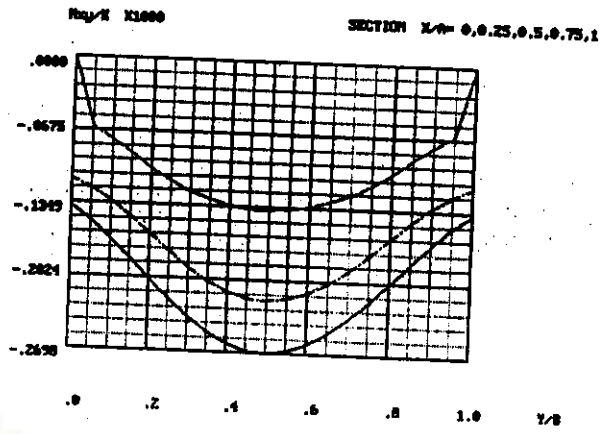
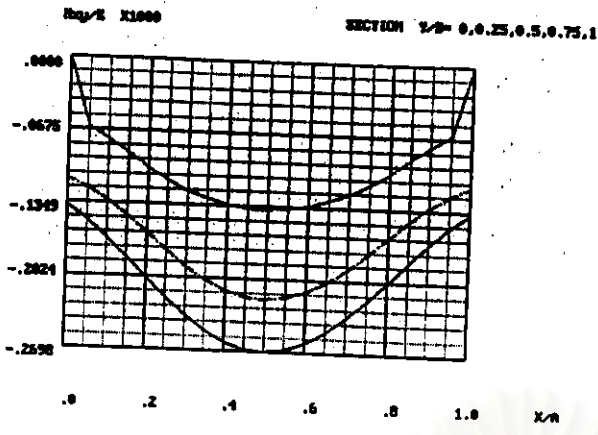
SECTION $Y/B = 0.0, 0.25, 0.5, 0.75, 1$



$\psi(X/K) \times 1000$

SECTION $X/h = 0.0, 0.25, 0.5, 0.75, 1$





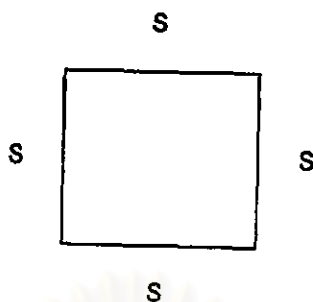
ผลของกรณีที่ 1 :

$$\frac{A}{B} = 1.0$$

$$\frac{f}{h} = 4.0$$

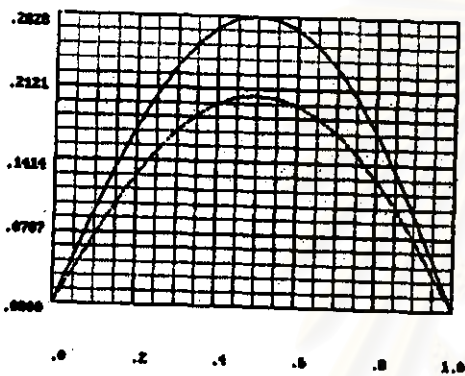
$$\frac{P_3 AB}{Eh^2} = 0.01$$

$$\nu = 0.3$$



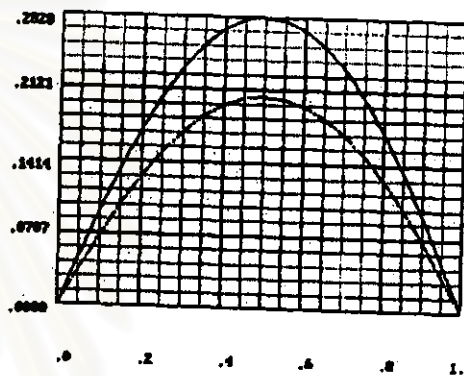
$w(h/\delta) \times 1000$

SECTION $l/h = 0.0, 0.25, 0.5, 0.75, 1$



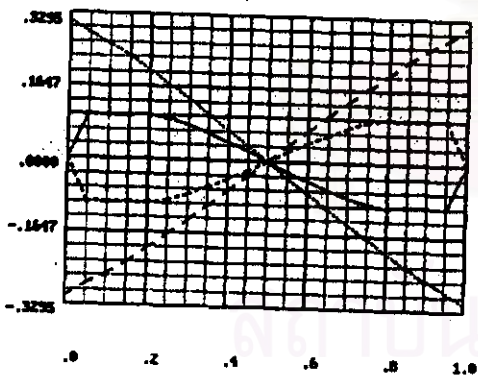
$w(h/\delta) \times 1000$

SECTION $l/h = 0.0, 0.25, 0.5, 0.75, 1$



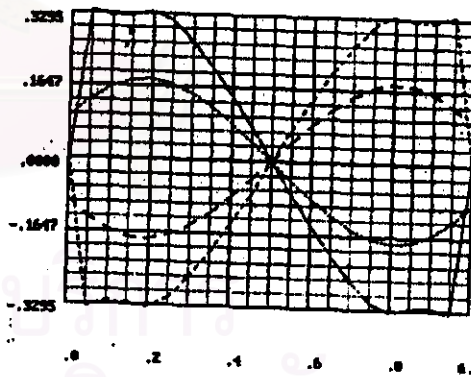
$\theta_{max}/\epsilon \times 1000$

SECTION $l/h = 0.0, 0.25, 0.5, 0.75, 1$



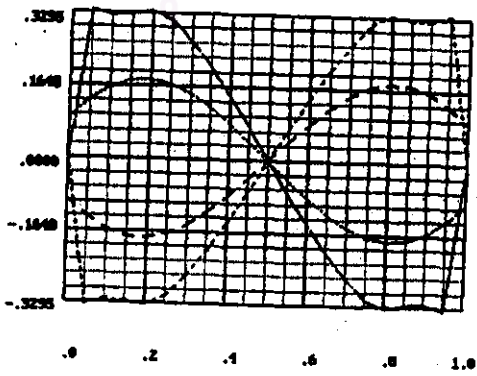
$\theta_{max}/\epsilon \times 1000$

SECTION $l/h = 0.0, 0.25, 0.5, 0.75, 1$



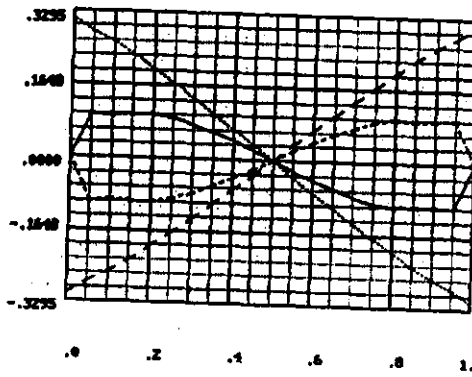
$\theta_{min}/\epsilon \times 1000$

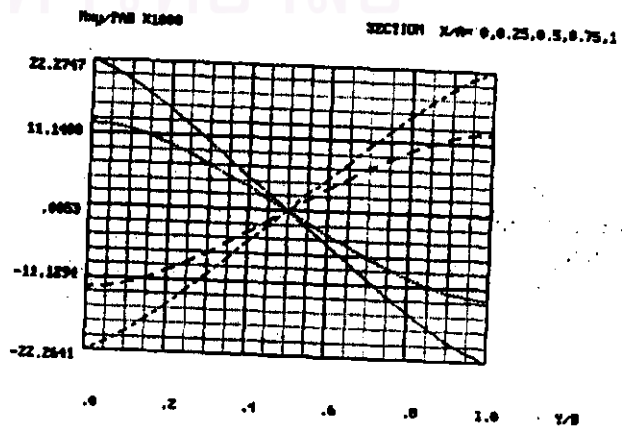
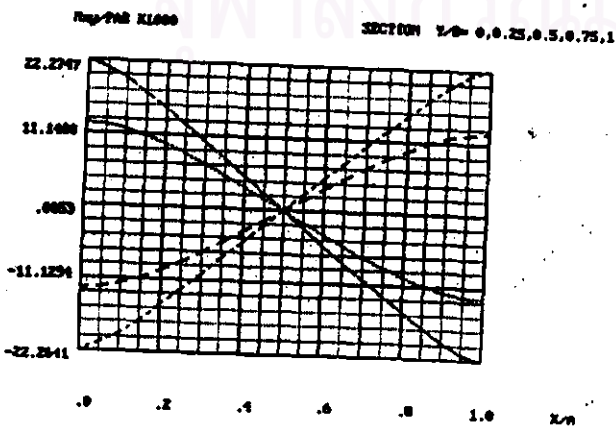
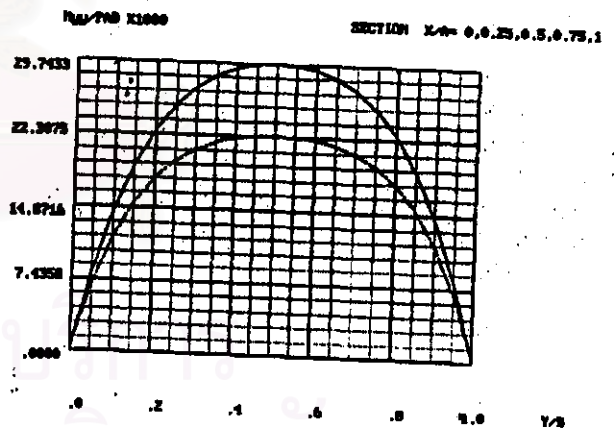
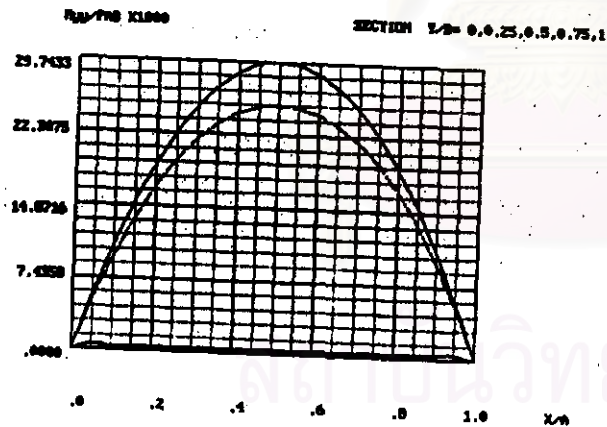
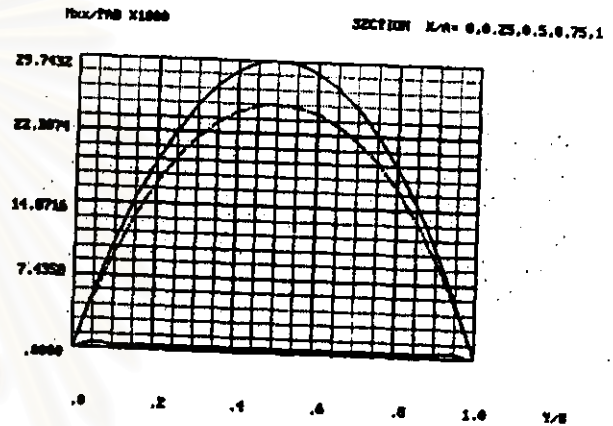
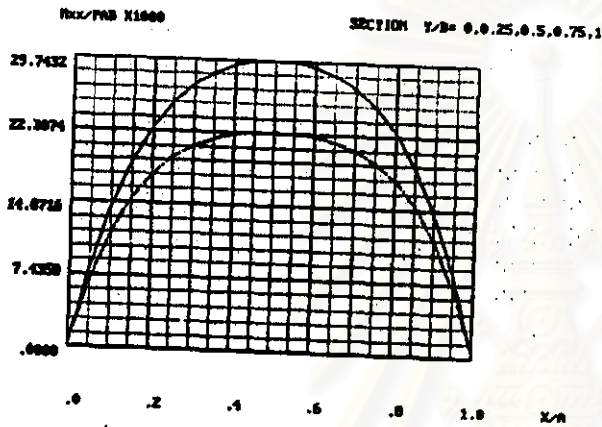
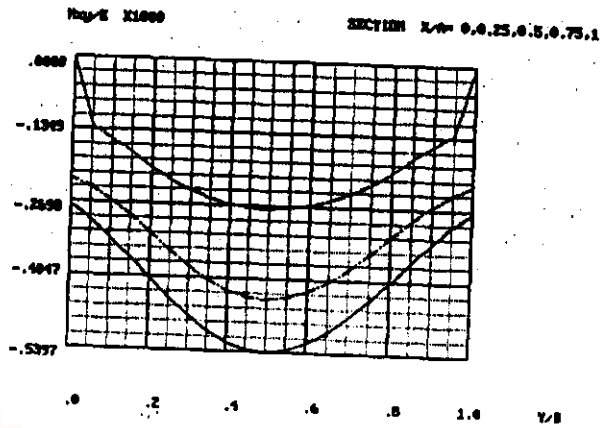
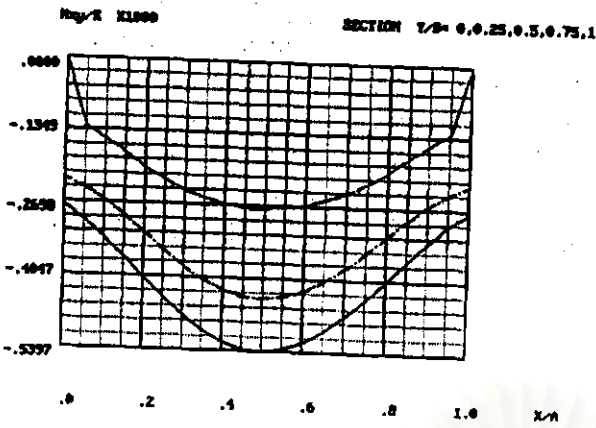
SECTION $l/h = 0.0, 0.25, 0.5, 0.75, 1$



$\theta_{min}/\epsilon \times 1000$

SECTION $l/h = 0.0, 0.25, 0.5, 0.75, 1$





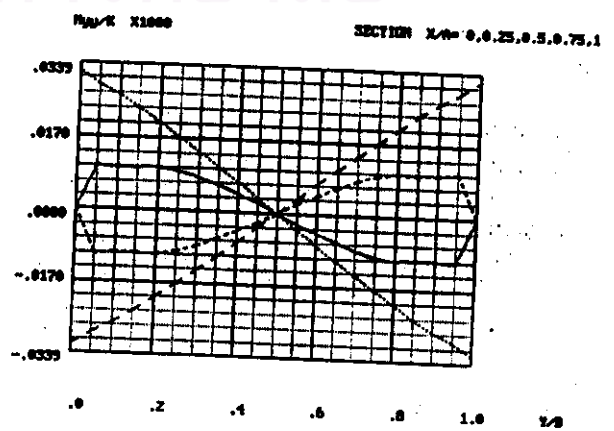
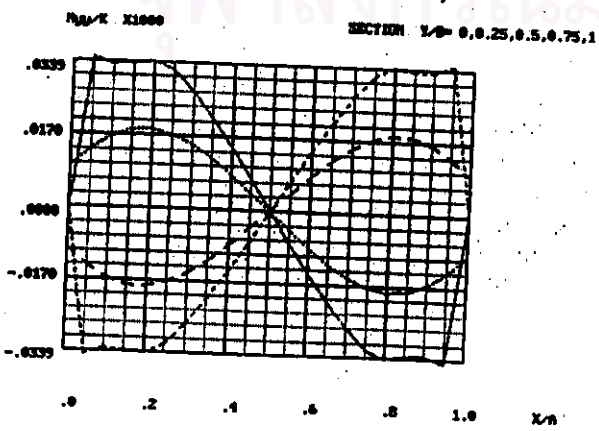
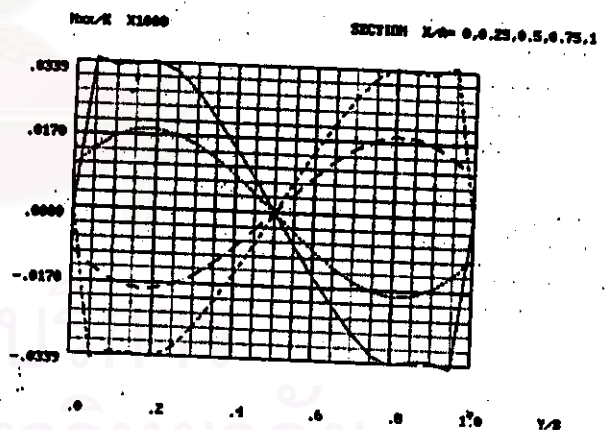
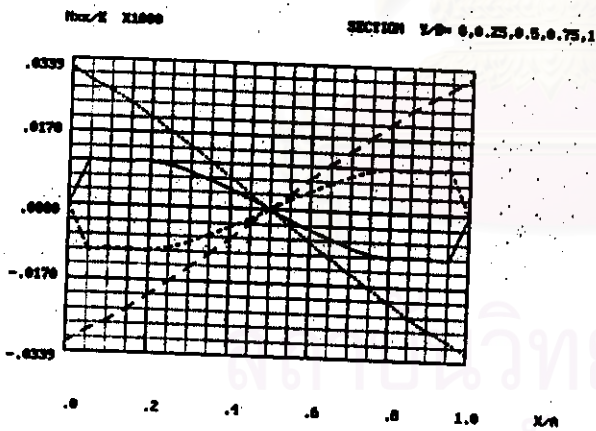
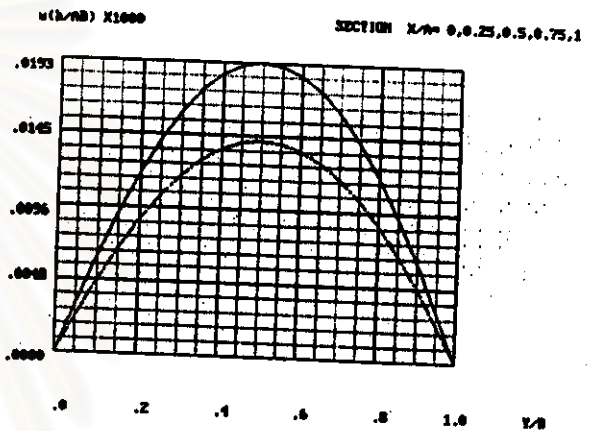
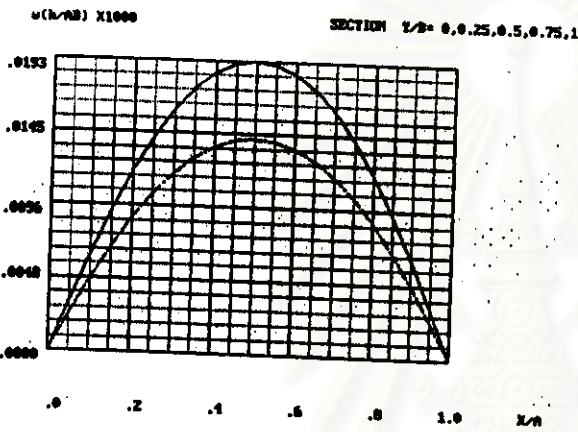
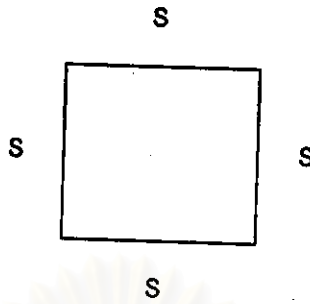
ผลของกรณีที่ 1 :

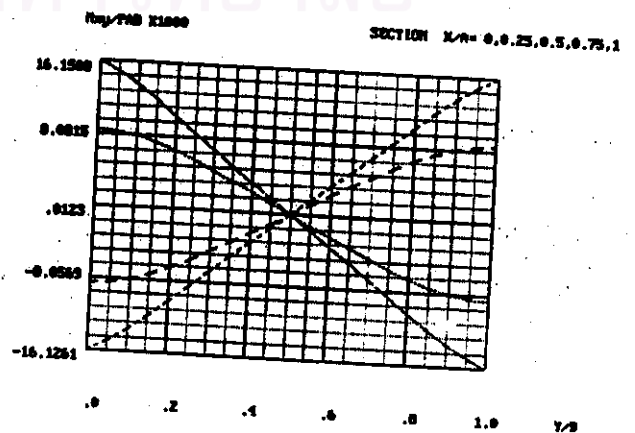
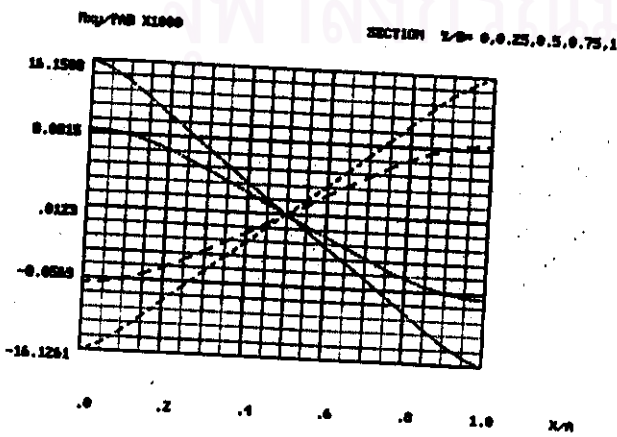
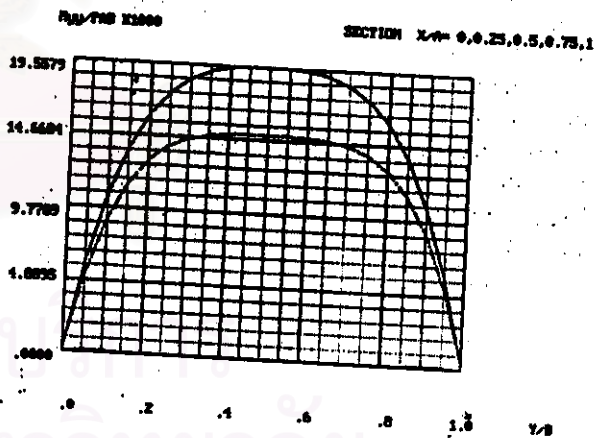
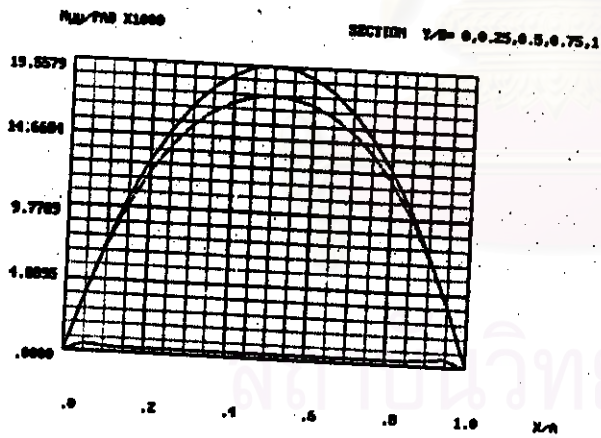
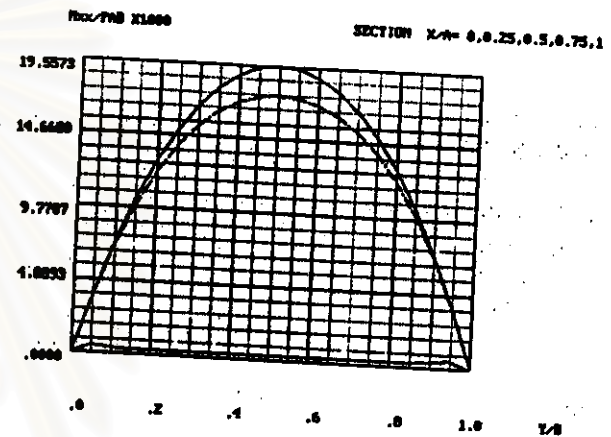
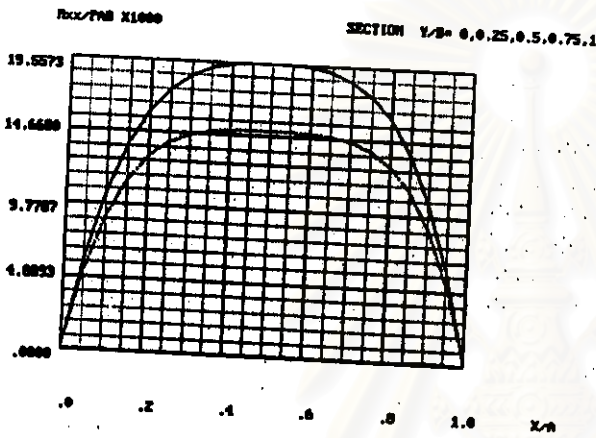
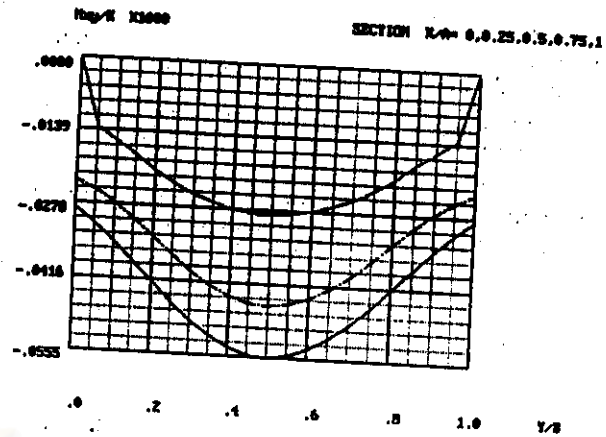
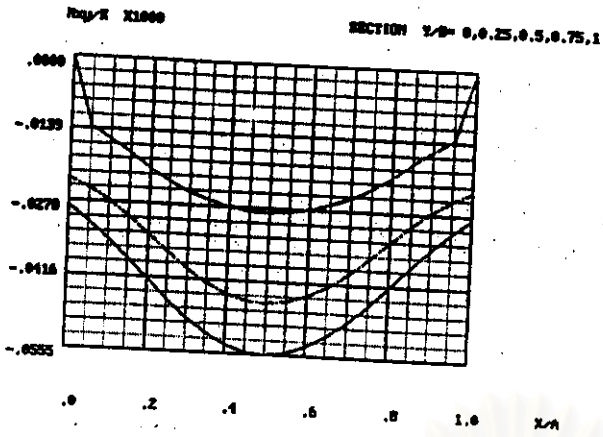
$$\frac{A}{B} = 1.0$$

$$\frac{f}{h} = 6.0$$

$$\frac{P_3 AB}{Eh^2} = 0.001$$

$$\nu = 0.3$$





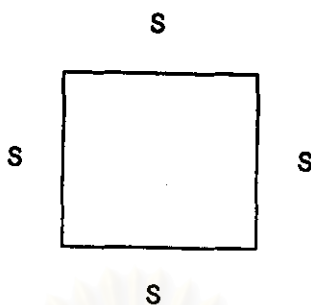
ผลของกรณีที่ 1 :

$$\frac{A}{B} = 1.0$$

$$\frac{f}{h} = 6.0$$

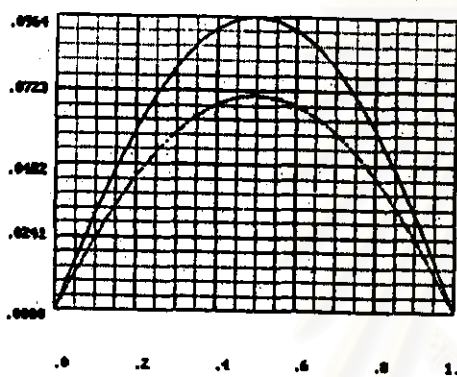
$$\frac{P_3 AB}{Eh^2} = 0.005$$

$$\nu = 0.3$$



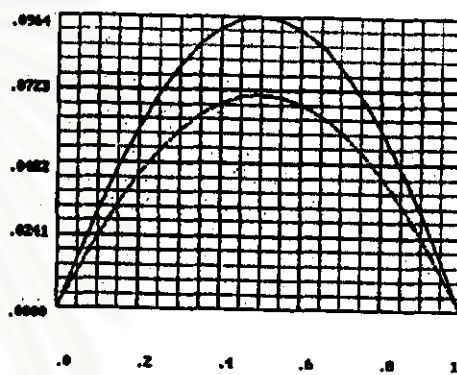
$w(L/8) \times 1000$

SECTION $L/a = 0.0, 0.25, 0.5, 0.75, 1$



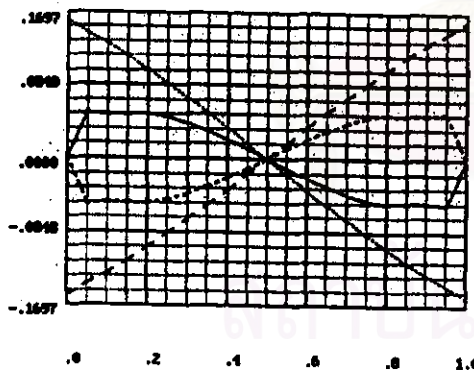
$w(L/8) \times 1000$

SECTION $L/a = 0.0, 0.25, 0.5, 0.75, 1$



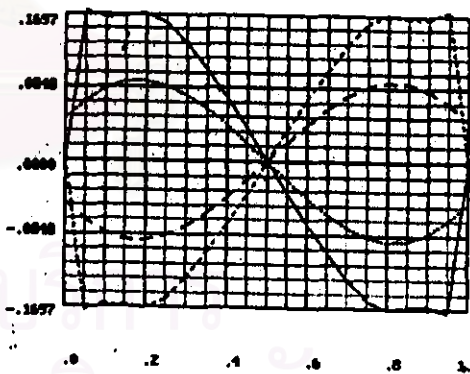
$M_{xx}/E \times 1000$

SECTION $L/a = 0.0, 0.25, 0.5, 0.75, 1$



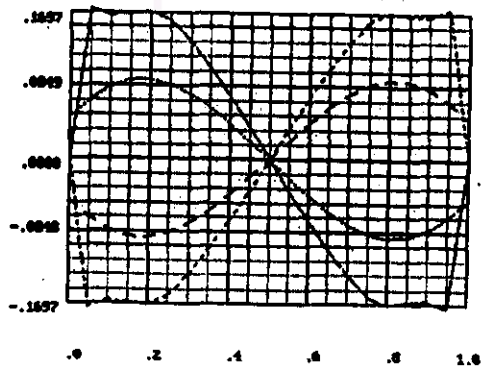
$M_{xx}/E \times 1000$

SECTION $L/a = 0.0, 0.25, 0.5, 0.75, 1$



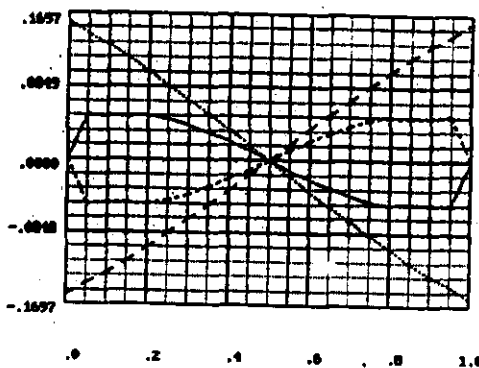
$M_{yy}/E \times 1000$

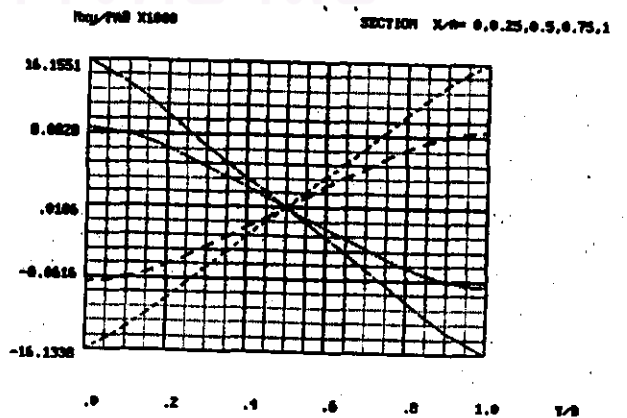
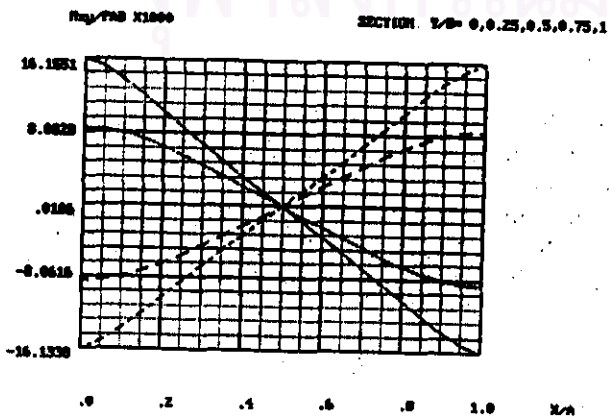
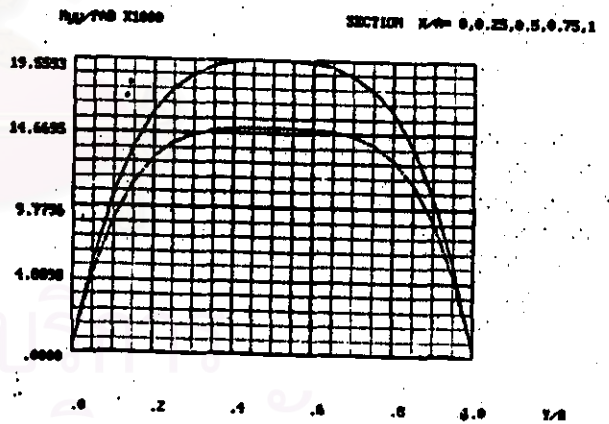
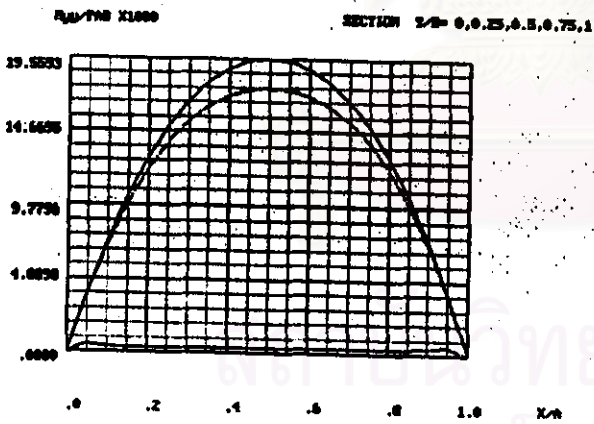
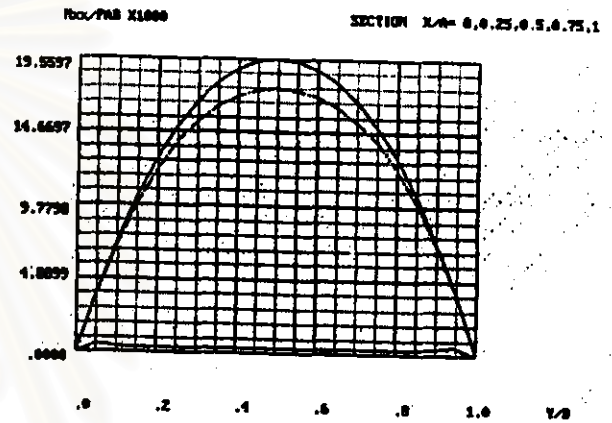
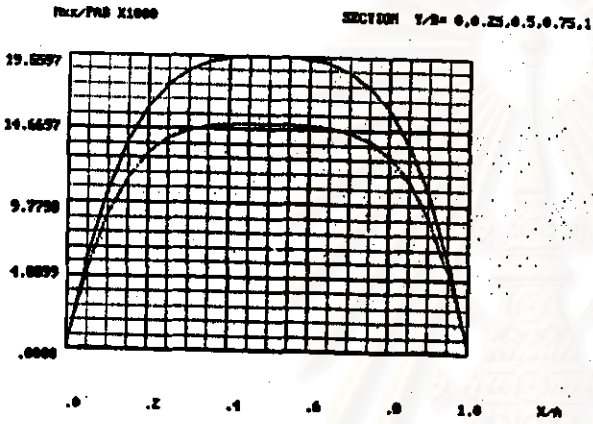
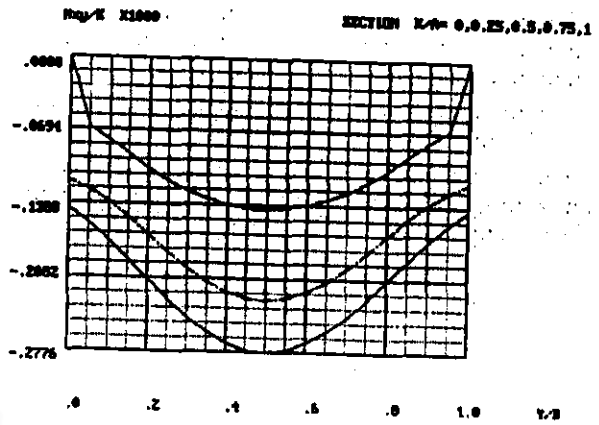
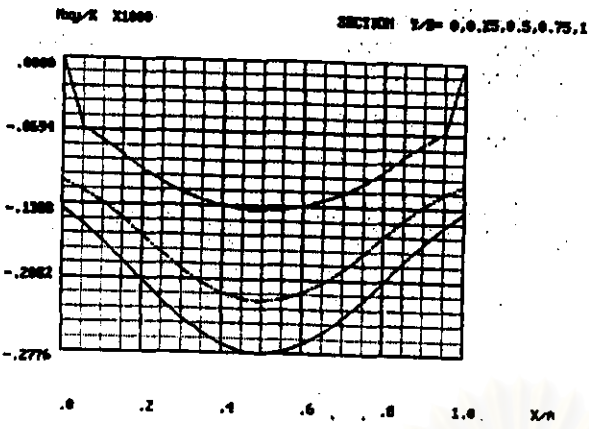
SECTION $L/a = 0.0, 0.25, 0.5, 0.75, 1$



$M_{yy}/E \times 1000$

SECTION $L/a = 0.0, 0.25, 0.5, 0.75, 1$





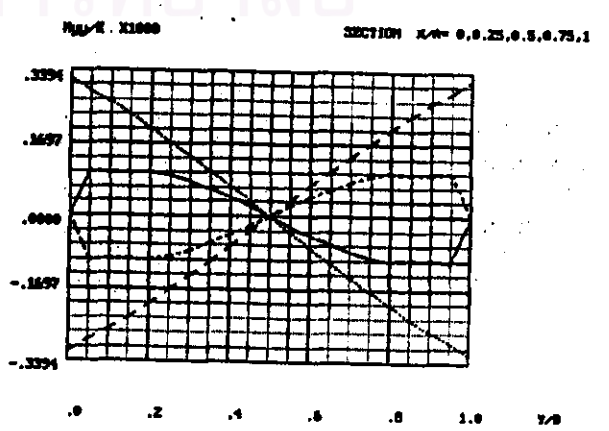
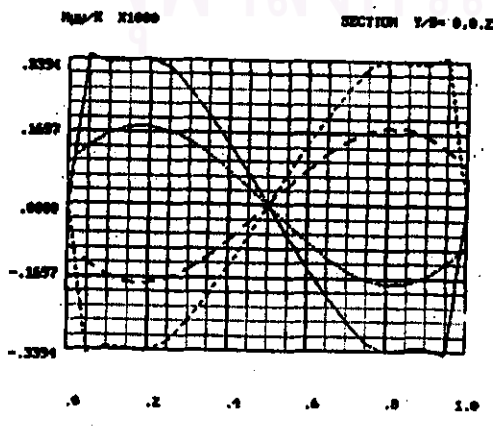
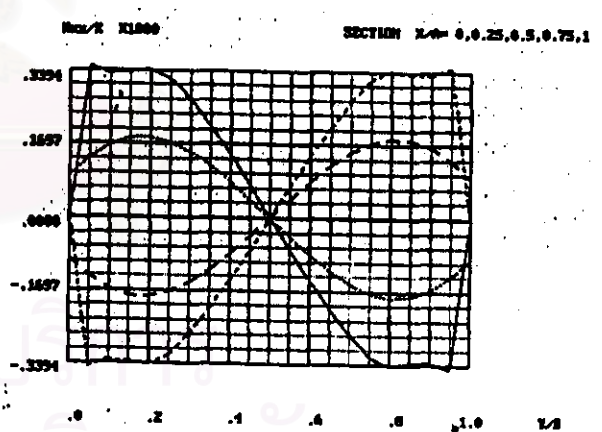
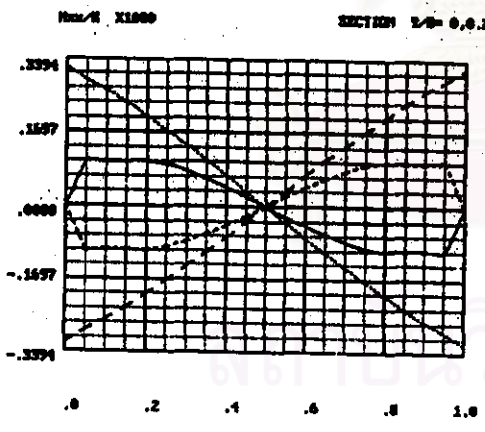
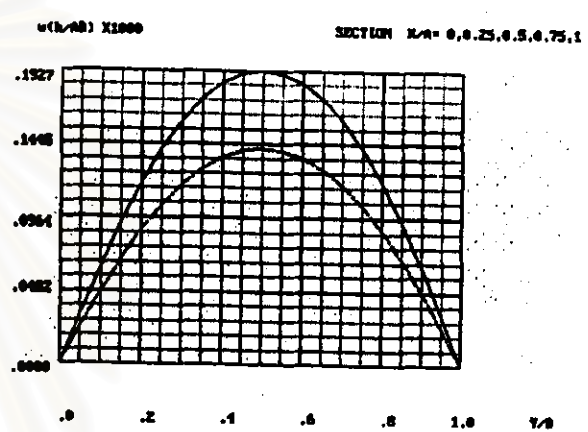
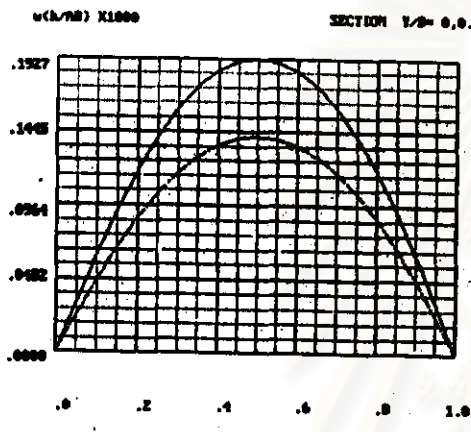
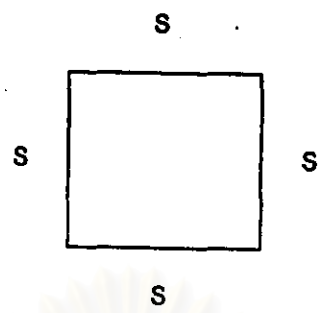
ผลของกรณีที่ 1 :

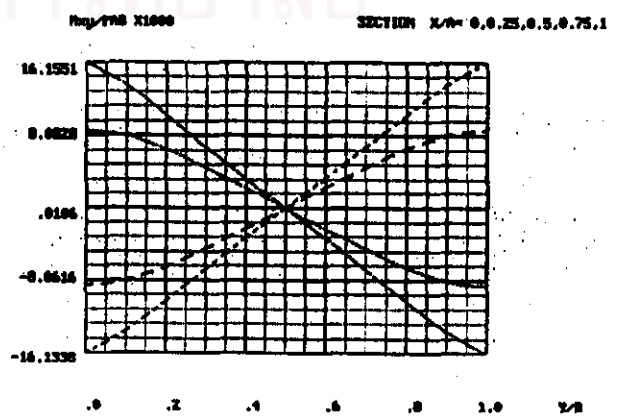
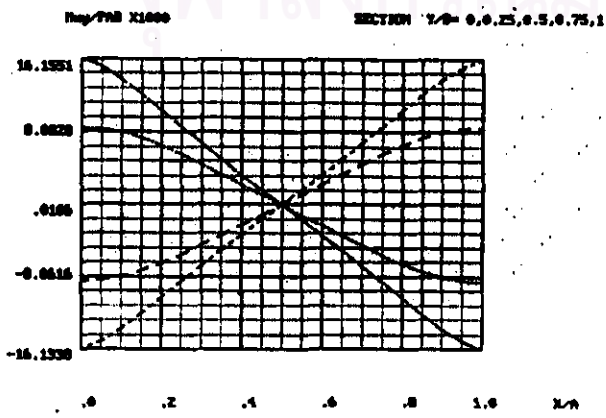
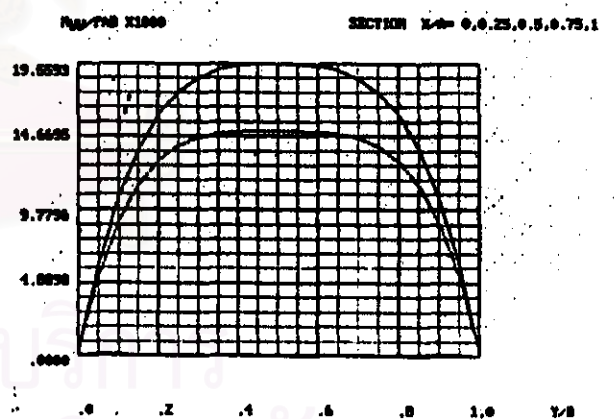
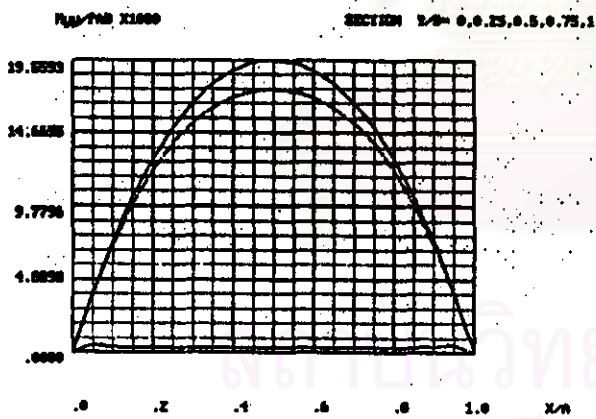
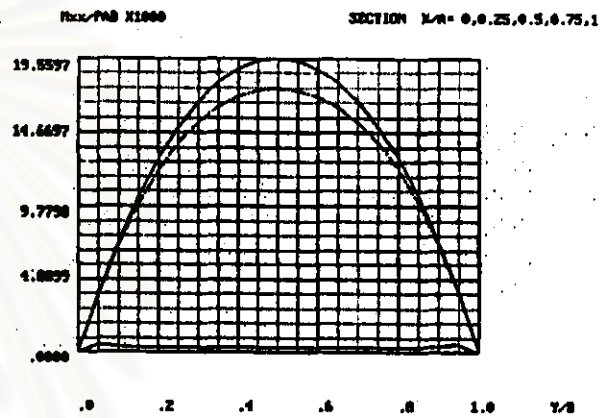
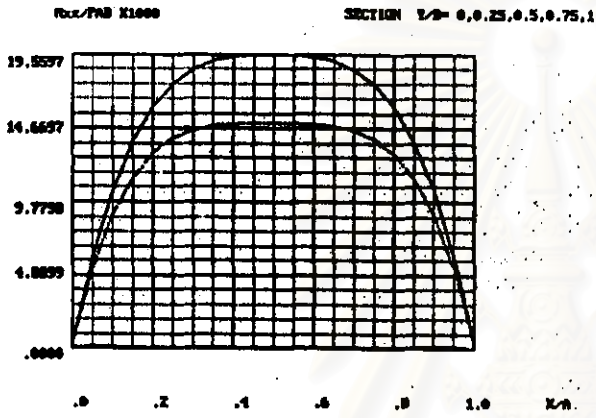
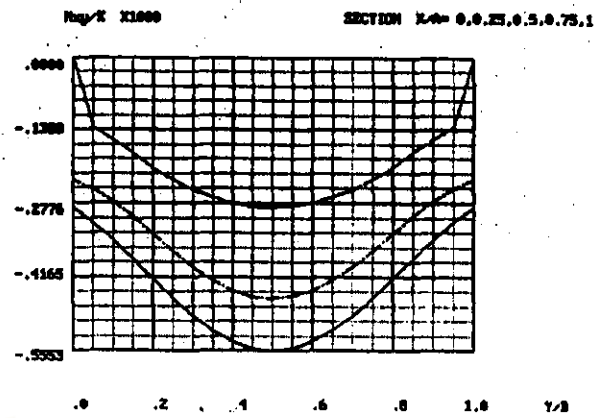
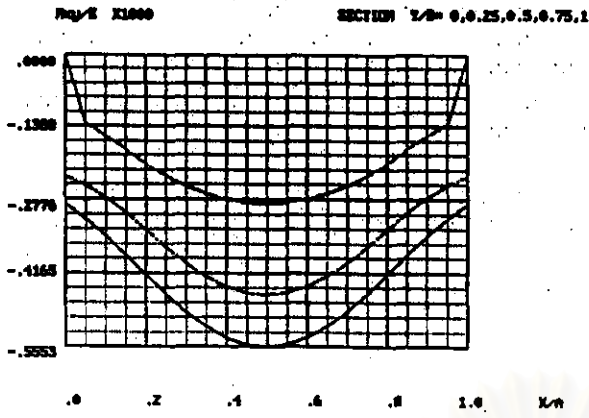
$$\frac{A}{B} = 1.0$$

$$\frac{f}{h} = 6.0$$

$$\frac{P_{3,AB}}{Eh^2} = 0.01$$

$$\nu = 0.3$$





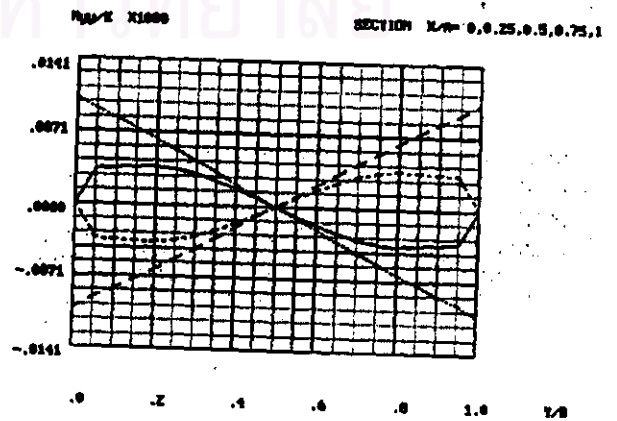
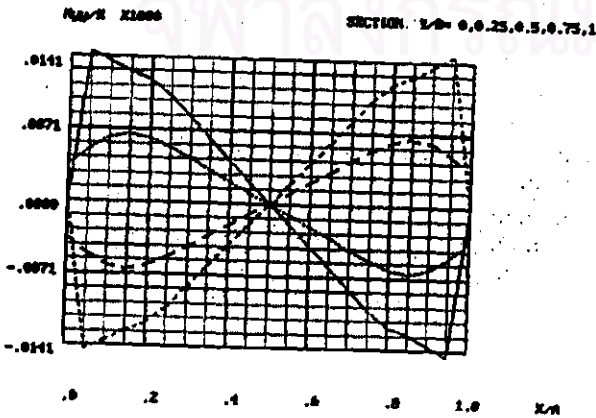
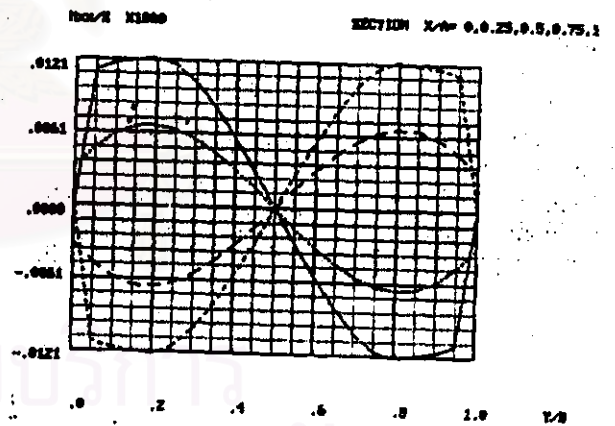
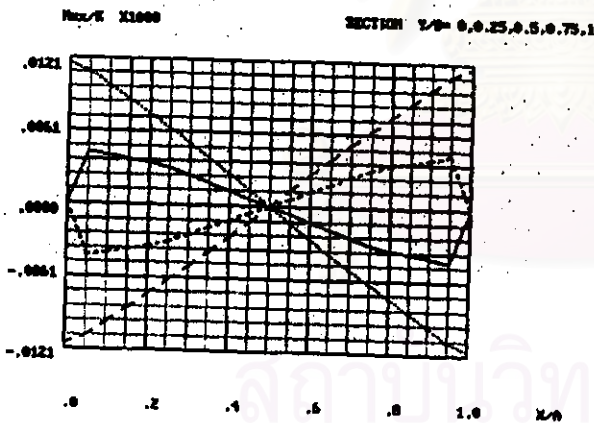
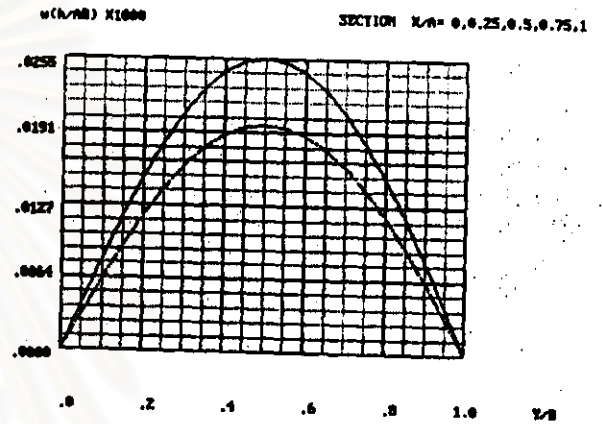
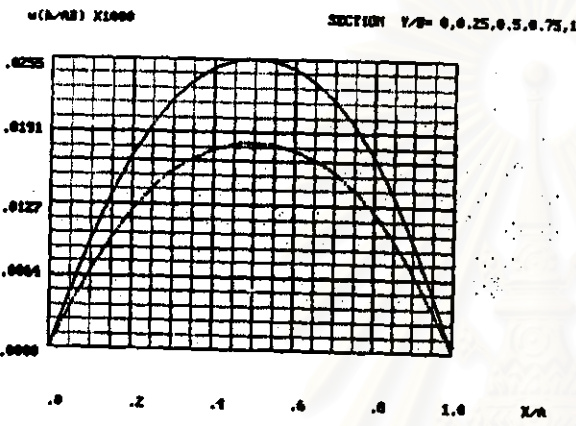
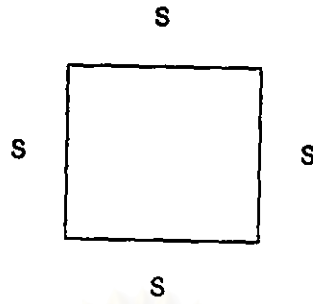
ผลของกรณีที่ 1 :

$$\frac{A}{B} = 2.0$$

$$\frac{f}{h} = 2.0$$

$$\frac{P_3 AB}{Eh^2} = 0.001$$

$$\nu = 0.3$$



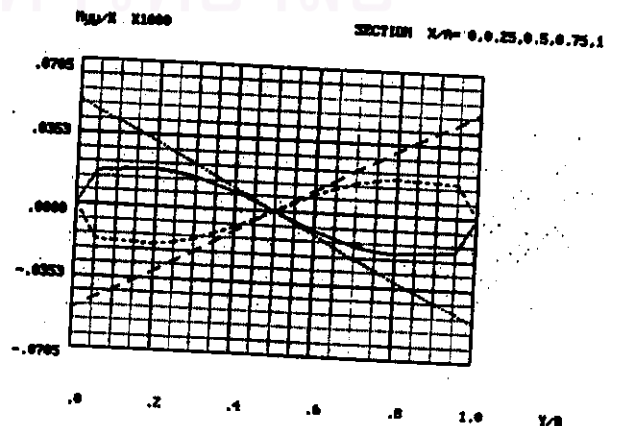
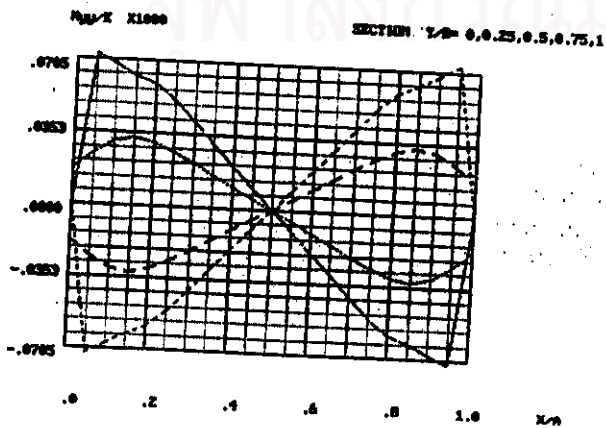
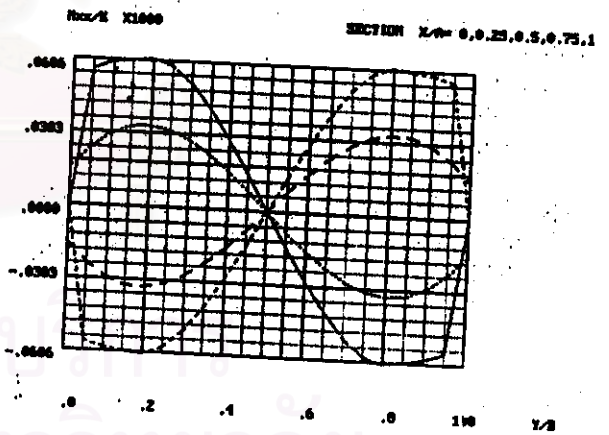
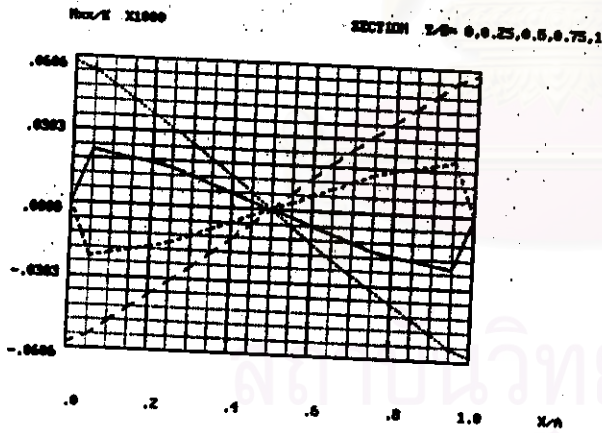
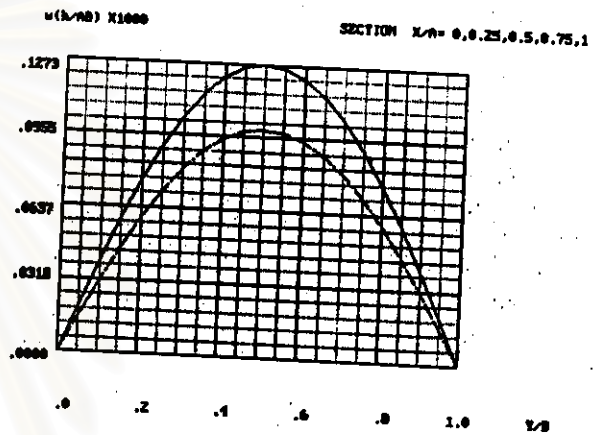
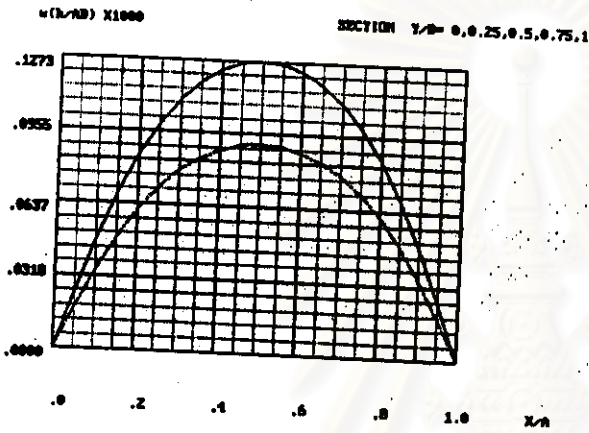
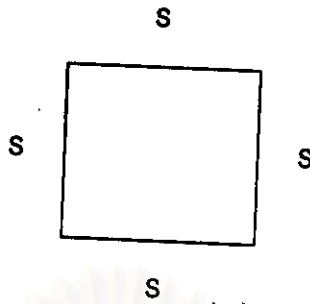
ผลของกรณีที่ 1 :

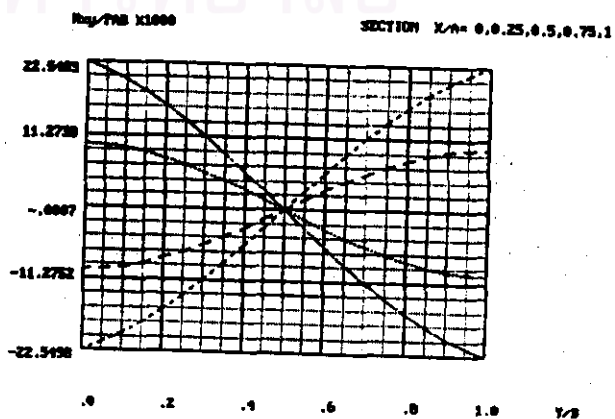
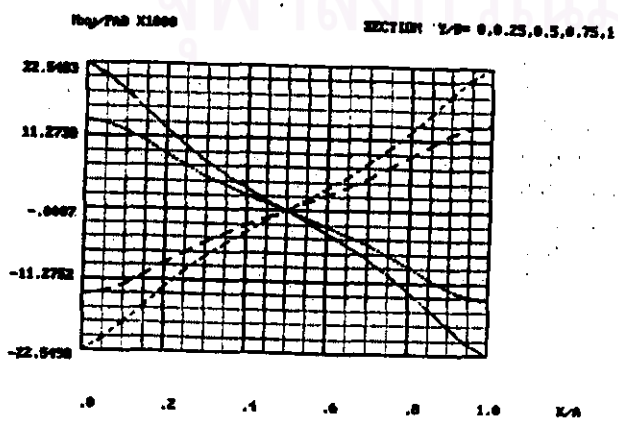
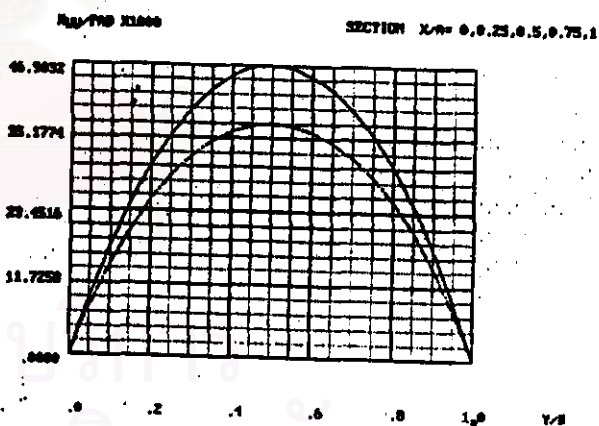
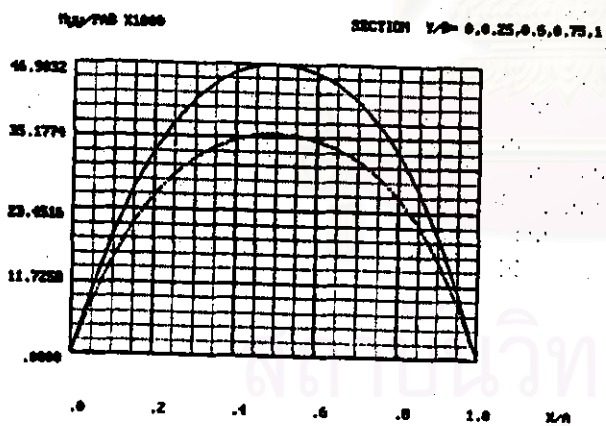
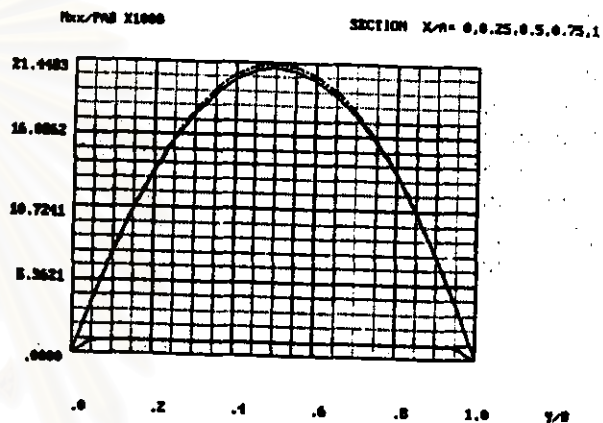
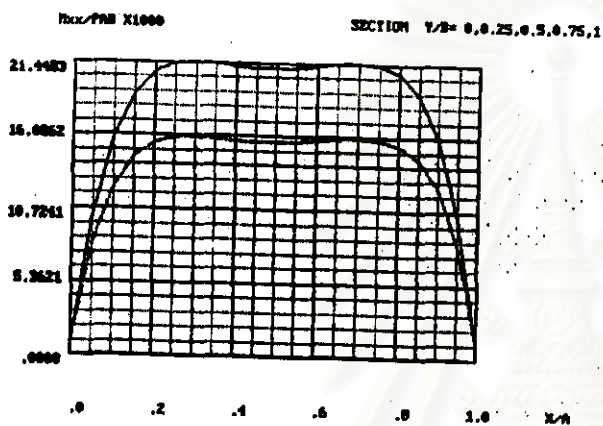
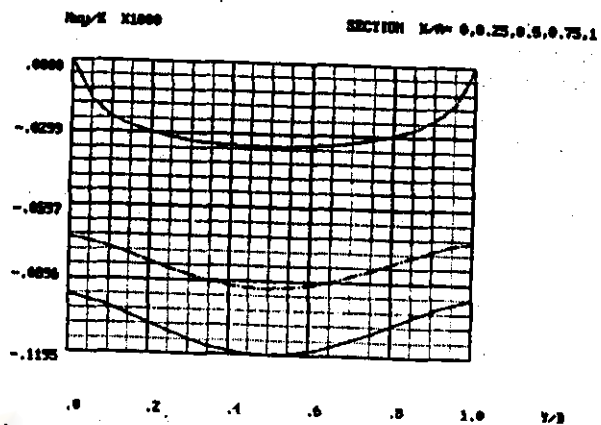
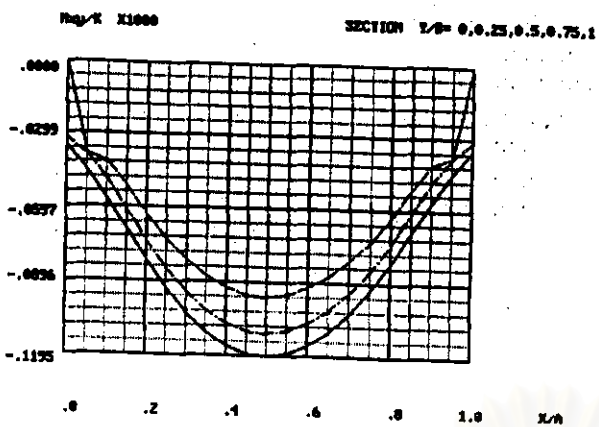
$$\frac{A}{B} = 2.0$$

$$\frac{f}{h} = 2.0$$

$$\frac{P_3 AB}{Eh^2} = 0.005$$

$$\nu = 0.3$$





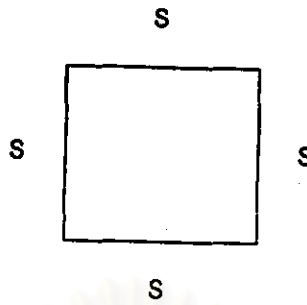
ผลของกรณีที่ 1 :

$$\frac{A}{B} = 2.0$$

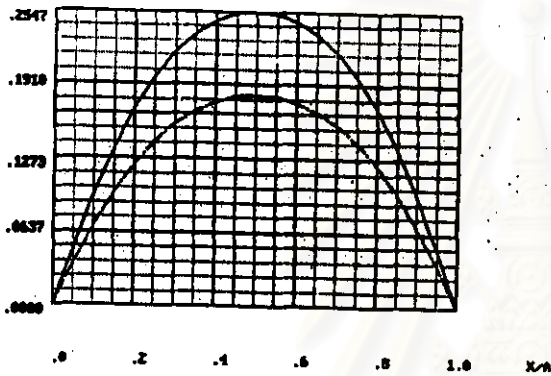
$$\frac{f}{h} = 2.0$$

$$\frac{P_3 AB}{Eh^2} = 0.01$$

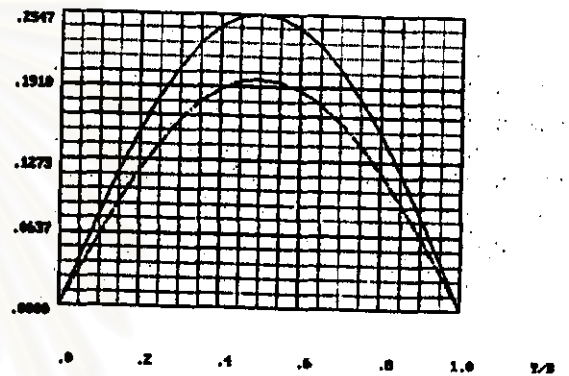
$$\nu = 0.3$$



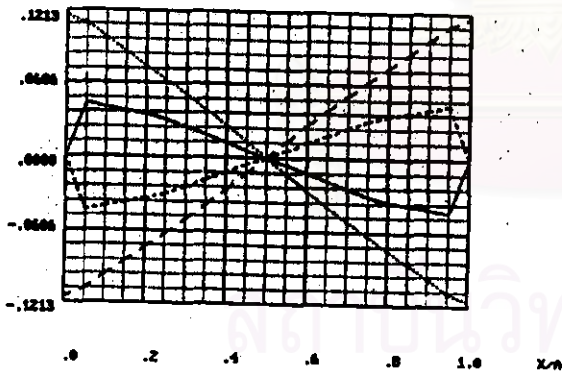
$w(h/\delta) \times 1000$ SECTION $Y/\delta = 0, 0.25, 0.5, 0.75, 1$



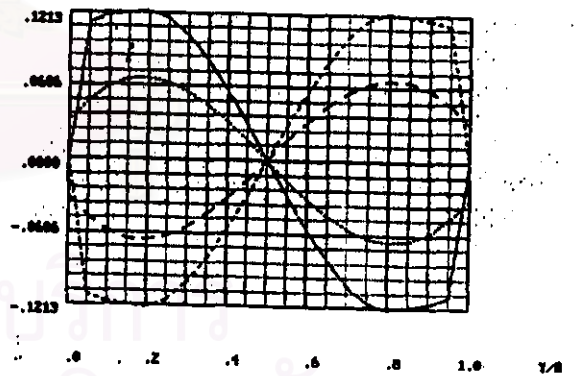
$w(h/\delta) \times 1000$ SECTION $X/\delta = 0, 0.25, 0.5, 0.75, 1$



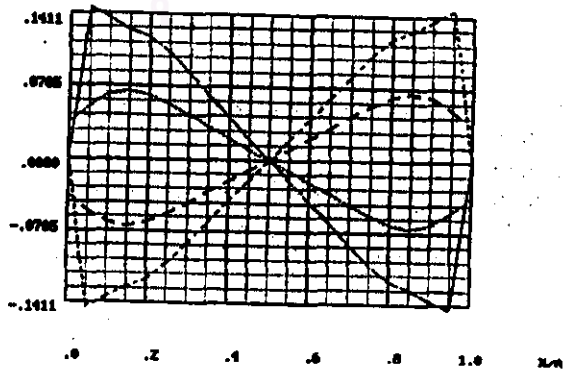
$M_{xx}/K \times 10000$ SECTION $Y/\delta = 0, 0.25, 0.5, 0.75, 1$



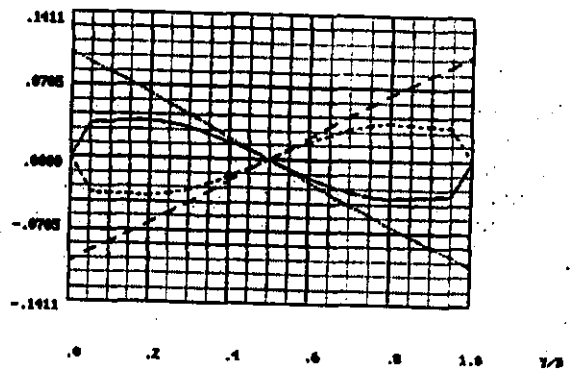
$M_{xx}/K \times 10000$ SECTION $X/\delta = 0, 0.25, 0.5, 0.75, 1$

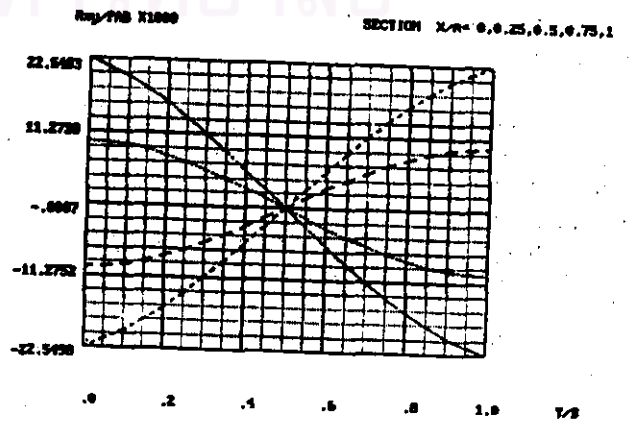
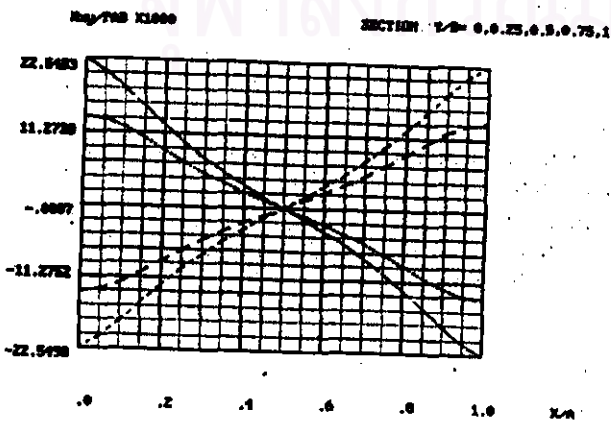
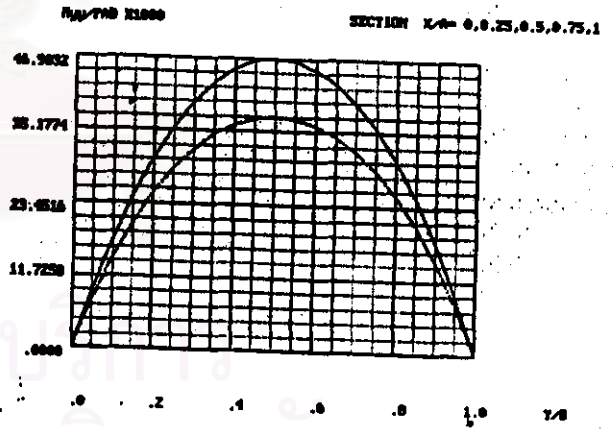
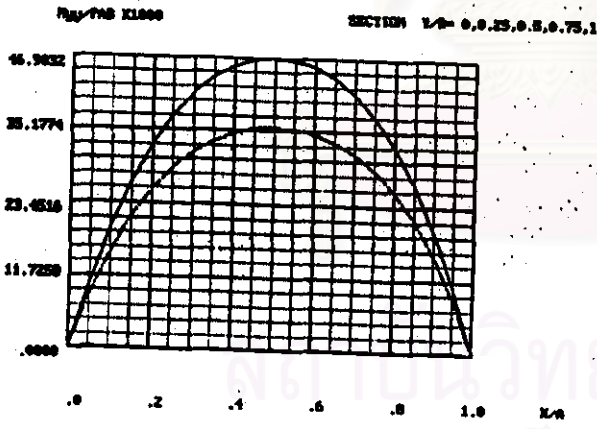
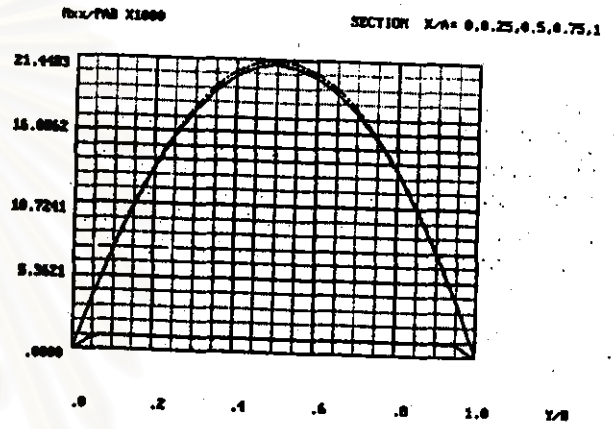
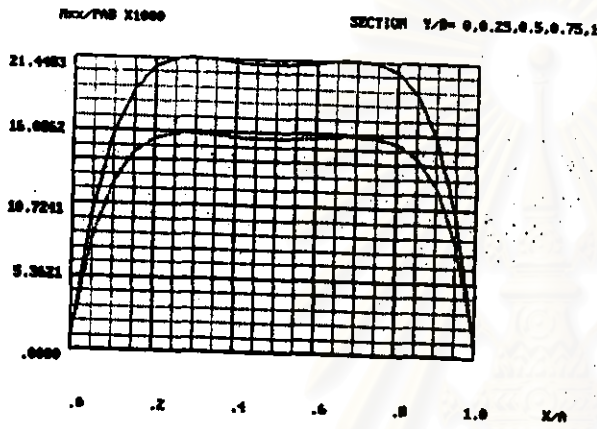
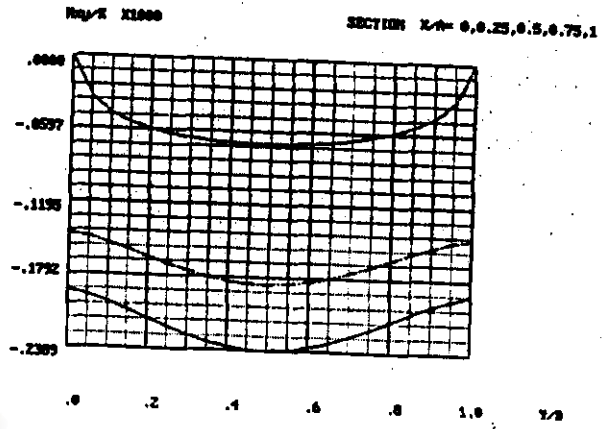
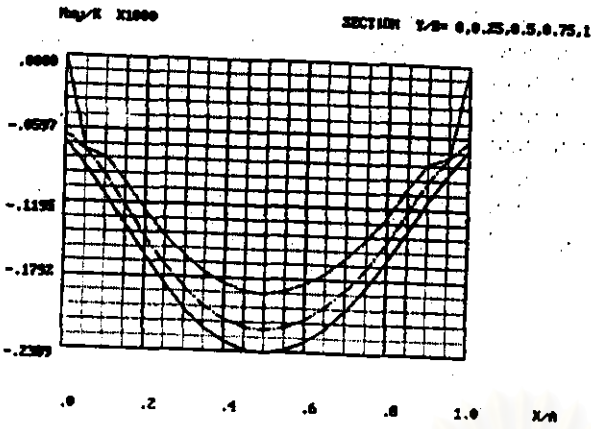


$M_{yy}/K \times 10000$ SECTION $Y/\delta = 0, 0.25, 0.5, 0.75, 1$



$M_{yy}/K \times 10000$ SECTION $X/\delta = 0, 0.25, 0.5, 0.75, 1$





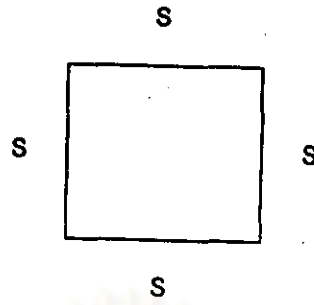
ผลของกรณีที่ 1 :

$$\frac{A}{B} = 2.0$$

$$\frac{f}{h} = 4.0$$

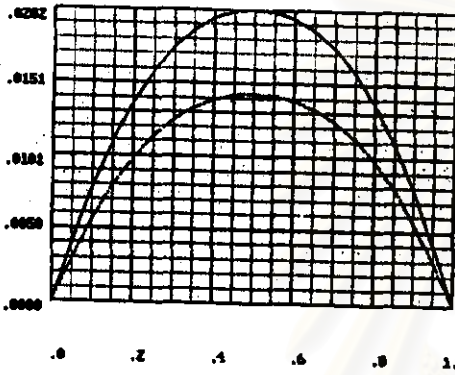
$$\frac{P_3 AB}{Eh^2} = 0.001$$

$$\nu = 0.3$$



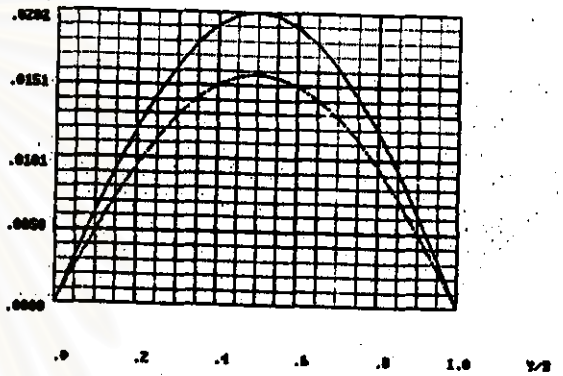
$w(h/\nu B) \times 1000$

SECTION $Y/B = 0.0, 0.25, 0.5, 0.75, 1$



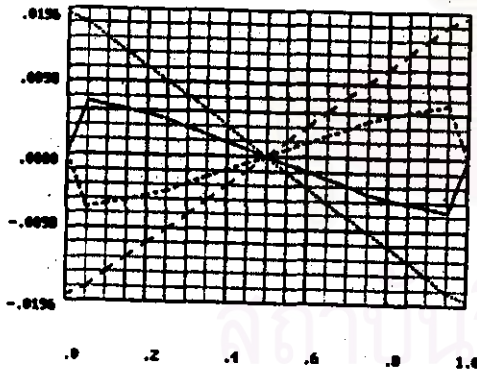
$w(h/\nu B) \times 1000$

SECTION $Y/B = 0.0, 0.25, 0.5, 0.75, 1$



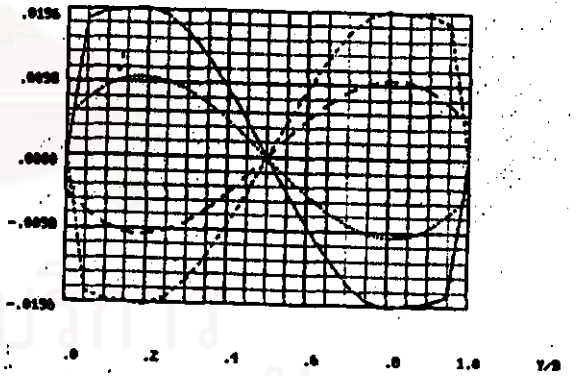
$\theta_{xy}/\epsilon \times 1000$

SECTION $Y/B = 0.0, 0.25, 0.5, 0.75, 1$



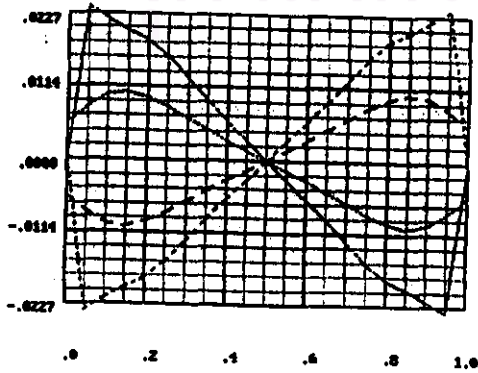
$\theta_{xy}/\epsilon \times 1000$

SECTION $Y/B = 0.0, 0.25, 0.5, 0.75, 1$



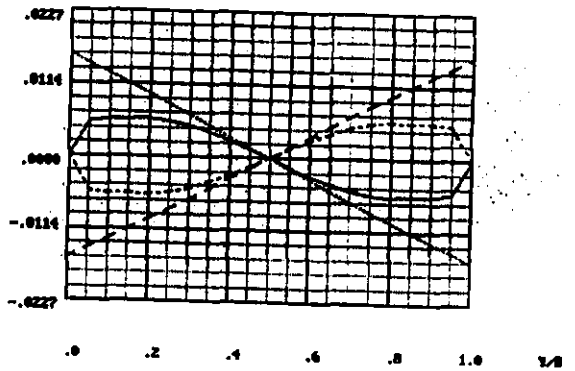
$\theta_{yz}/\epsilon \times 1000$

SECTION $Y/B = 0.0, 0.25, 0.5, 0.75, 1$

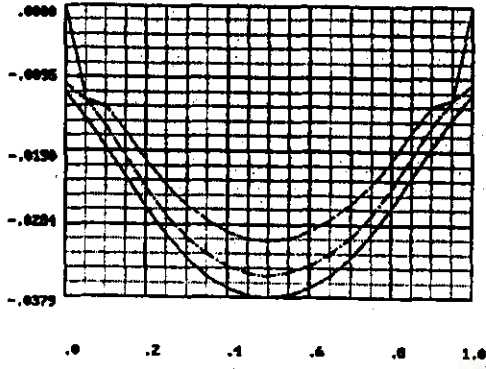


$\theta_{yz}/\epsilon \times 1000$

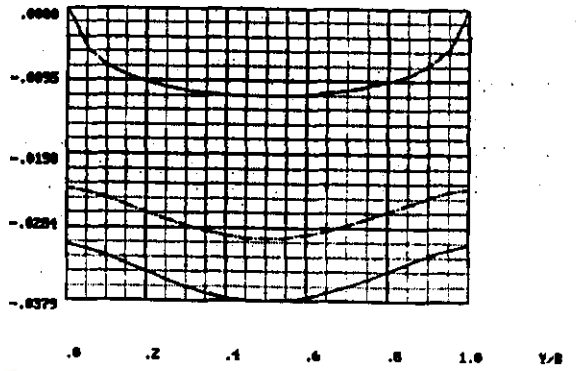
SECTION $Y/B = 0.0, 0.25, 0.5, 0.75, 1$



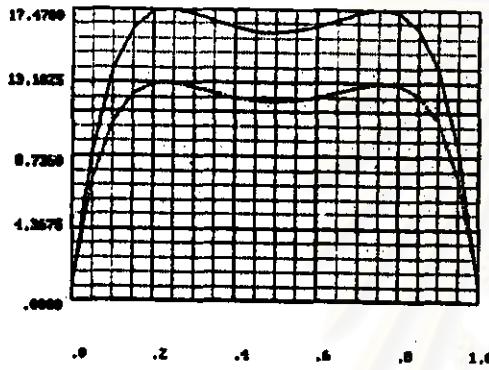
$\eta_{xy}/K \times 1000$ SECTION $Y/B = 0, 0.25, 0.5, 0.75, 1$



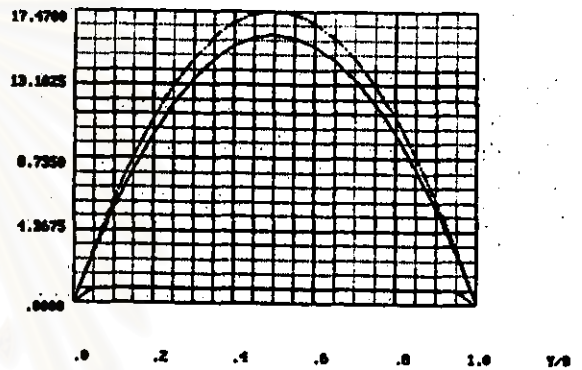
$\eta_{xy}/K \times 1000$ SECTION $X/A = 0, 0.25, 0.5, 0.75, 1$



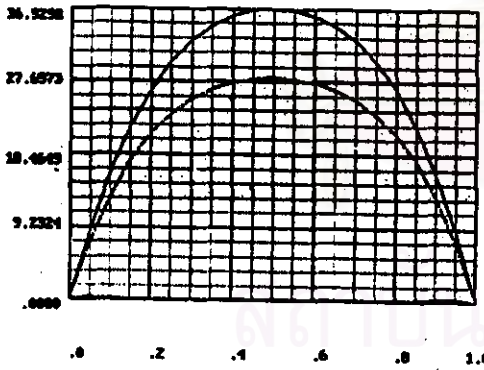
$\tau_{xz}/\tau_{yz} \times 1000$ SECTION $Y/B = 0, 0.25, 0.5, 0.75, 1$



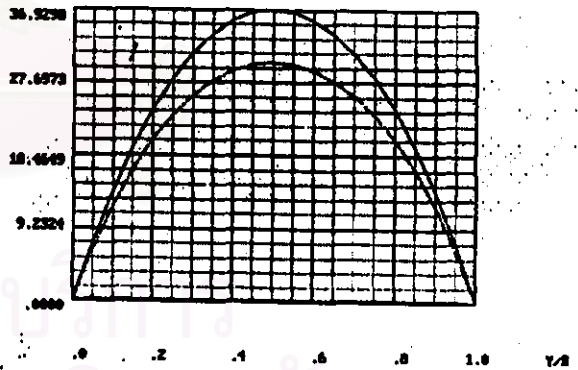
$\tau_{xz}/\tau_{yz} \times 1000$ SECTION $X/A = 0, 0.25, 0.5, 0.75, 1$



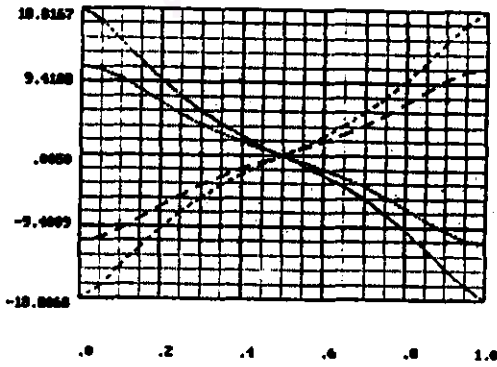
$\tau_{xy}/\tau_{yz} \times 1000$ SECTION $Y/B = 0, 0.25, 0.5, 0.75, 1$



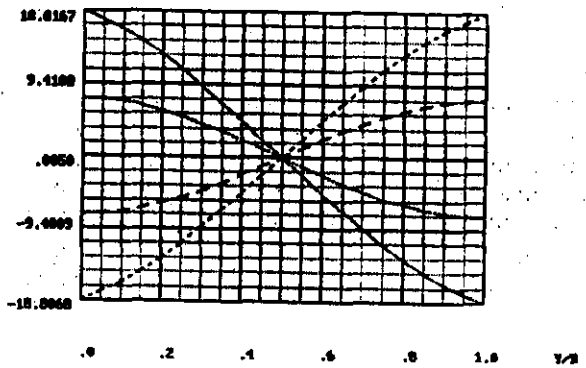
$\tau_{xy}/\tau_{yz} \times 1000$ SECTION $X/A = 0, 0.25, 0.5, 0.75, 1$

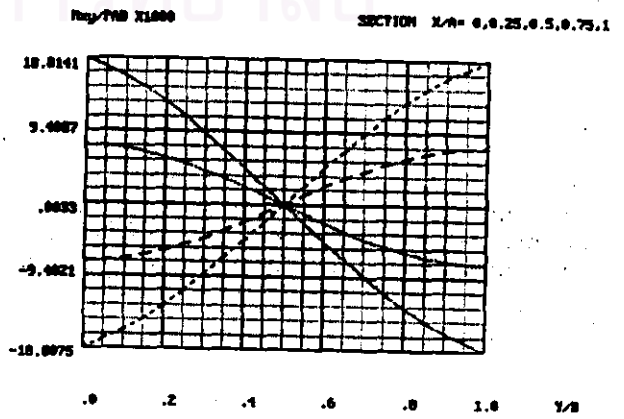
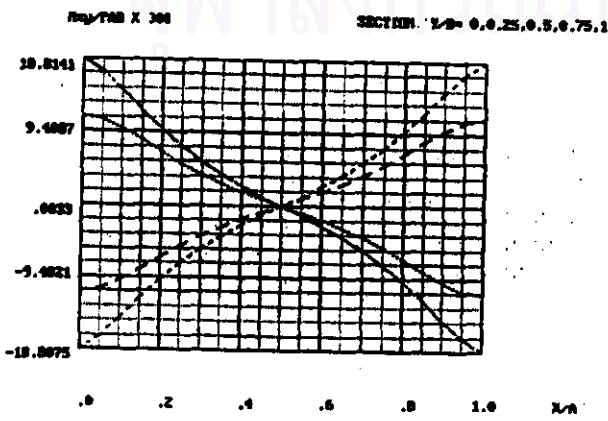
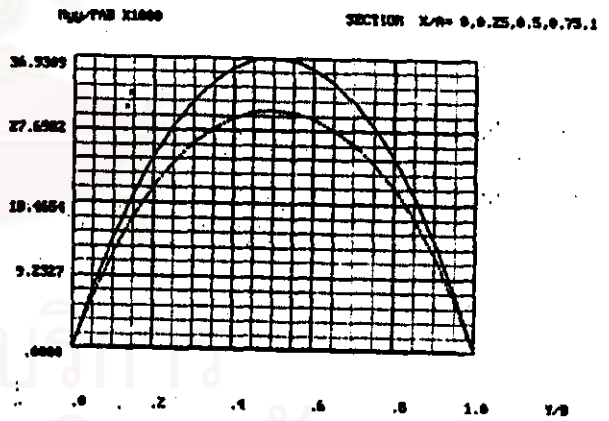
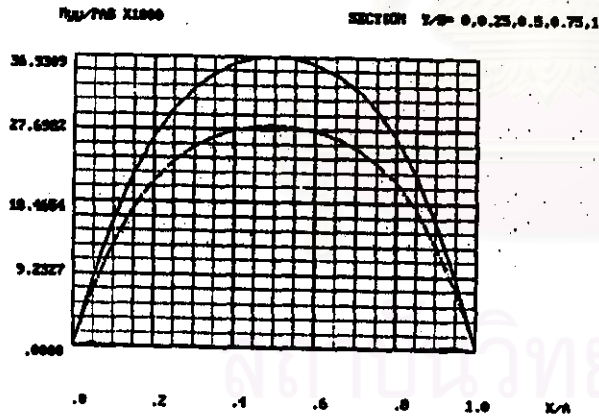
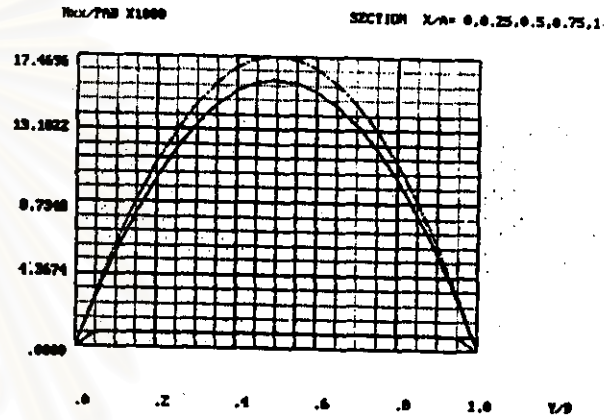
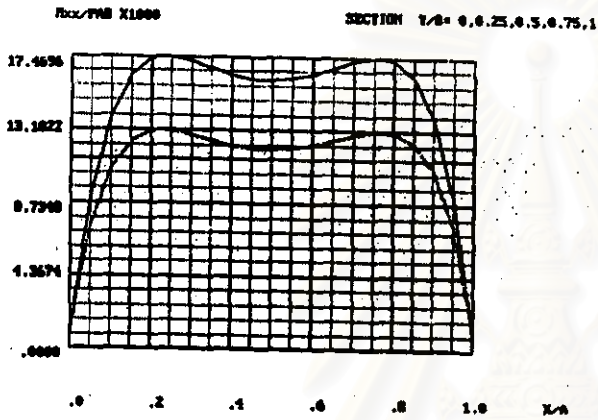
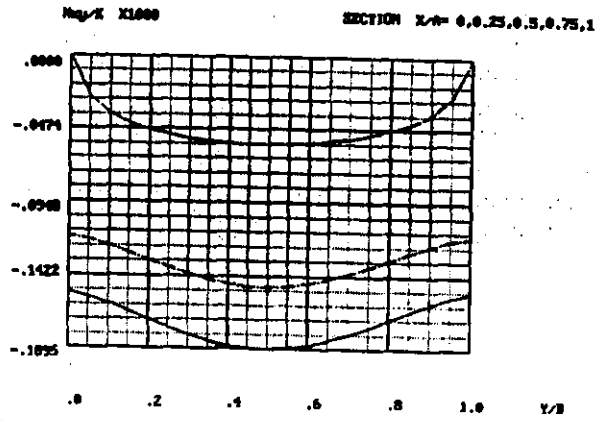
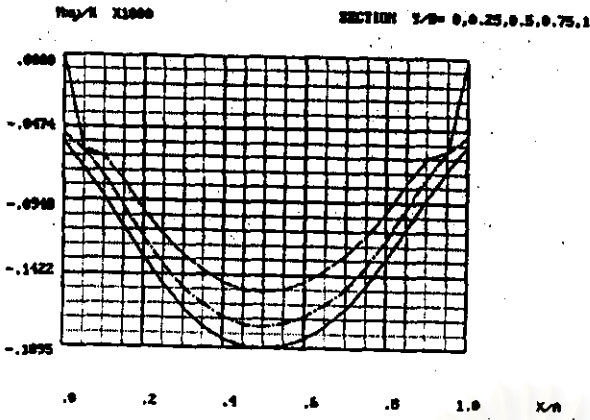


$\eta_{xy}/\tau_{yz} \times 1000$ SECTION $Y/B = 0, 0.25, 0.5, 0.75, 1$



$\eta_{xy}/\tau_{yz} \times 1000$ SECTION $X/A = 0, 0.25, 0.5, 0.75, 1$





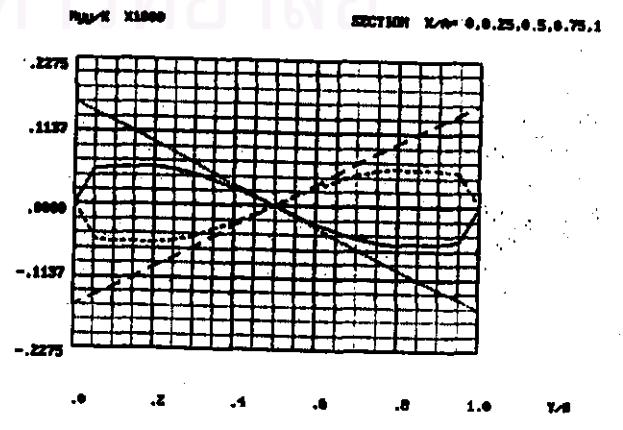
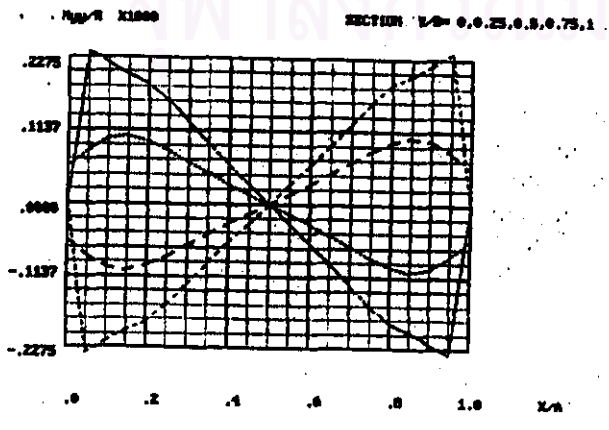
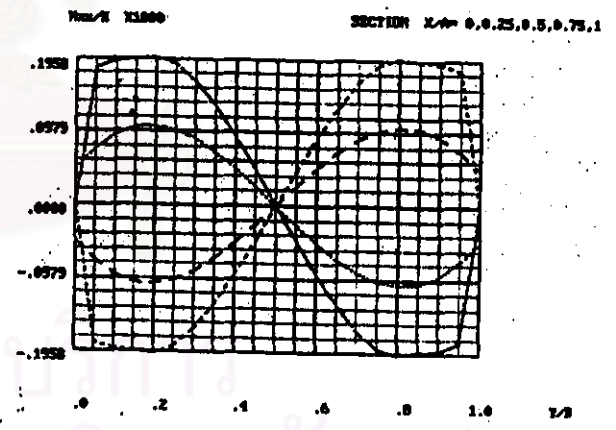
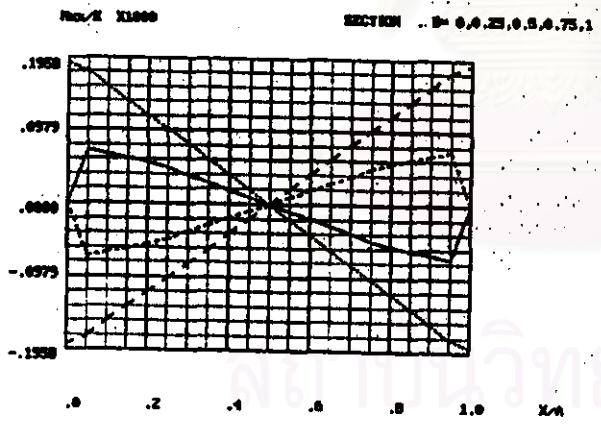
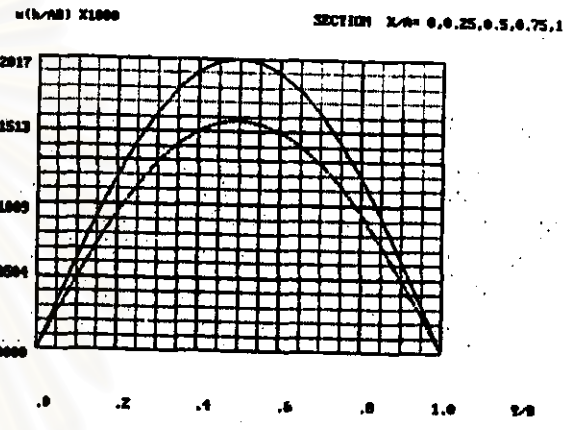
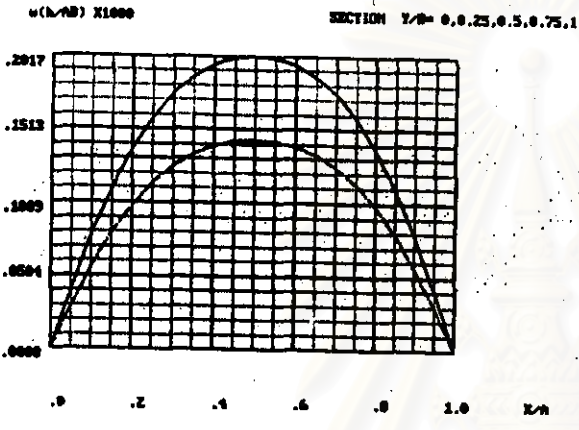
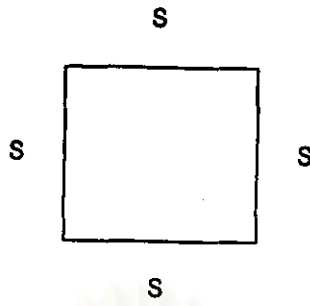
ผลของกรณีที่ 1 :

$$\frac{A}{B} = 2.0$$

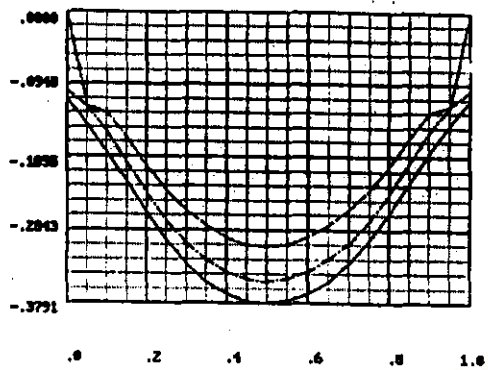
$$\frac{f}{h} = 4.0$$

$$\frac{P_3 AB}{Eh^2} = 0.01$$

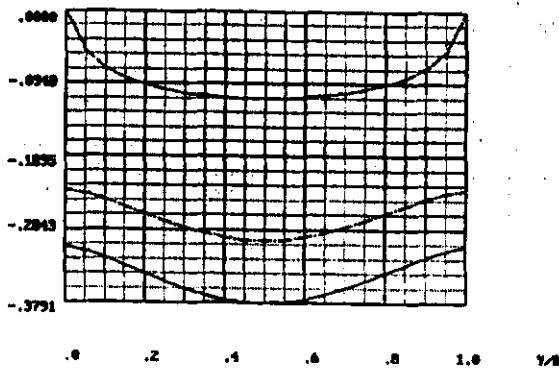
$$\nu = 0.3$$



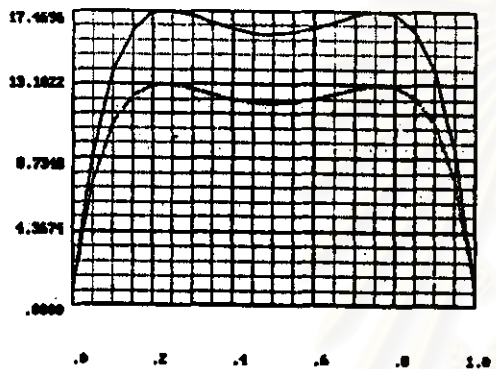
$\eta_{ij}/K \times 1000$ SECTION $\lambda/a = 0, 0.25, 0.5, 0.75, 1$



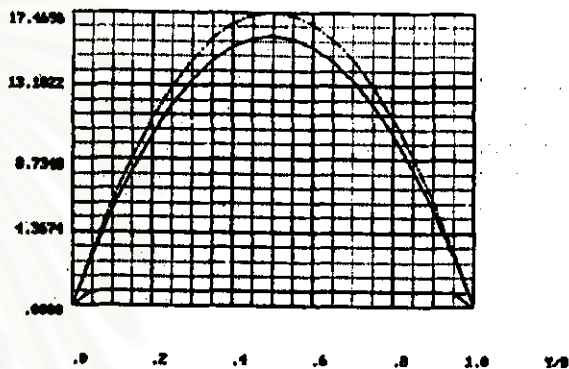
$\eta_{ij}/K \times 1000$ SECTION $\lambda/a = 0, 0.25, 0.5, 0.75, 1$



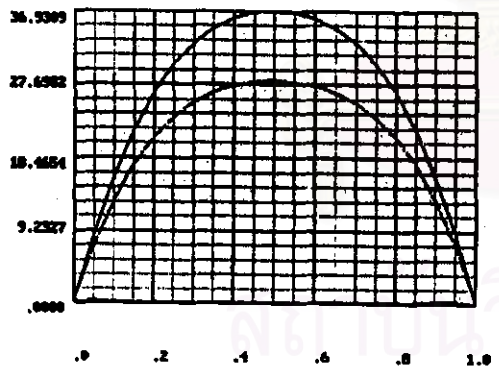
$\eta_{xz}/P_{90} \times 1000$ SECTION $\lambda/a = 0, 0.25, 0.5, 0.75, 1$



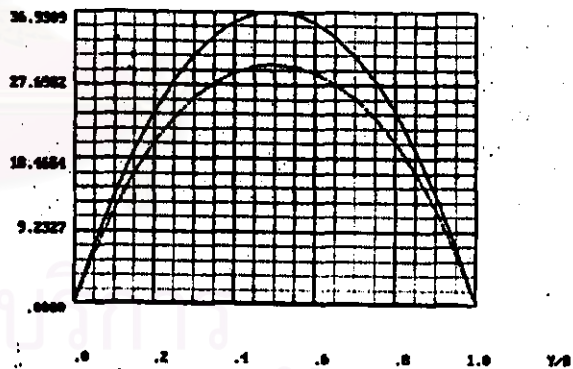
$\eta_{xz}/P_{90} \times 1000$ SECTION $\lambda/a = 0, 0.25, 0.5, 0.75, 1$



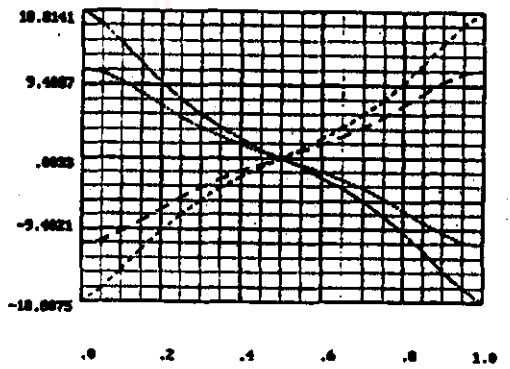
$\eta_{yy}/P_{90} \times 1000$ SECTION $\lambda/a = 0, 0.25, 0.5, 0.75, 1$



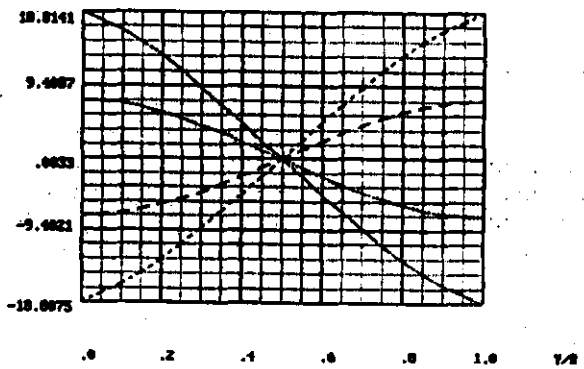
$\eta_{yy}/P_{90} \times 1000$ SECTION $\lambda/a = 0, 0.25, 0.5, 0.75, 1$



$\eta_{xy}/P_{90} \times 1000$ SECTION $\lambda/a = 0, 0.25, 0.5, 0.75, 1$



$\eta_{xy}/P_{90} \times 1000$ SECTION $\lambda/a = 0, 0.25, 0.5, 0.75, 1$



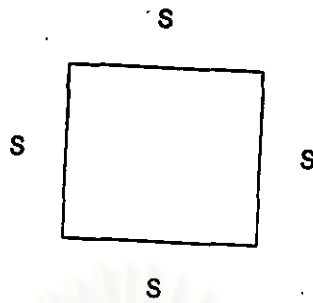
ผลของกรณีที่ 1 :

$$\frac{A}{B} = 2.0$$

$$\frac{f}{h} = 6.0$$

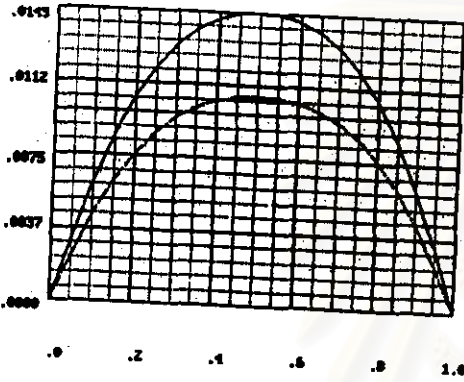
$$\frac{P_3 AB}{Eh^2} = 0.001$$

$$\nu = 0.3$$



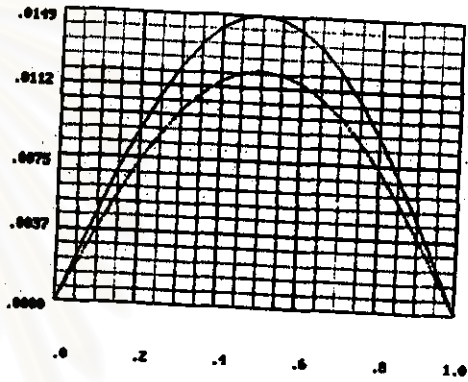
$w(x,y) \times 1000$

SECTION $y/b = 0, 0.25, 0.5, 0.75, 1$



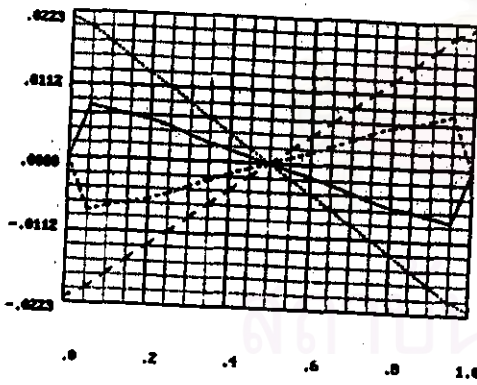
$w(x,y) \times 1000$

SECTION $x/a = 0, 0.25, 0.5, 0.75, 1$



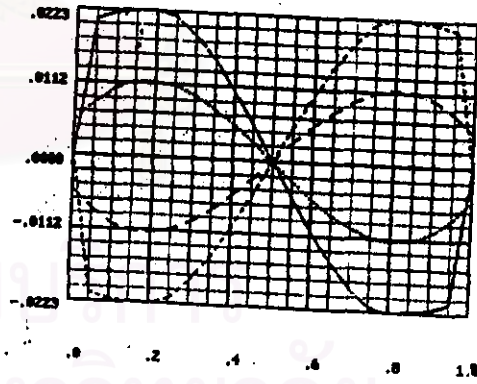
$\theta(x,y) \times 1000$

SECTION $y/b = 0, 0.25, 0.5, 0.75, 1$



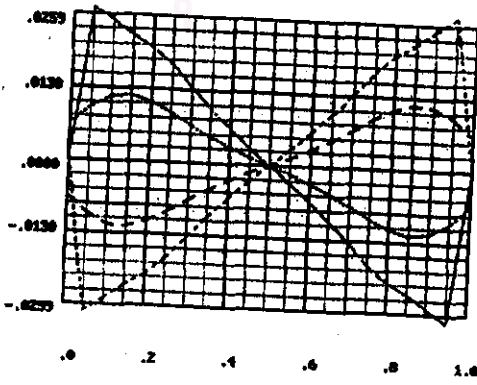
$\theta(x,y) \times 1000$

SECTION $x/a = 0, 0.25, 0.5, 0.75, 1$



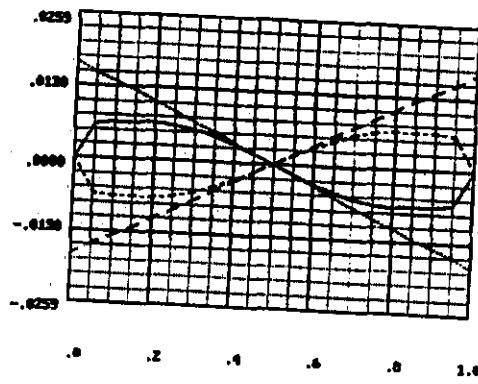
$\theta(x,y) \times 1000$

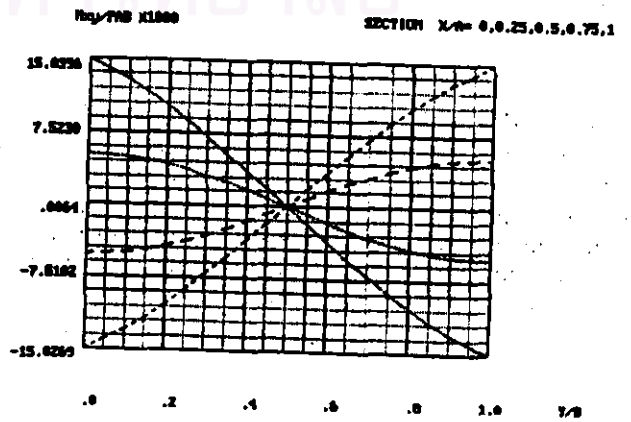
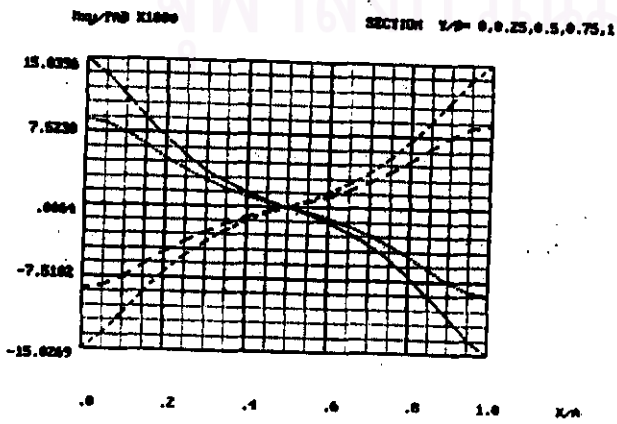
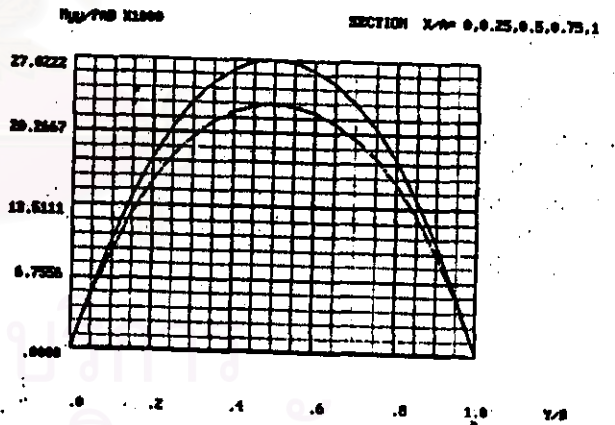
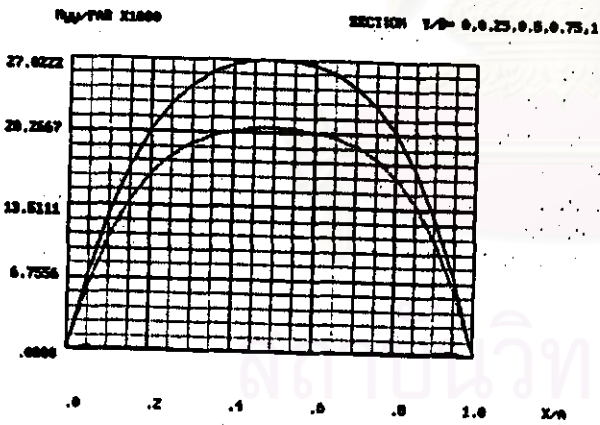
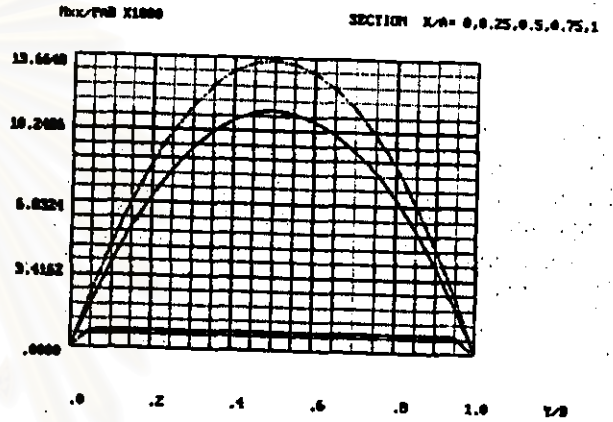
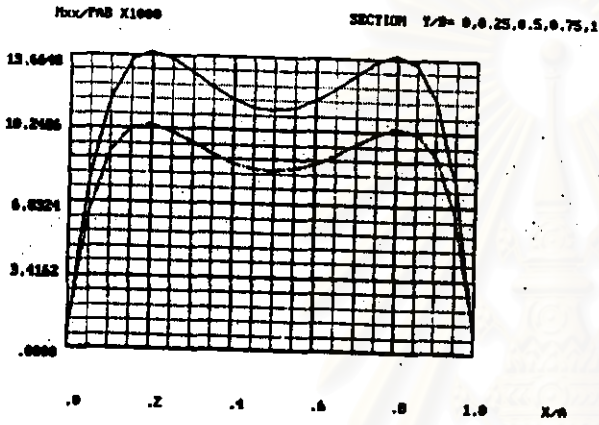
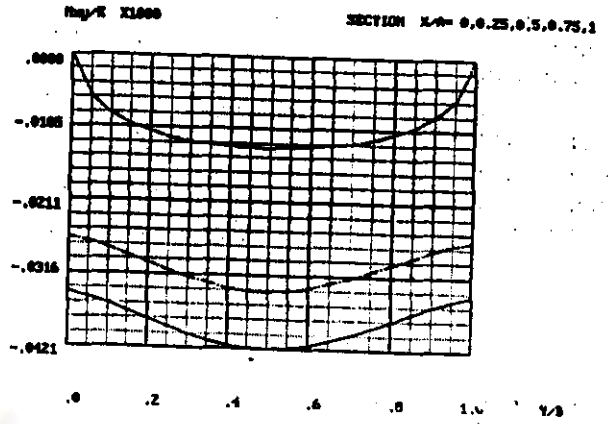
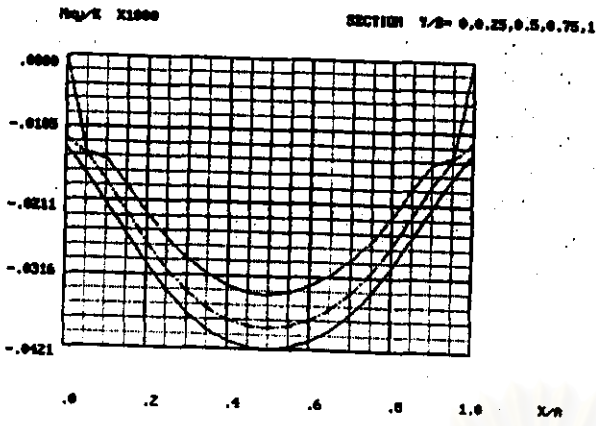
SECTION $y/b = 0, 0.25, 0.5, 0.75, 1$



$\theta(x,y) \times 1000$

SECTION $x/a = 0, 0.25, 0.5, 0.75, 1$





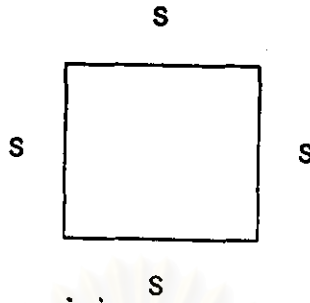
ผลของกรณีที่ 1 :

$$\frac{A}{B} = 2.0$$

$$\frac{f}{h} = 6.0$$

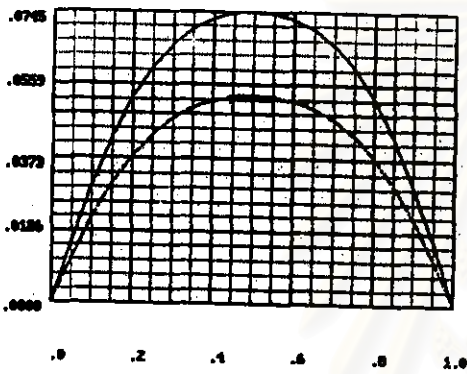
$$\frac{P_3 AB}{Eh^2} = 0.005$$

$$\nu = 0.3$$



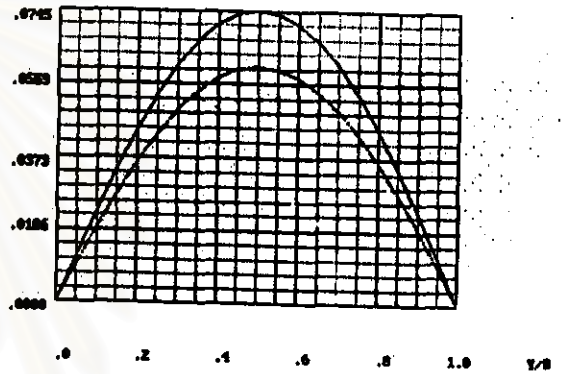
$w(x/h) \times 1000$

SECTION $x/h = 0, 0.25, 0.5, 0.75, 1$



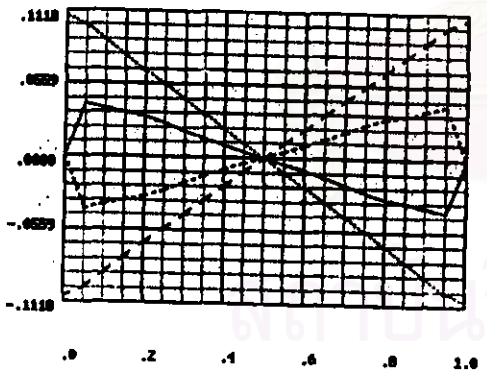
$w(x/h) \times 1000$

SECTION $x/h = 0, 0.25, 0.5, 0.75, 1$



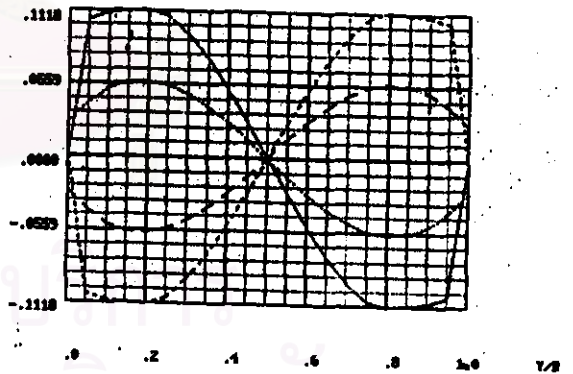
$\theta_{xx}/E \times 1000$

SECTION $x/h = 0, 0.25, 0.5, 0.75, 1$



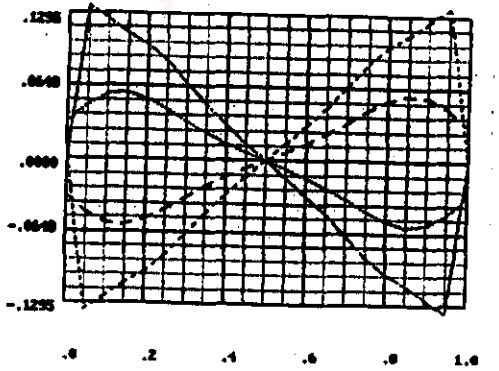
$\theta_{xx}/E \times 1000$

SECTION $x/h = 0, 0.25, 0.5, 0.75, 1$



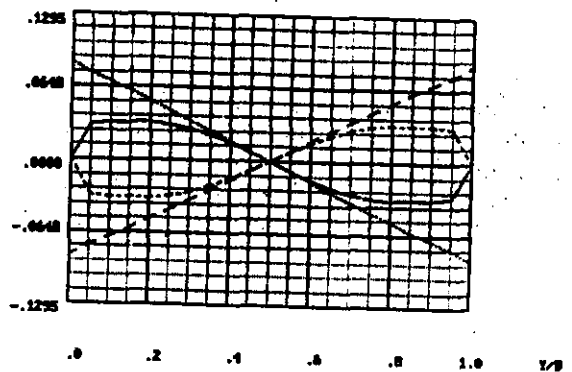
$\theta_{yy}/E \times 1000$

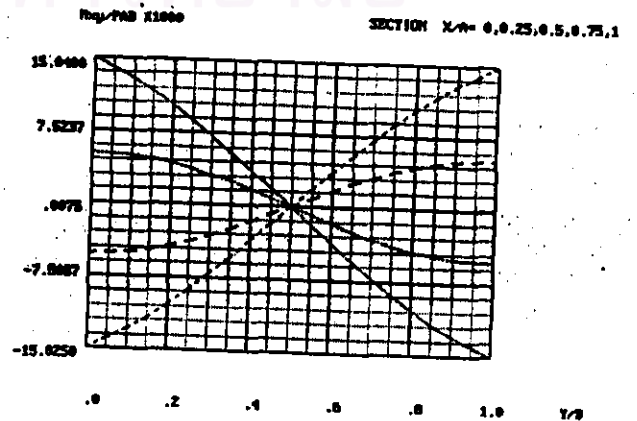
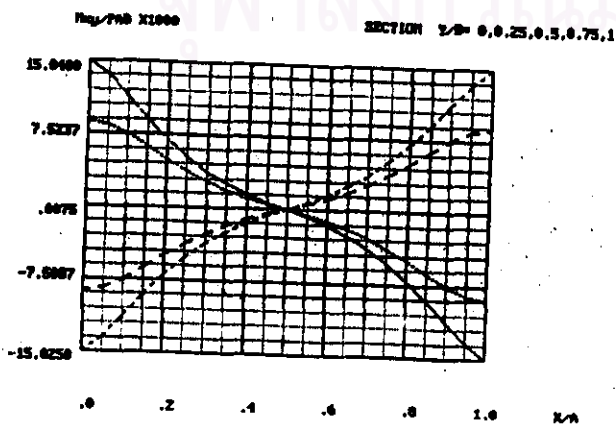
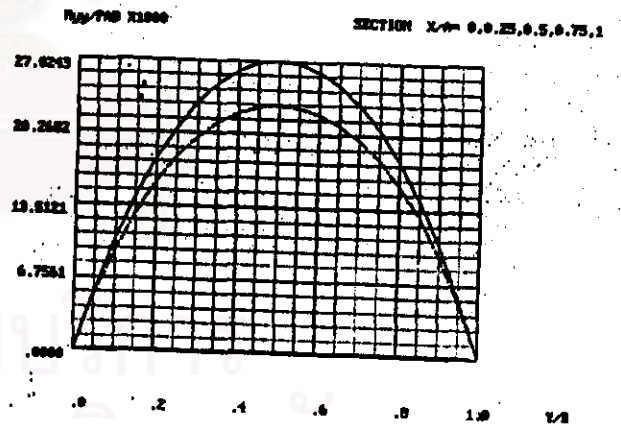
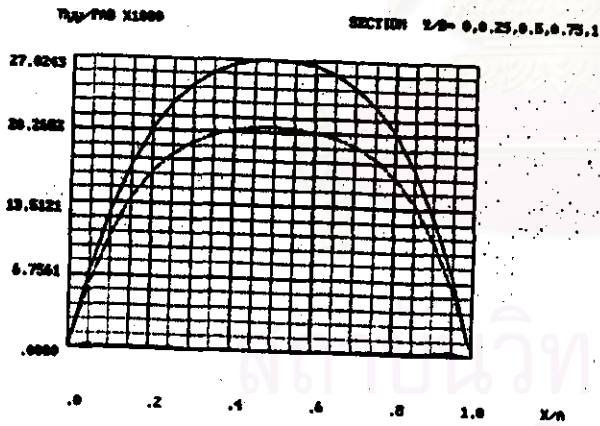
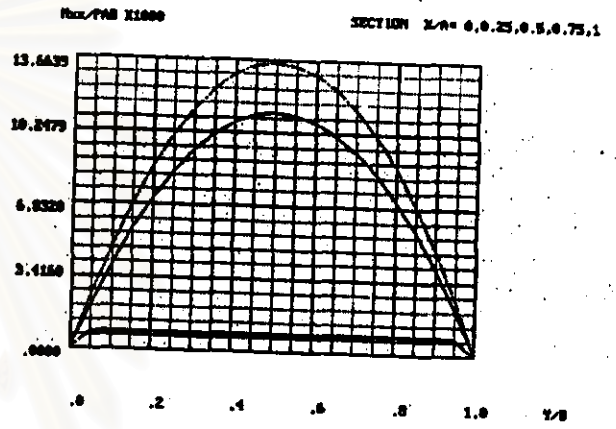
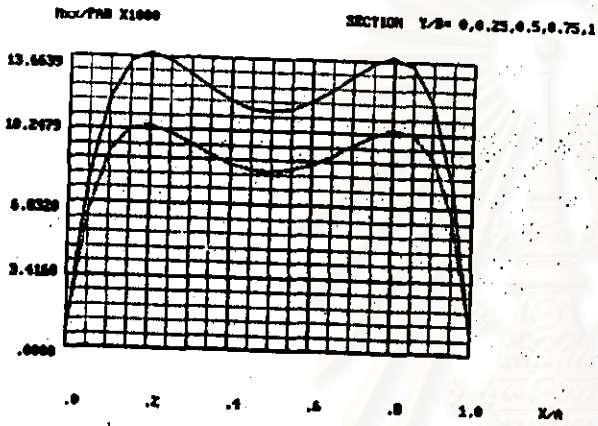
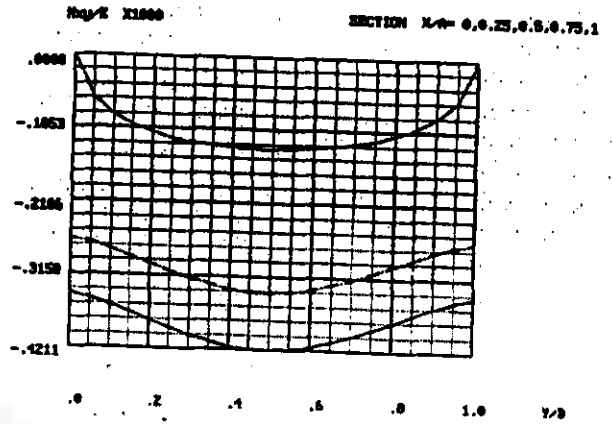
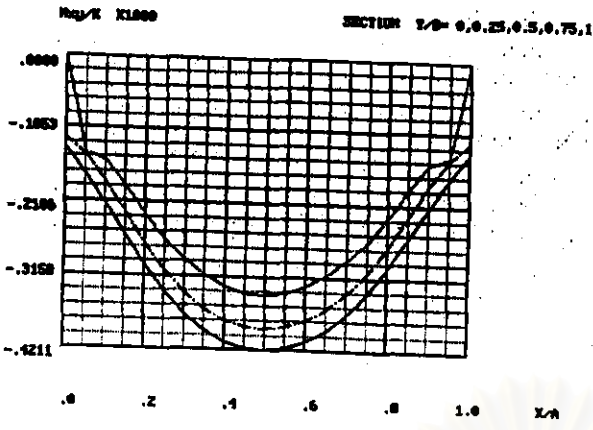
SECTION $x/h = 0, 0.25, 0.5, 0.75, 1$



$\theta_{yy}/E \times 1000$

SECTION $x/h = 0, 0.25, 0.5, 0.75, 1$





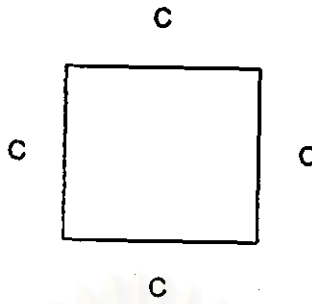
ผลของกรณีที่ 2 :

$$\frac{A}{B} = 0.5$$

$$\frac{f}{h} = 2.0$$

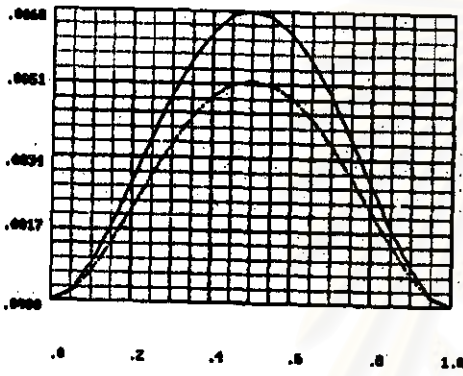
$$\frac{P_3 AB}{Eh^2} = 0.001$$

$$\nu = 0.3$$



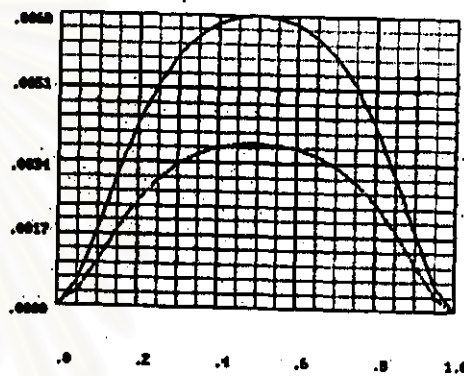
$u(h/\delta) \times 1000$

SECTION $Y/\delta = 0, 0.25, 0.5, 0.75, 1$



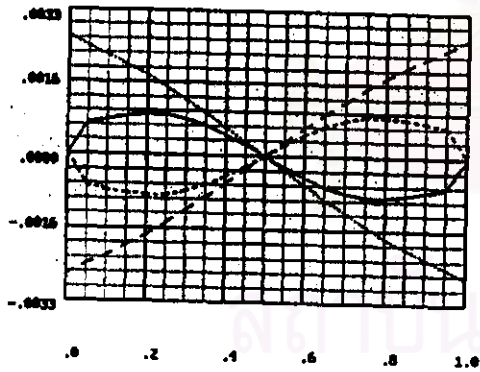
$u(h/\delta) \times 1000$

SECTION $Y/\delta = 0, 0.25, 0.5, 0.75, 1$



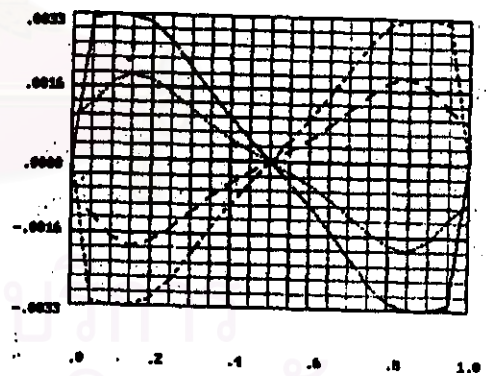
$\theta_{\max} \times 1000$

SECTION $Y/\delta = 0, 0.25, 0.5, 0.75, 1$



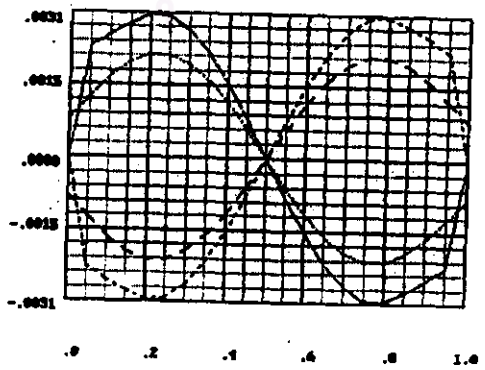
$\theta_{\max} \times 1000$

SECTION $Y/\delta = 0, 0.25, 0.5, 0.75, 1$



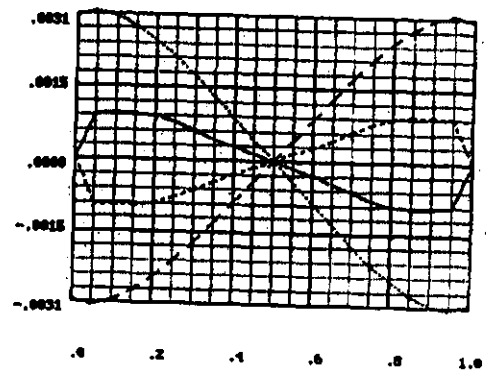
$\theta_{\max} \times 1000$

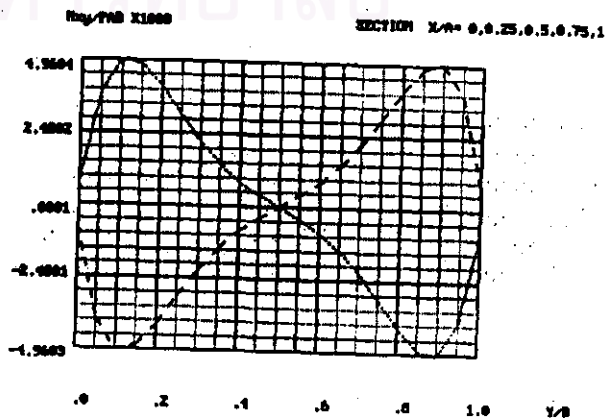
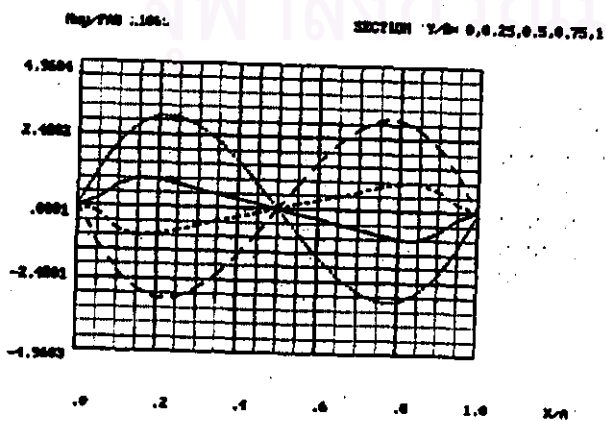
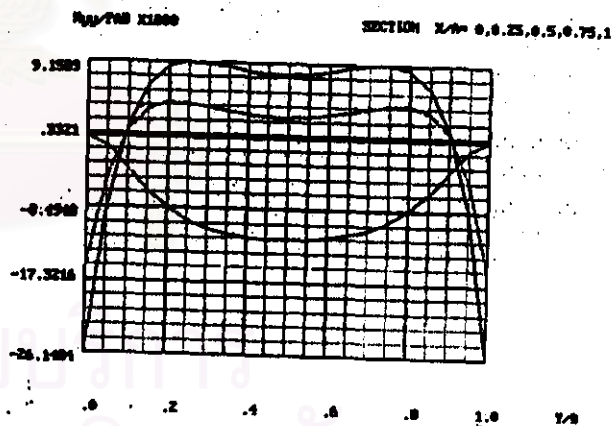
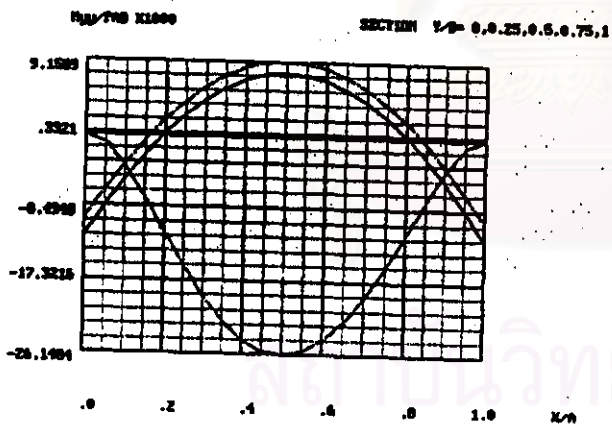
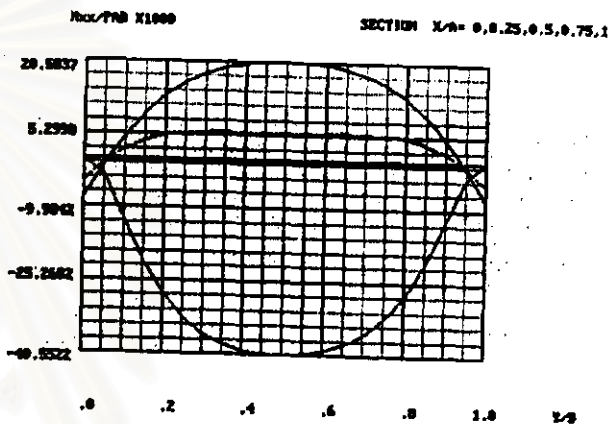
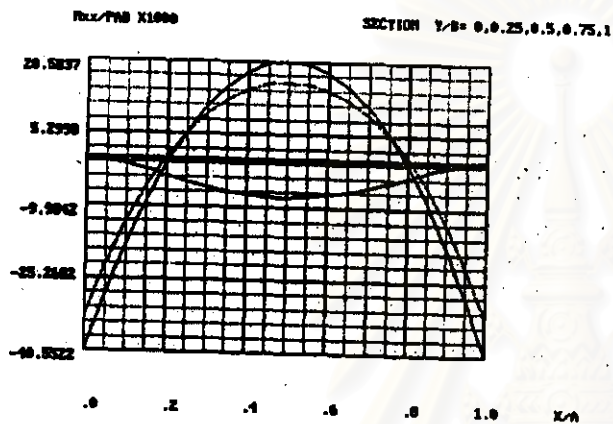
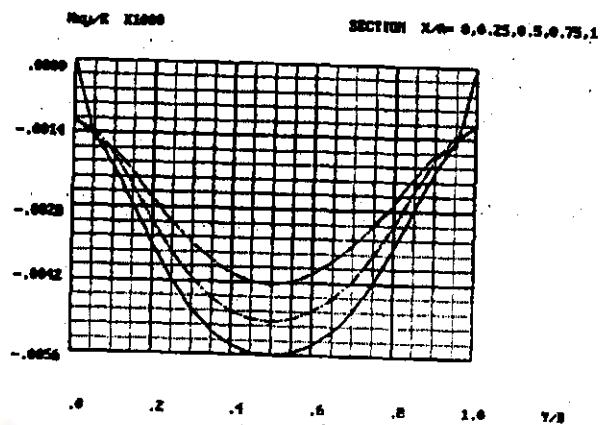
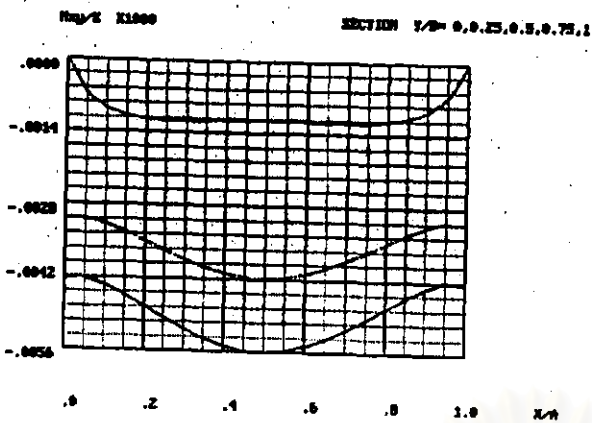
SECTION $Y/\delta = 0, 0.2, 0.4, 0.75, 1$



$\theta_{\max} \times 1000$

SECTION $Y/\delta = 0, 0.25, 0.5, 0.75, 1$





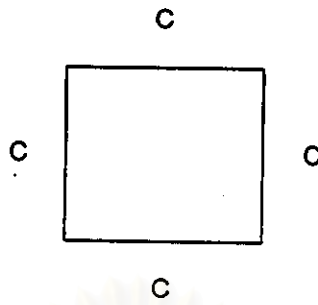
ผลของกรณีที่ 2 :

$$\frac{A}{B} = 0.5$$

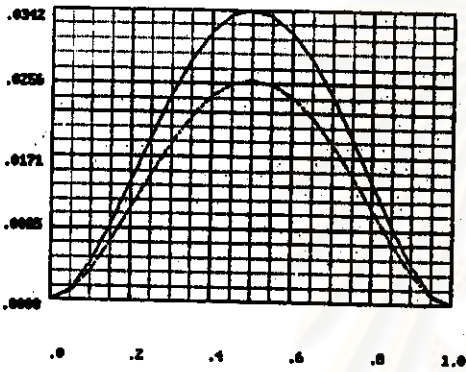
$$\frac{f}{h} = 2.0$$

$$\frac{P_3 AB}{Eh^2} = 0.005$$

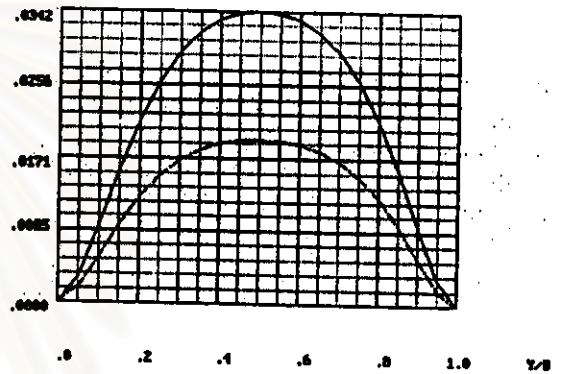
$$\nu = 0.3$$



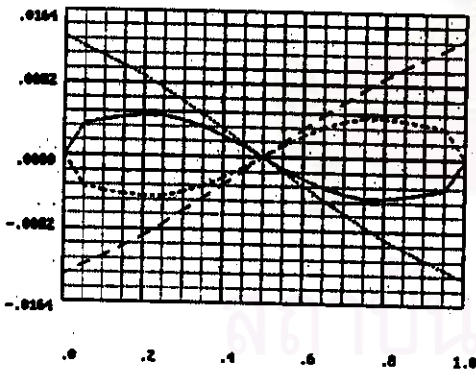
$w(h/AB) \times 1000$ SECTION $Y/B = 0, 0.25, 0.5, 0.75, 1$



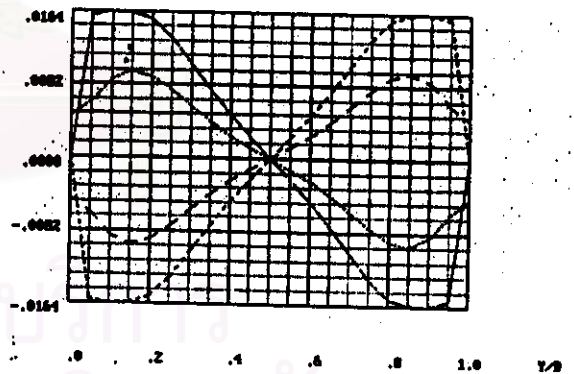
$w(h/AB) \times 1000$ SECTION $X/A = 0, 0.25, 0.5, 0.75, 1$



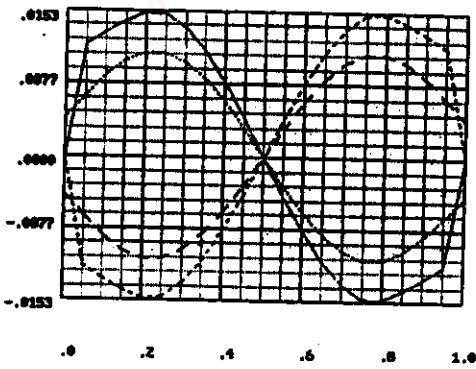
$M_{xx}/K \times 1000$ SECTION $Y/B = 0, 0.25, 0.5, 0.75, 1$



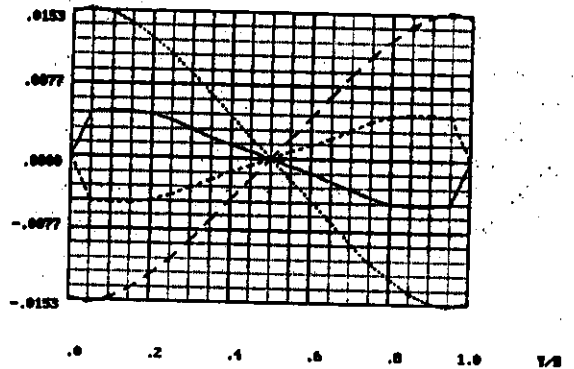
$M_{xx}/K \times 1000$ SECTION $X/A = 0, 0.25, 0.5, 0.75, 1$

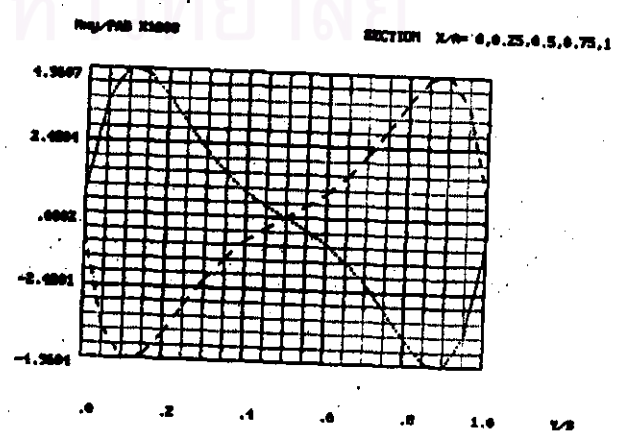
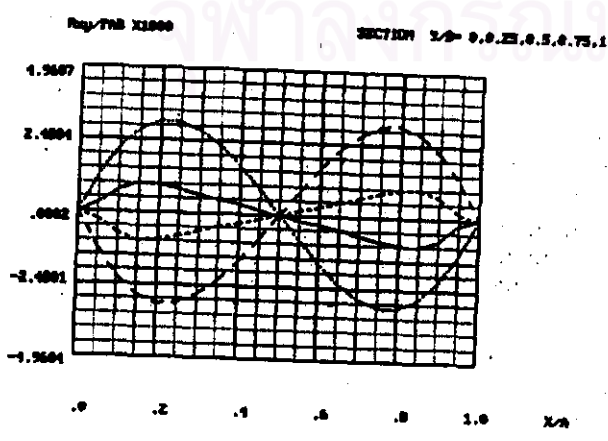
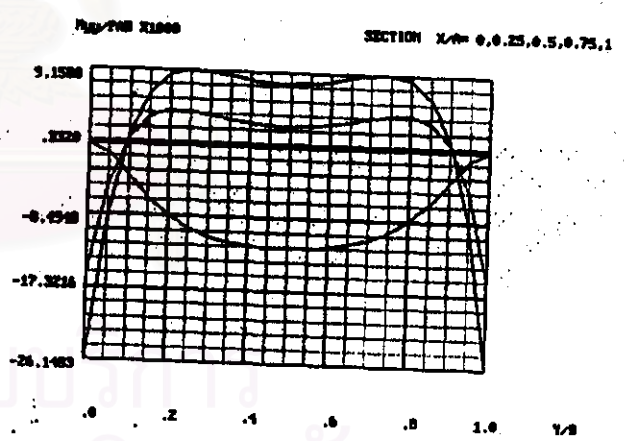
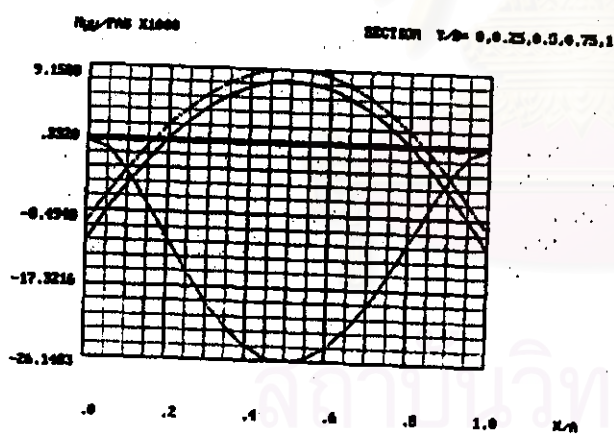
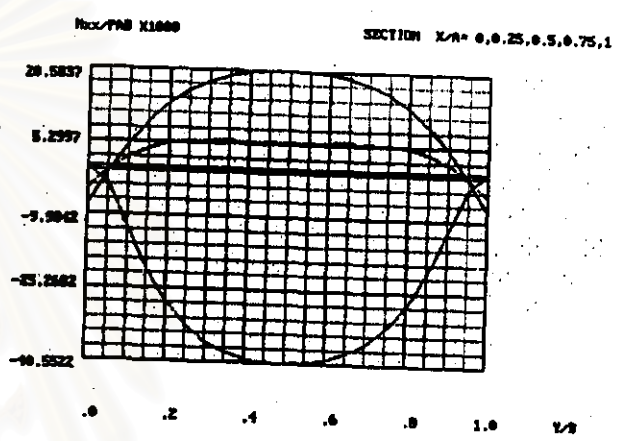
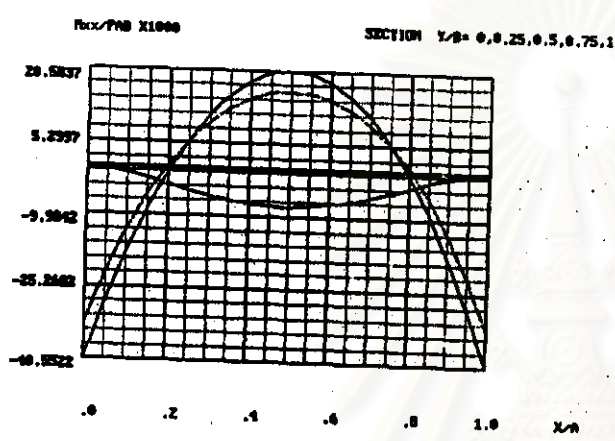
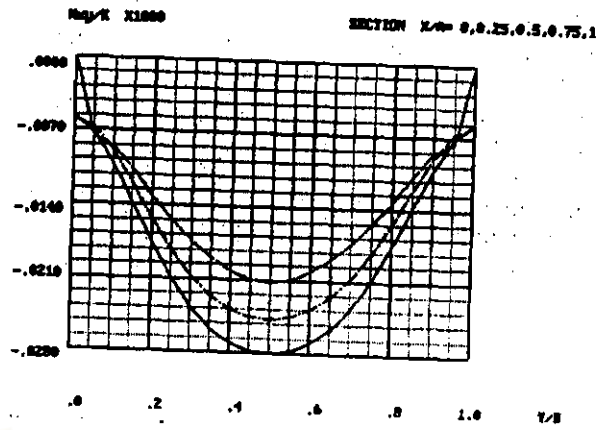
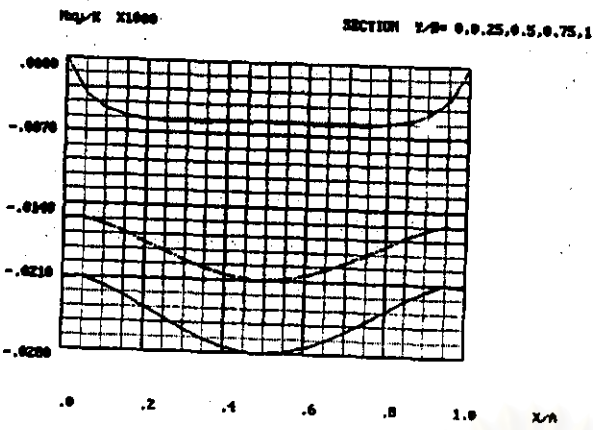


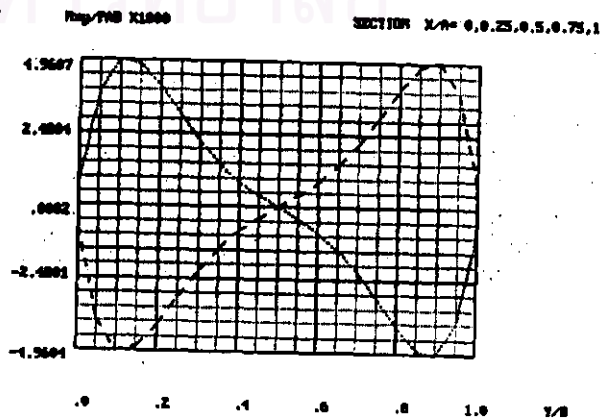
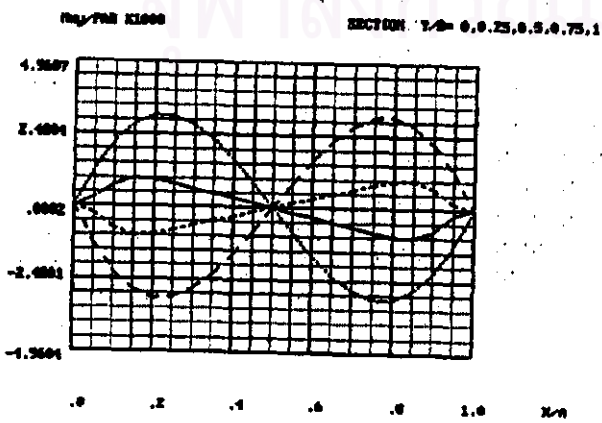
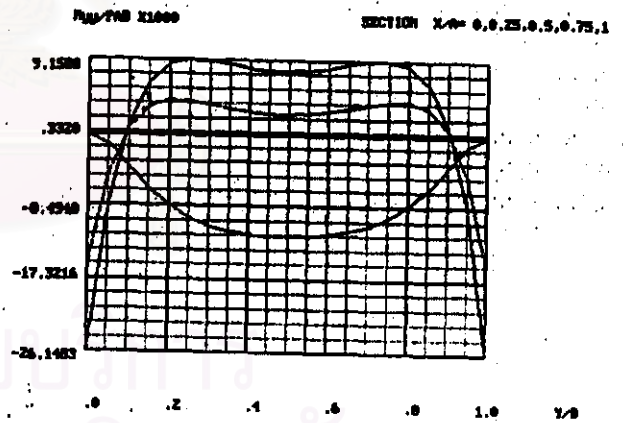
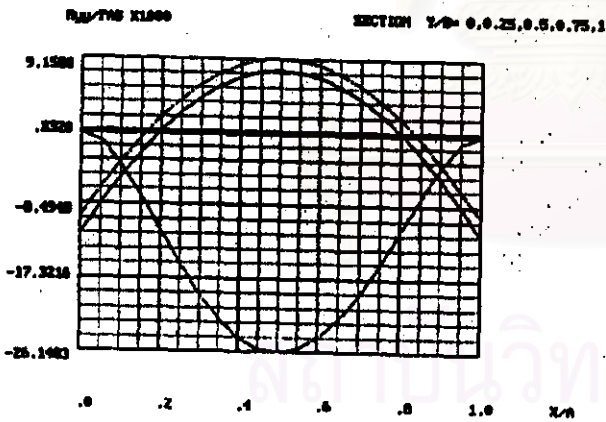
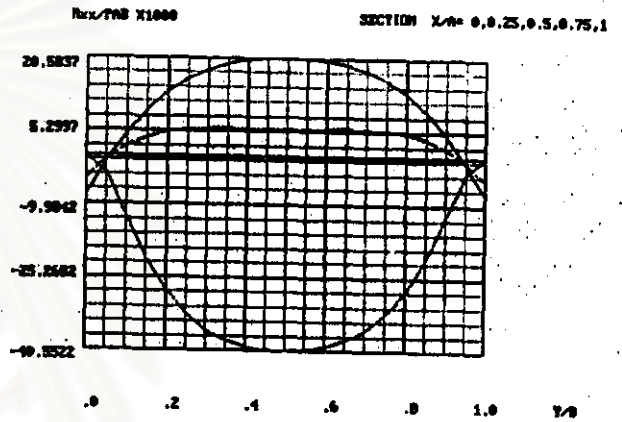
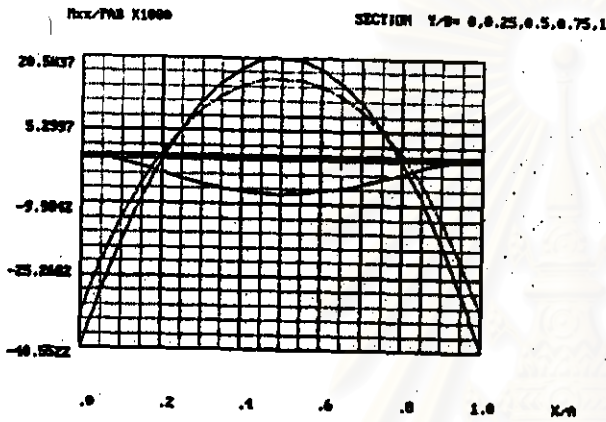
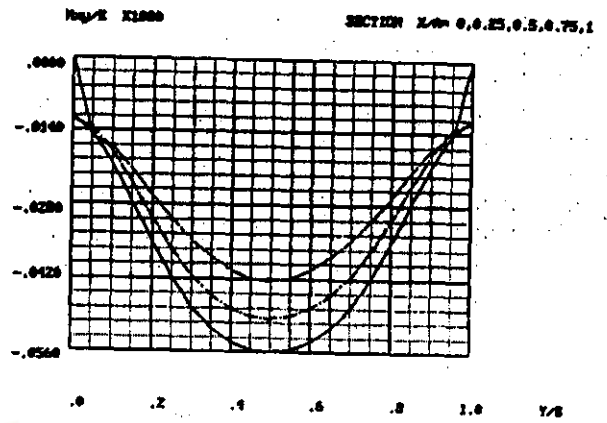
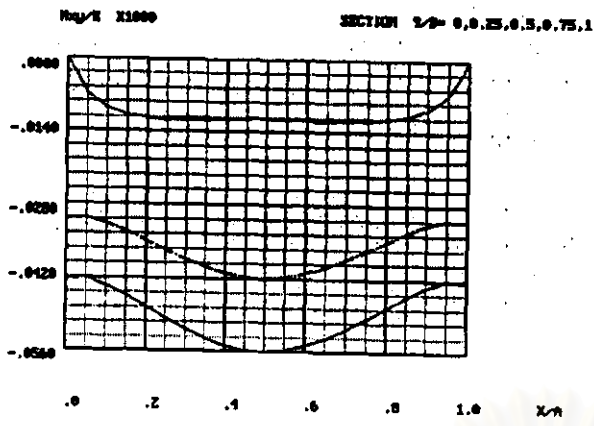
$M_{yy}/K \times 1000$ SECTION $Y/B = 0, 0.25, 0.5, 0.75, 1$



$M_{yy}/K \times 1000$ SECTION $X/A = 0, 0.25, 0.5, 0.75, 1$







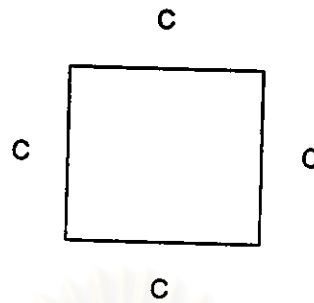
ผลของกรณีที่ 2 :

$$\frac{A}{B} = 0.5$$

$$\frac{f}{h} = 4.0$$

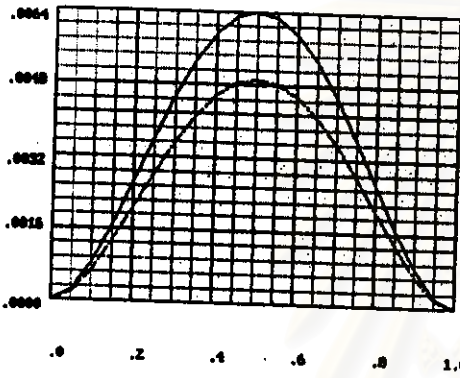
$$\frac{P_3 AB}{Eh^2} = 0.001$$

$$\nu = 0.3$$



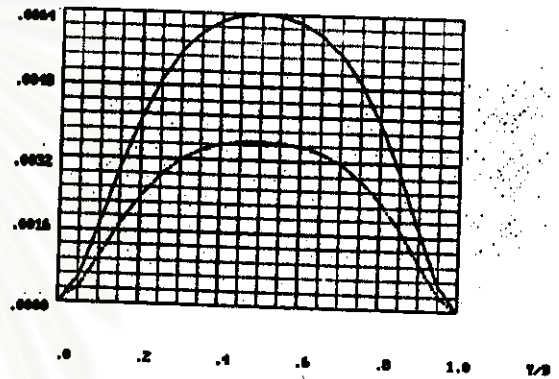
$w(h/\delta) \times 1000$

SECTION $Y/\delta = 0, 0.25, 0.5, 0.75, 1$



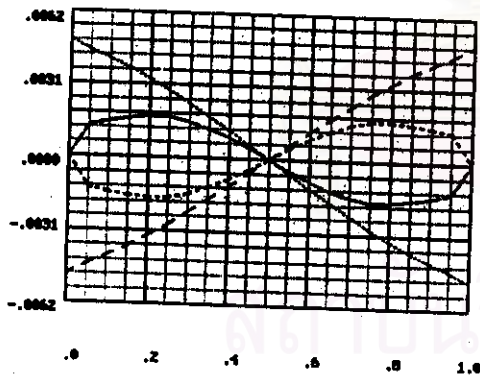
$w(h/\delta) \times 1000$

SECTION $X/\delta = 0, 0.25, 0.5, 0.75, 1$



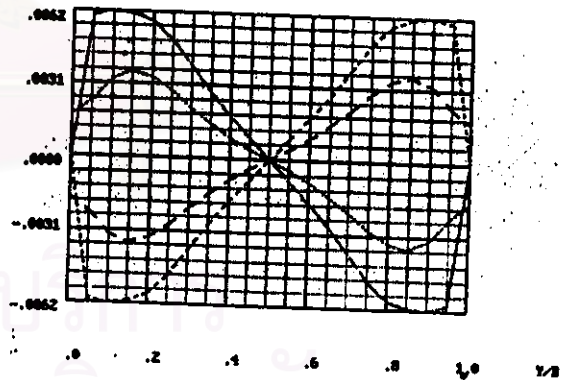
$\theta_{xx}/K \times 10000$

SECTION $Y/\delta = 0, 0.25, 0.5, 0.75, 1$



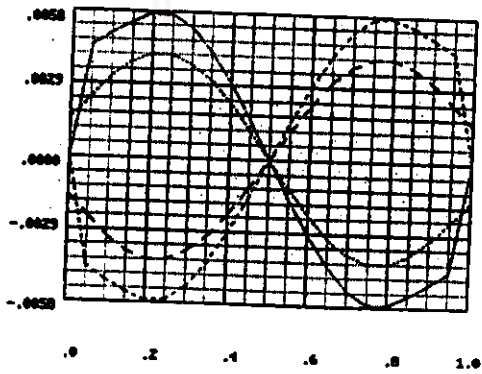
$\theta_{xx}/K \times 10000$

SECTION $X/\delta = 0, 0.25, 0.5, 0.75, 1$



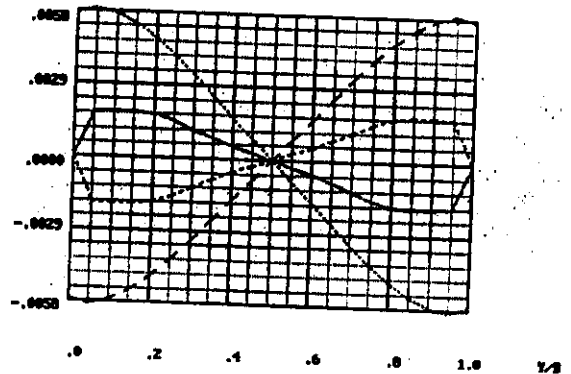
$\theta_{yy}/K \times 10000$

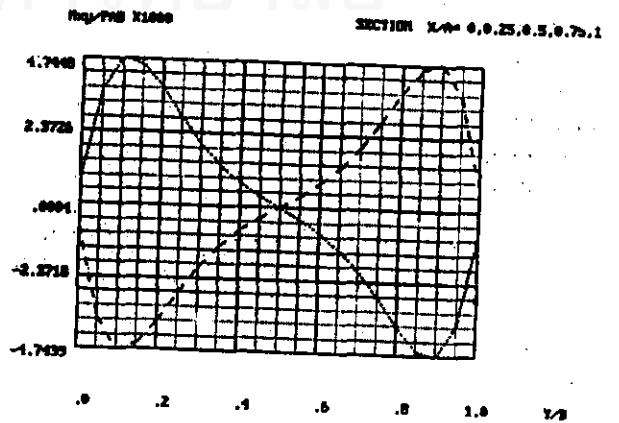
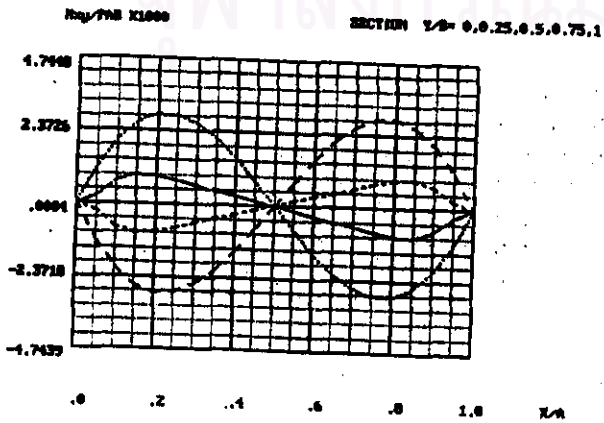
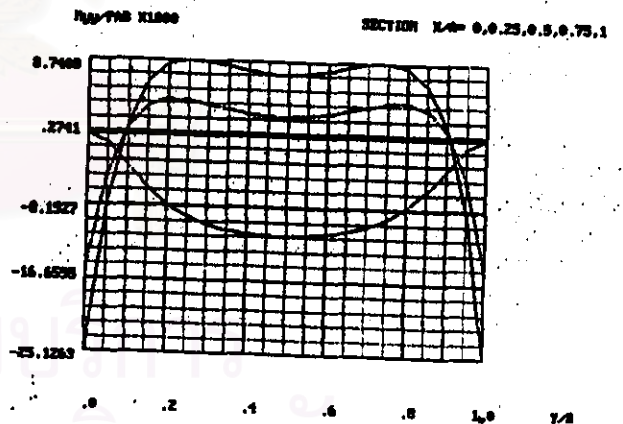
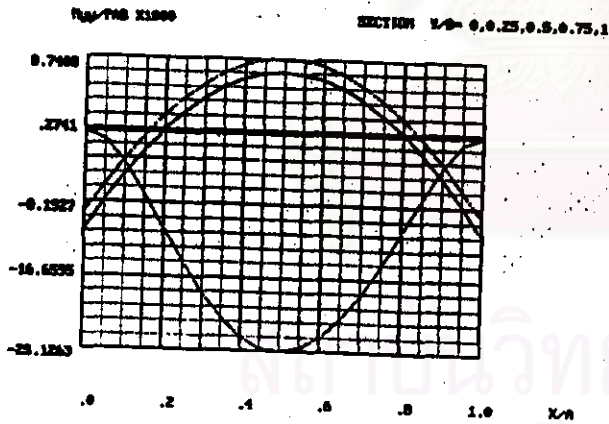
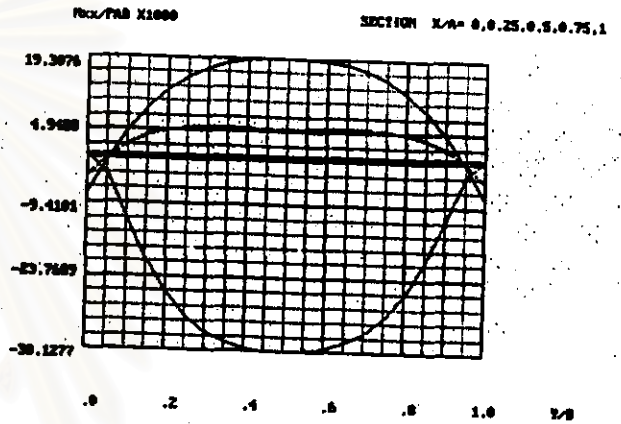
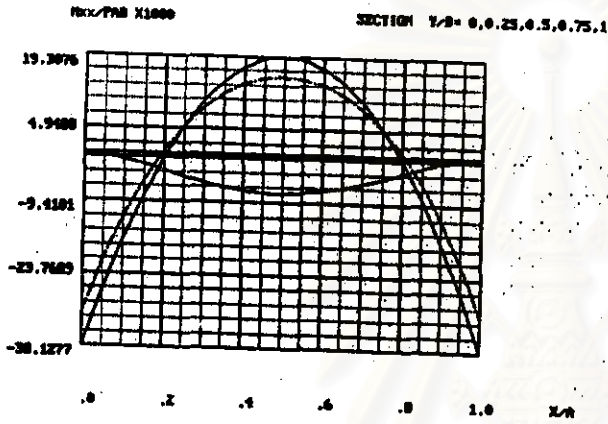
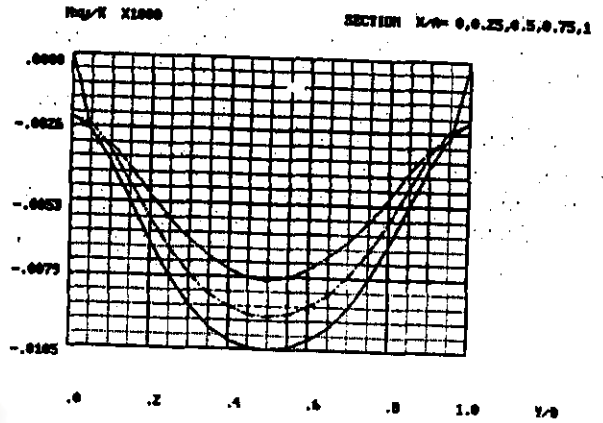
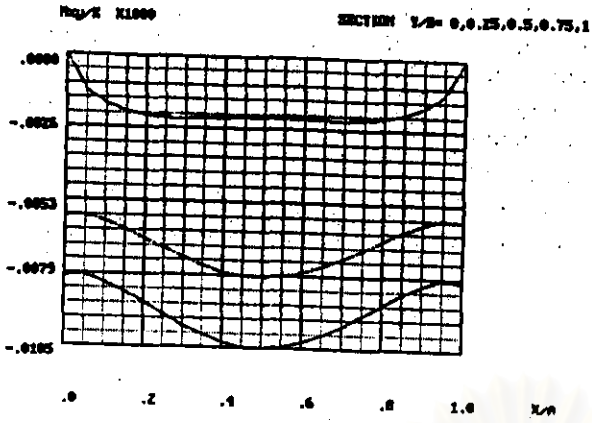
SECTION $Y/\delta = 0, 0.25, 0.5, 0.75, 1$



$\theta_{yy}/K \times 10000$

SECTION $X/\delta = 0, 0.25, 0.5, 0.75, 1$





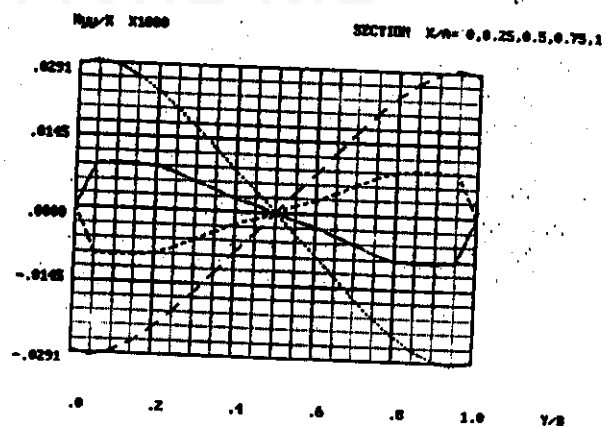
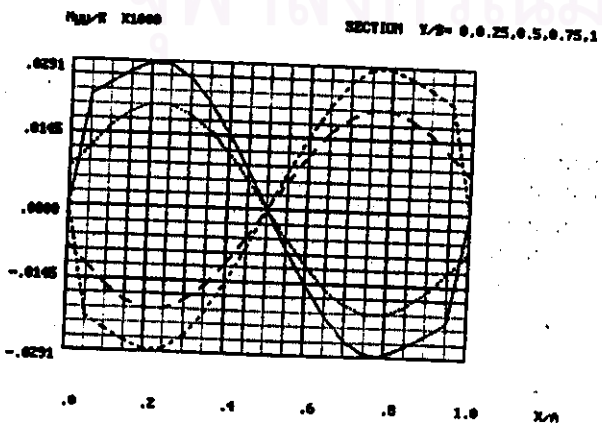
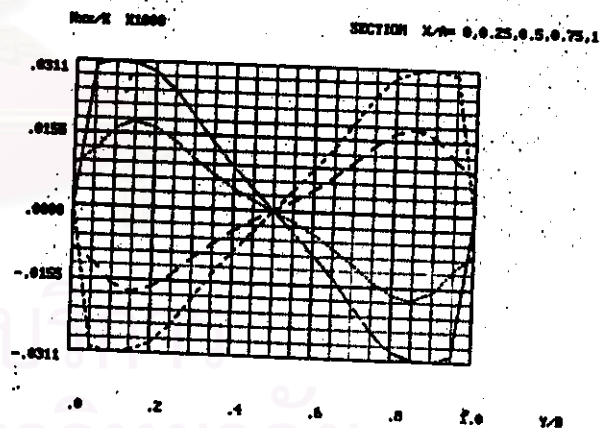
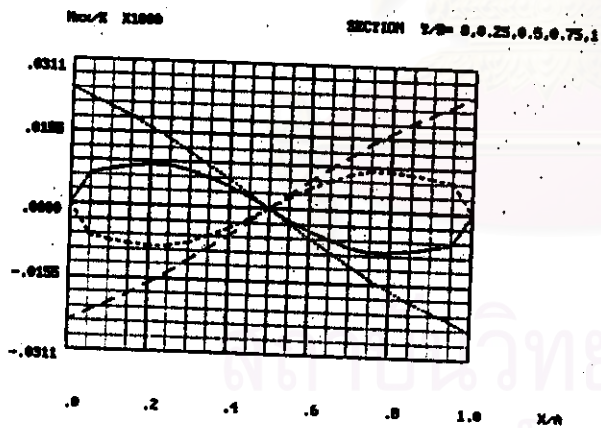
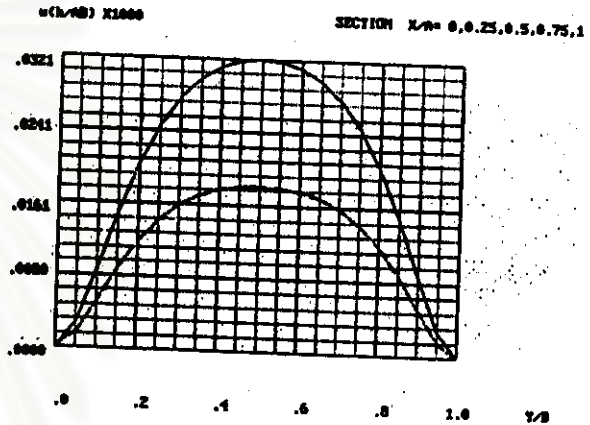
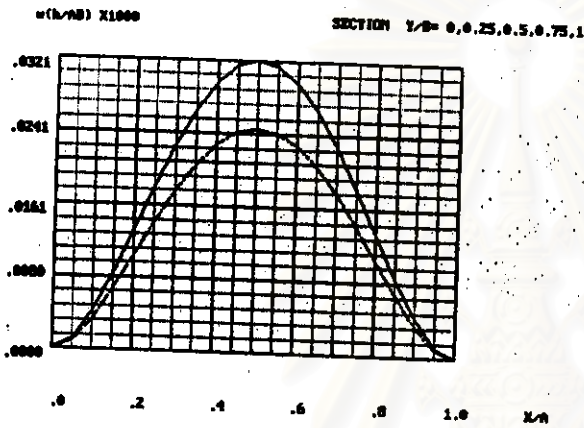
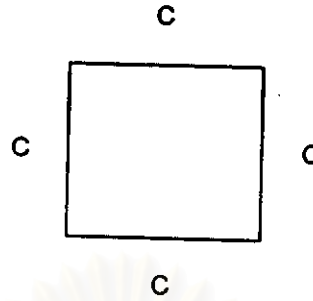
ผลของกรณีที่ 2 :

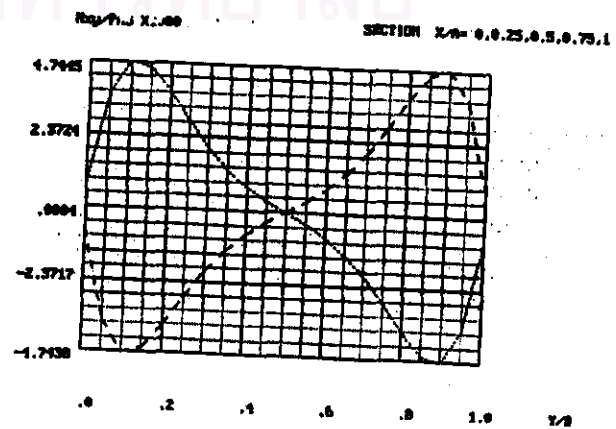
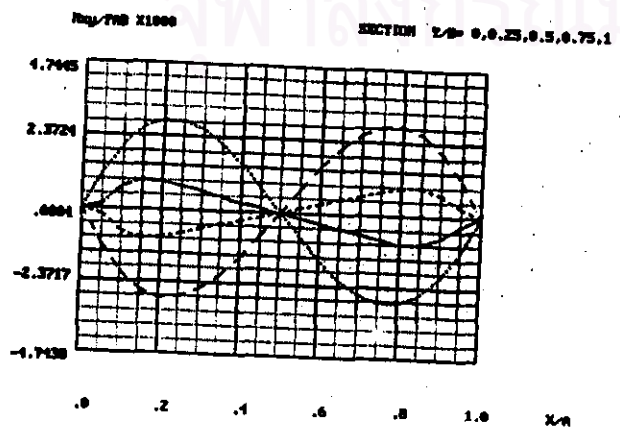
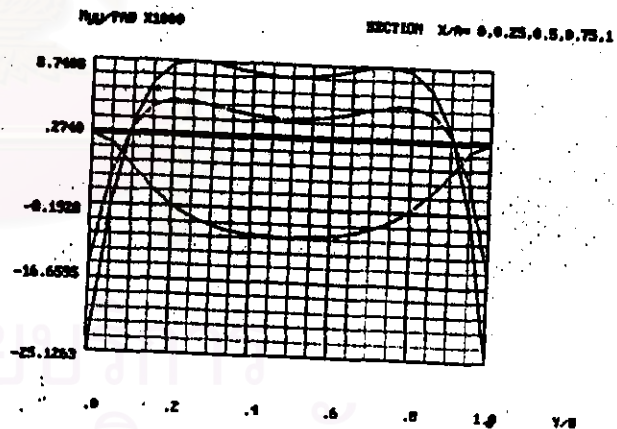
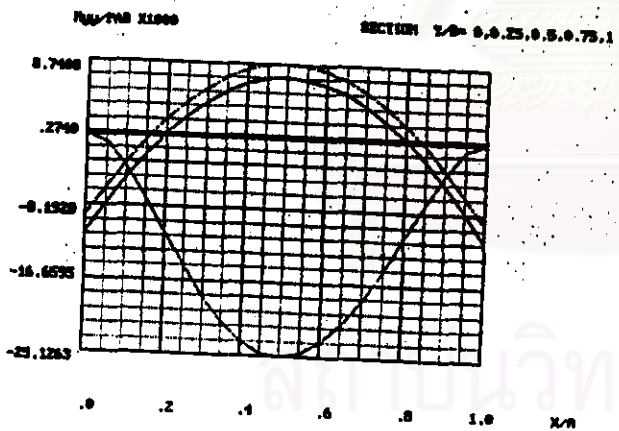
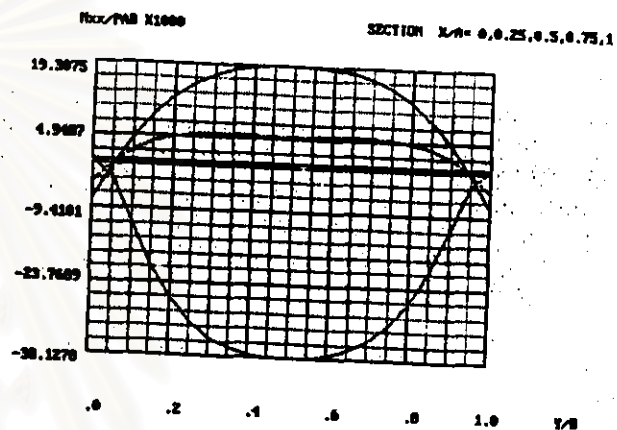
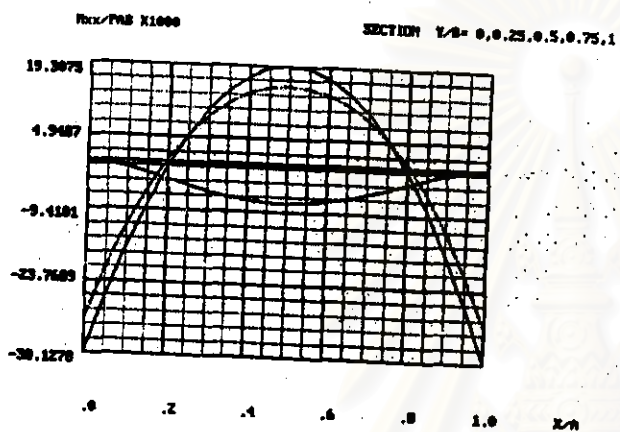
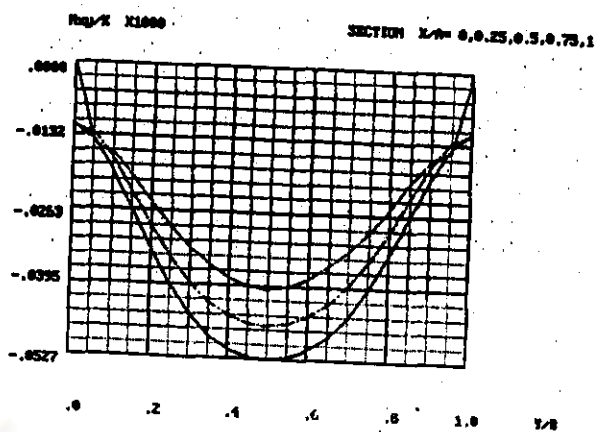
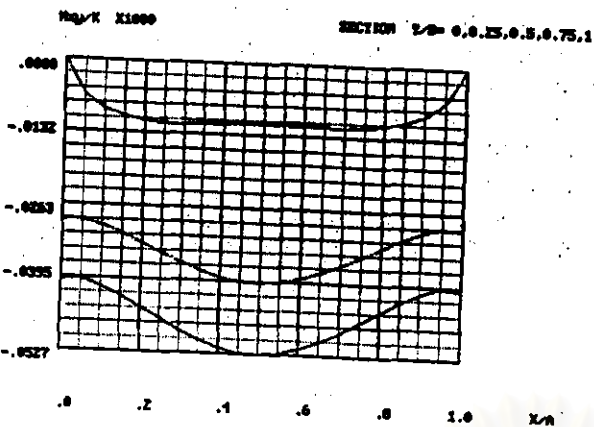
$$\frac{A}{B} = 0.5$$

$$\frac{f}{h} = 4.0$$

$$\frac{P_3 AB}{Eh^2} = 0.005$$

$$\nu = 0.3$$





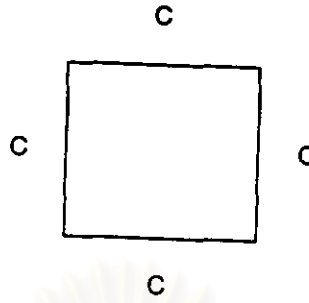
ผลของกรณีที่ 2 :

$$\frac{A}{B} = 0.5$$

$$\frac{f}{h} = 4.0$$

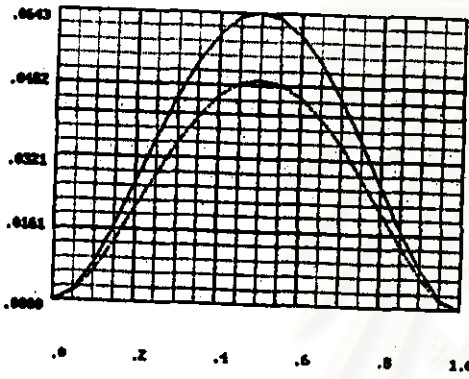
$$\frac{P_3 AB}{Eh^2} = 0.01$$

$$\nu = 0.3$$



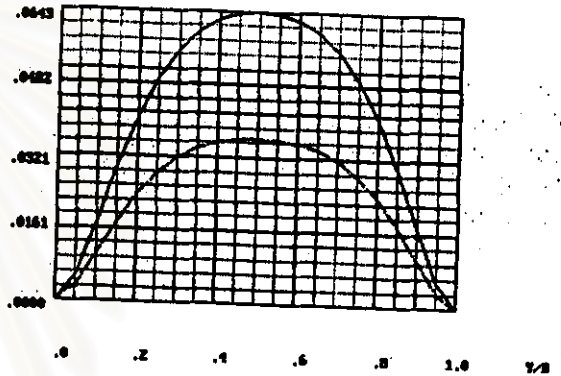
$u(z/B) \times 1000$

SECTION $Y/B = 0, 0.25, 0.5, 0.75, 1$



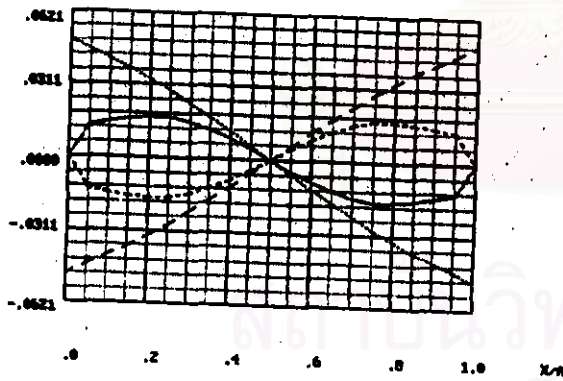
$u(z/B) \times 1000$

SECTION $X/h = 0, 0.25, 0.5, 0.75, 1$



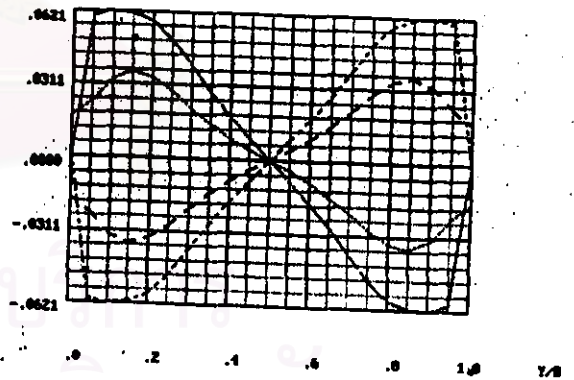
$w(z/B) \times 1000$

SECTION $Y/B = 0, 0.25, 0.5, 0.75, 1$



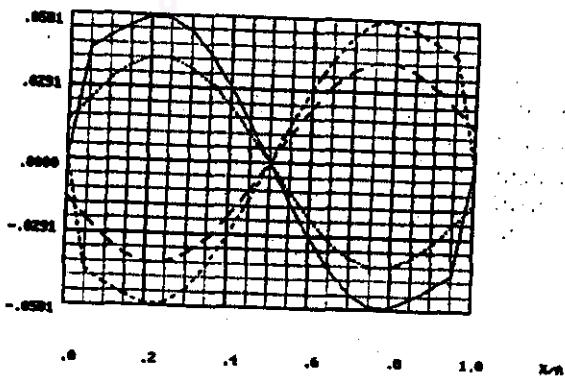
$w(z/B) \times 1000$

SECTION $X/h = 0, 0.25, 0.5, 0.75, 1$



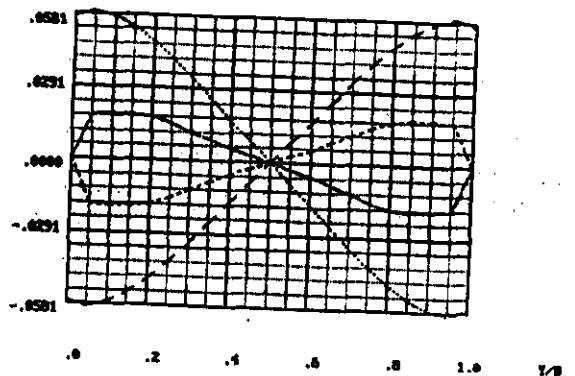
$\theta(z/B) \times 1000$

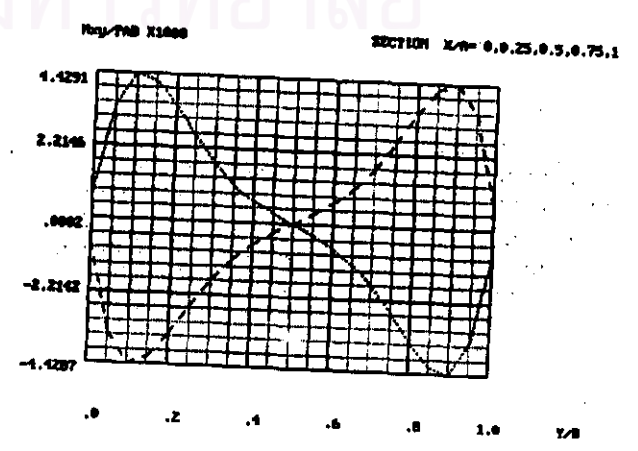
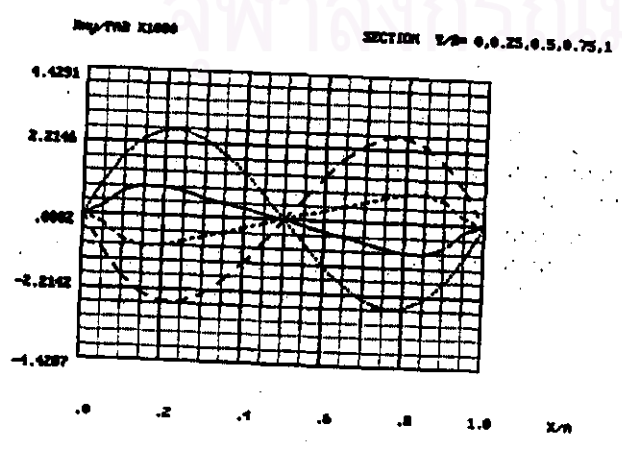
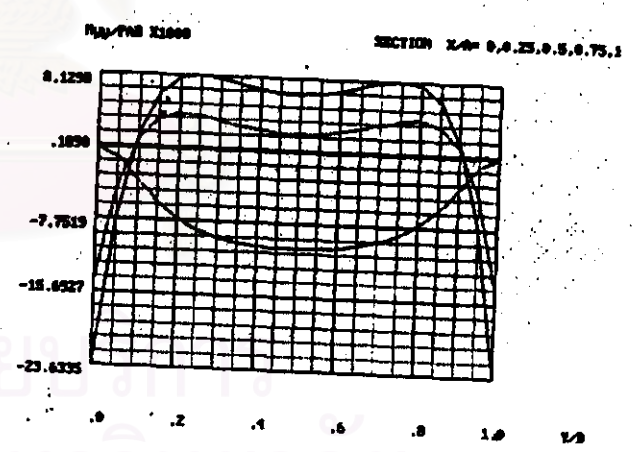
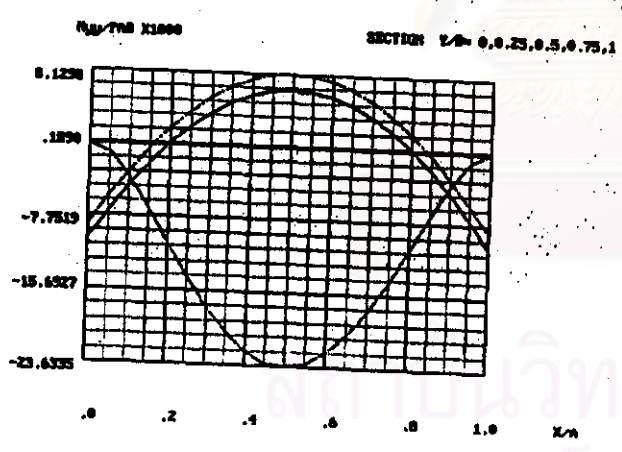
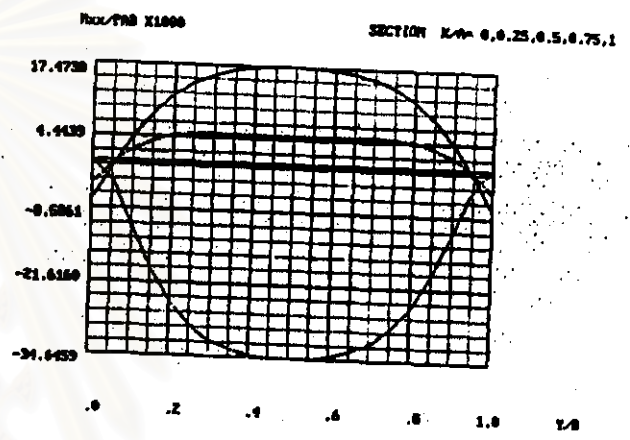
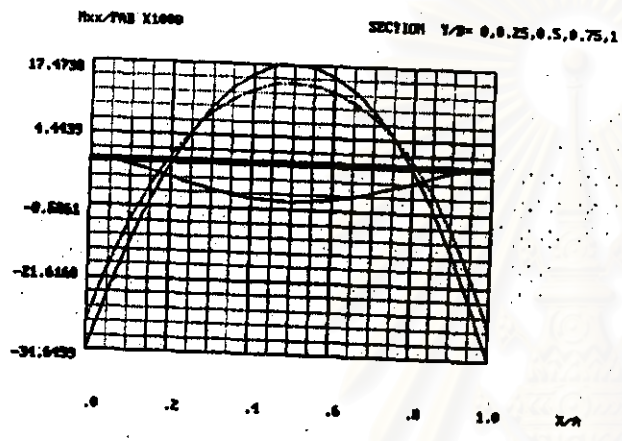
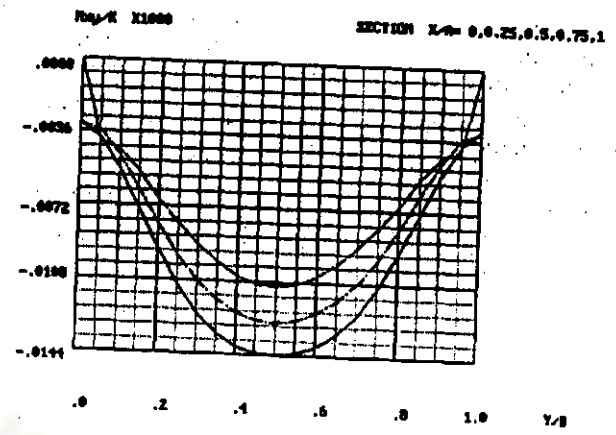
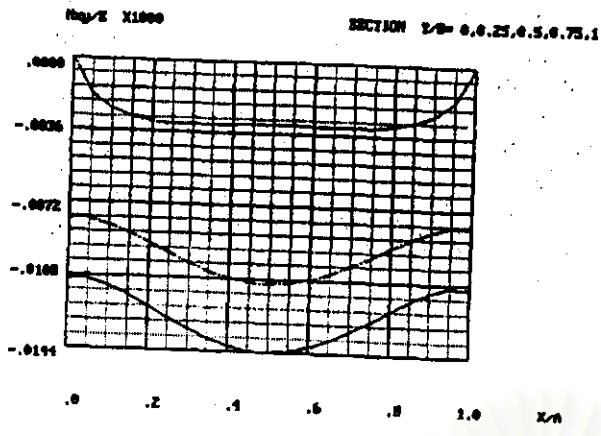
SECTION $Y/B = 0, 0.25, 0.5, 0.75, 1$



$\theta(z/B) \times 1000$

SECTION $X/h = 0, 0.25, 0.5, 0.75, 1$





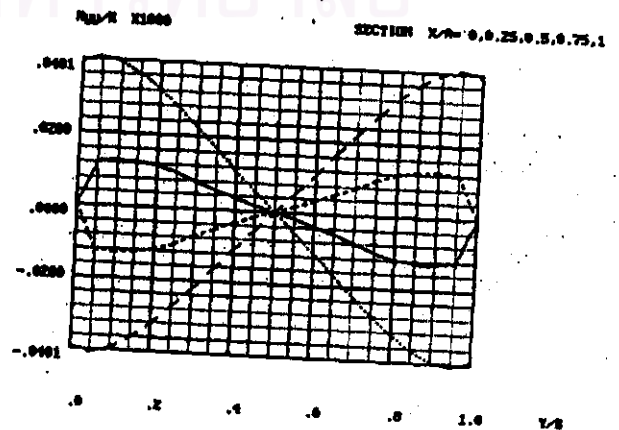
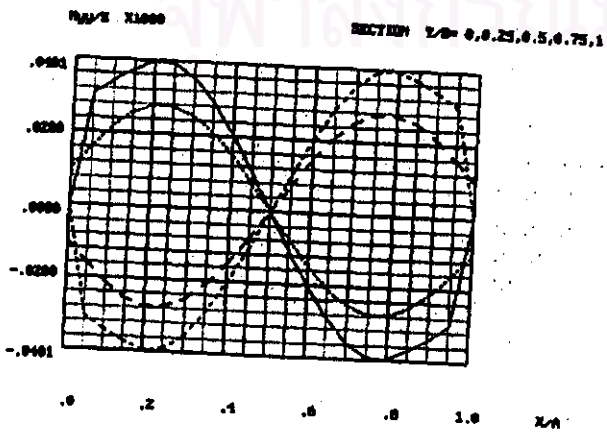
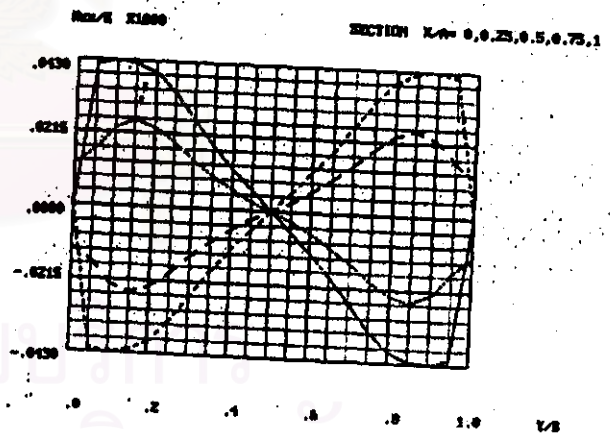
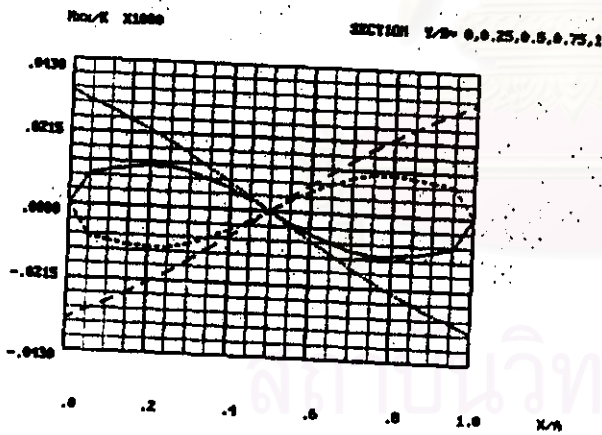
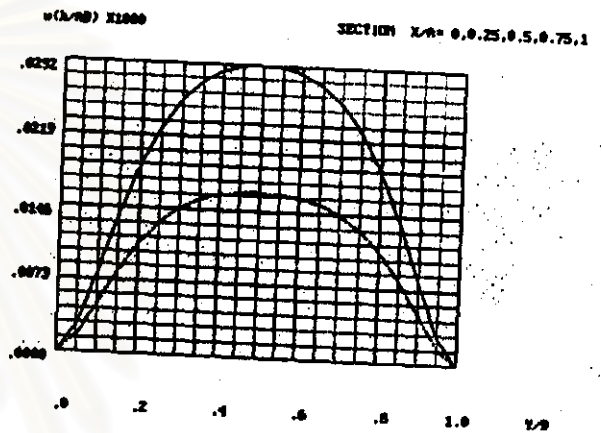
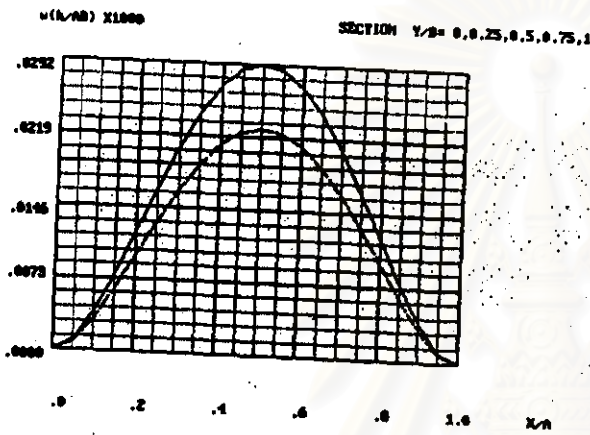
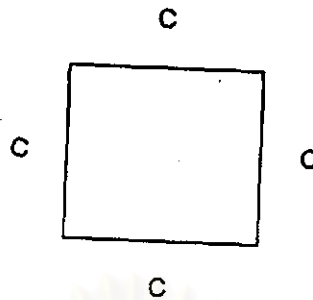
ผลของกรณีที่ 2 :

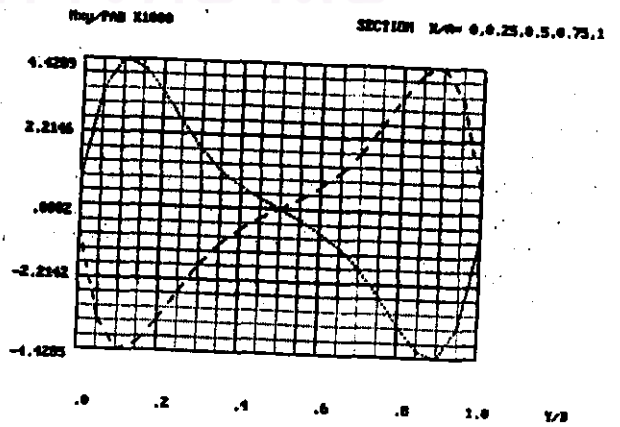
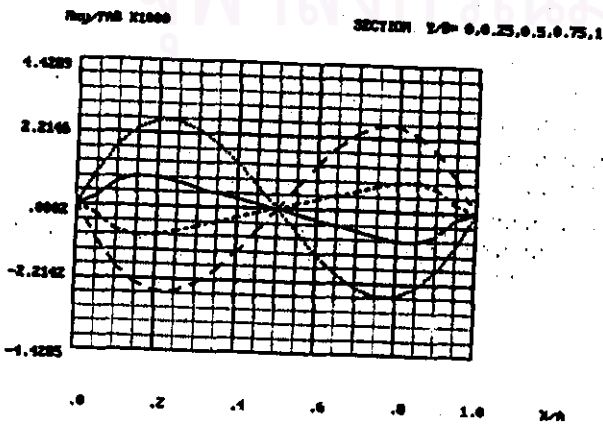
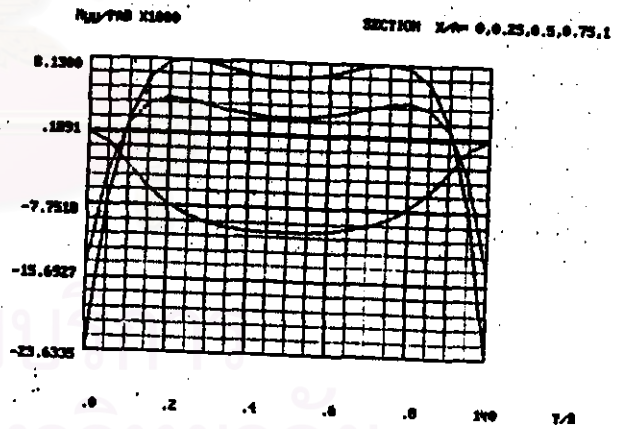
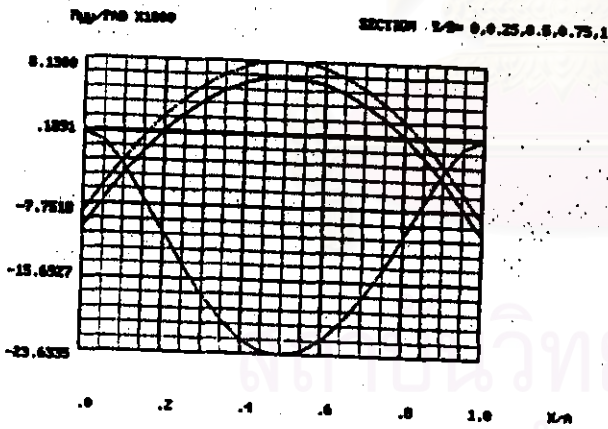
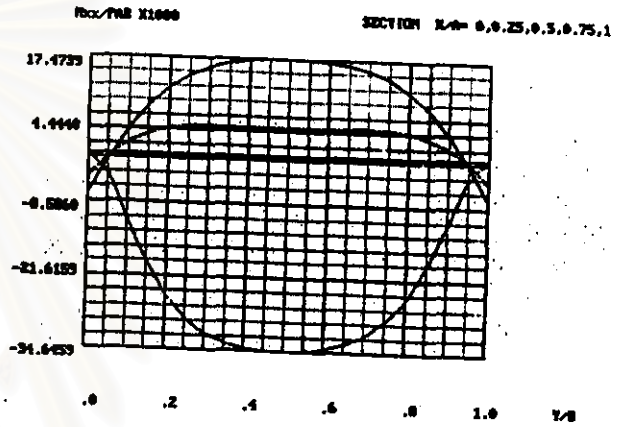
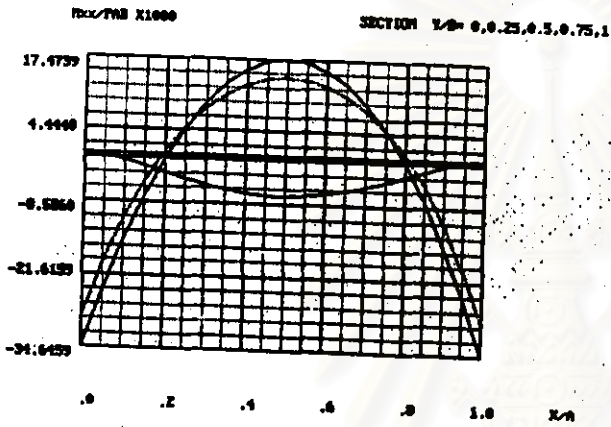
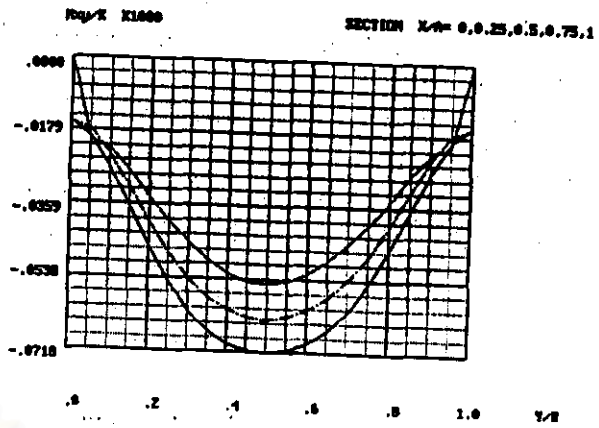
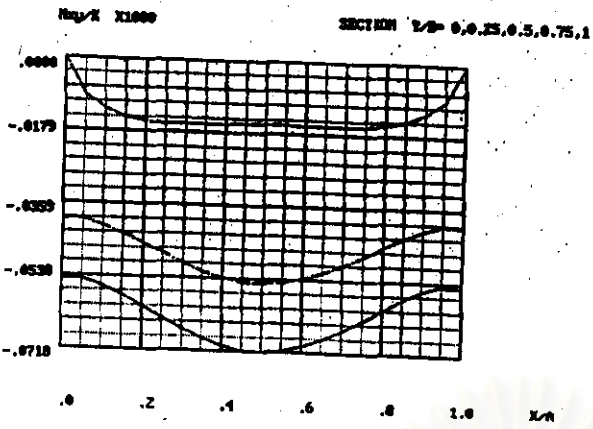
$$\frac{A}{B} = 0.5$$

$$\frac{f}{h} = 6.0$$

$$\frac{P_3 AB}{Eh^2} = 0.005$$

$$\nu = 0.3$$





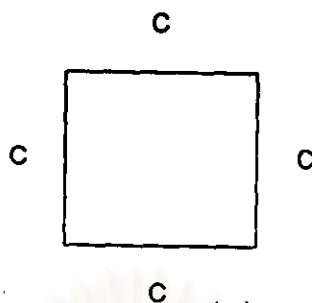
ผลของกรณีที่ 2 :

$$\frac{A}{B} = 0.5$$

$$\frac{f}{h} = 6.0$$

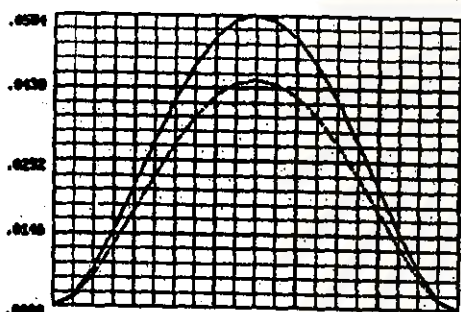
$$\frac{P_{3AB}}{Eh^2} = 0.01$$

$$\nu = 0.3$$



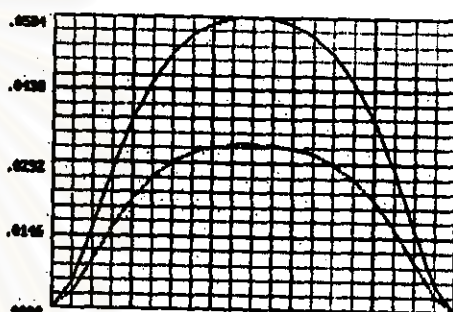
$v(l/h) \times 1000$

SECTION $l/h = 0.0, 0.25, 0.5, 0.75, 1$



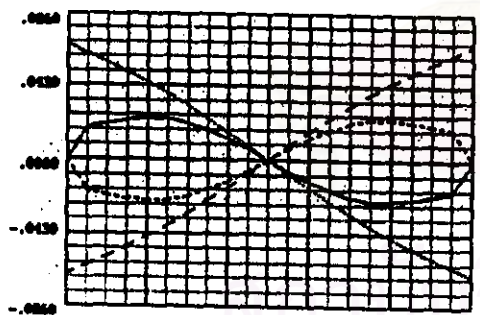
$v(l/h) \times 1000$

SECTION $l/h = 0.0, 0.25, 0.5, 0.75, 1$



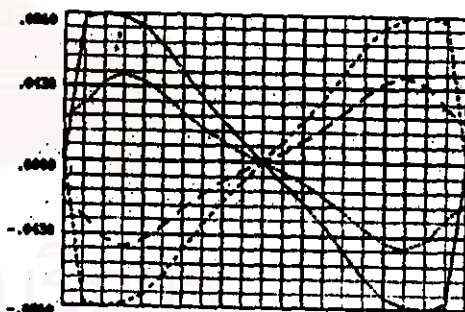
$w_{30}/E \times 10000$

SECTION $l/h = 0.0, 0.25, 0.5, 0.75, 1$



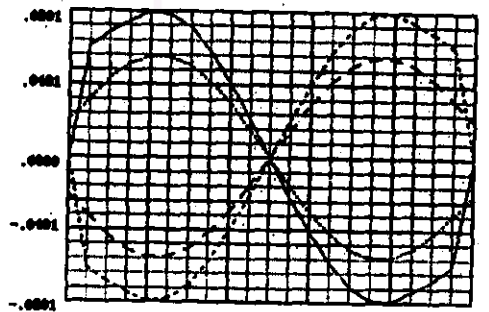
$w_{30}/E \times 10000$

SECTION $l/h = 0.0, 0.25, 0.5, 0.75, 1$



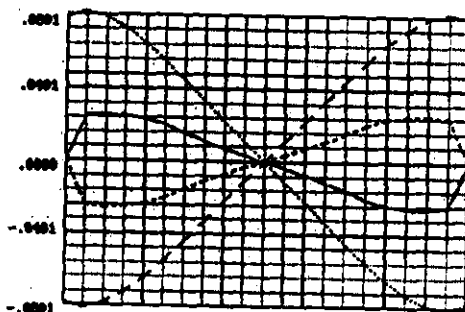
$w_{30}/E \times 10000$

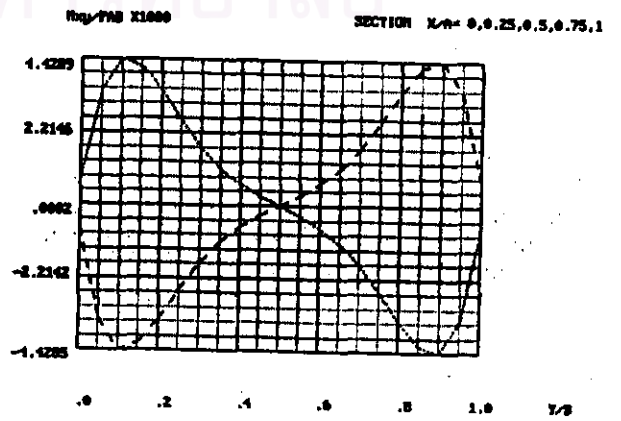
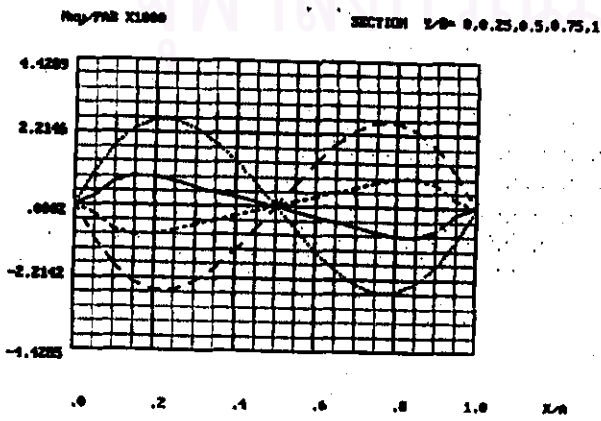
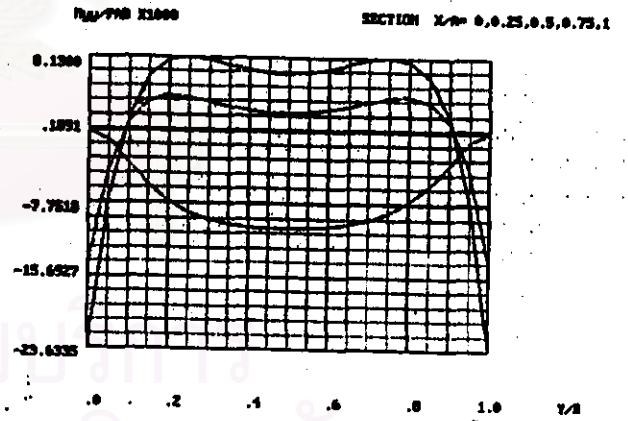
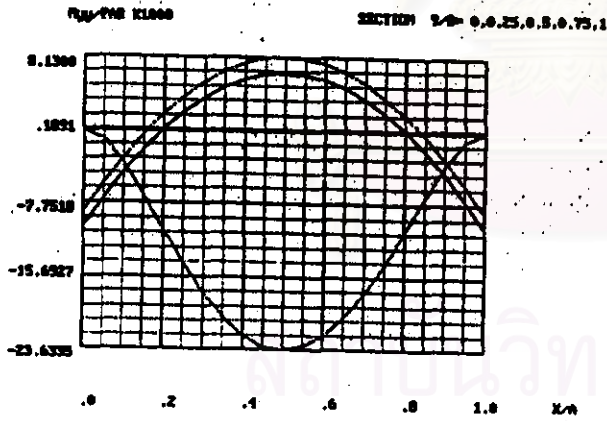
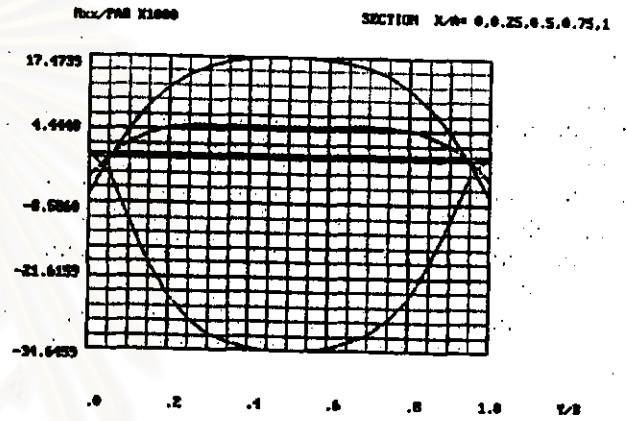
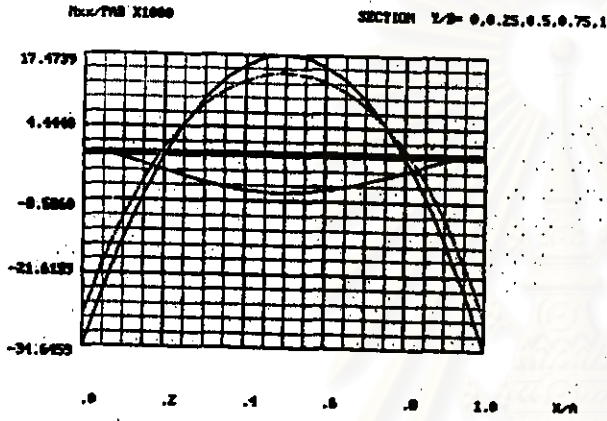
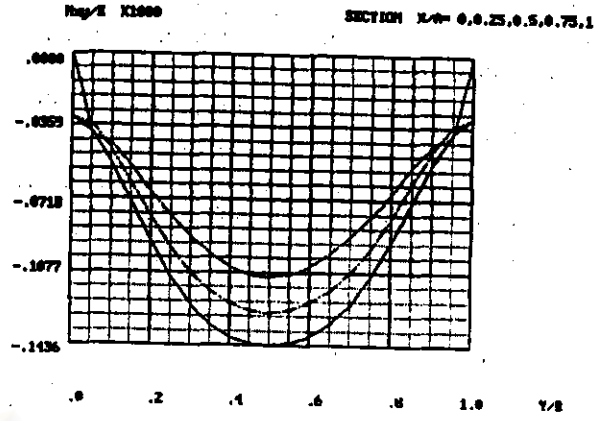
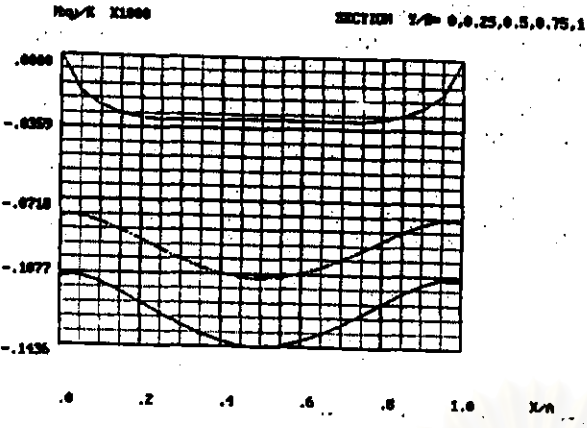
SECTION $l/h = 0.0, 0.25, 0.5, 0.75, 1$



$w_{30}/E \times 10000$

SECTION $l/h = 0.0, 0.25, 0.5, 0.75, 1$





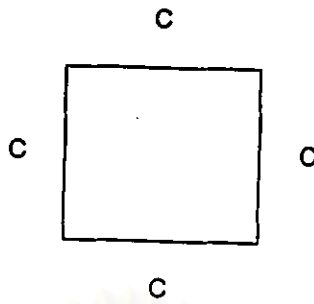
ผลของกรณีที่ 2 :

$$\frac{A}{B} = 1.0$$

$$\frac{f}{h} = 2.0$$

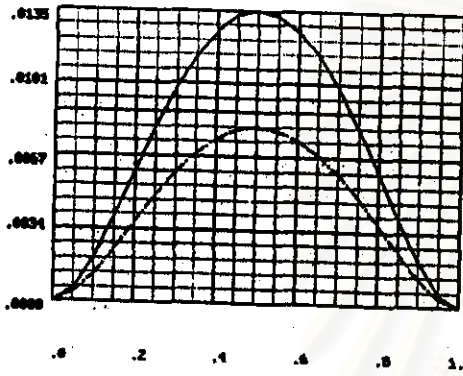
$$\frac{P_3 AB}{Eh^2} = 0.001$$

$$\nu = 0.3$$



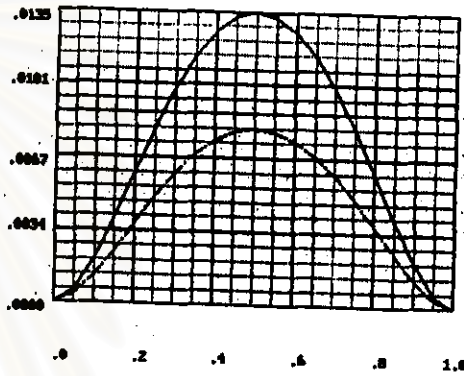
$w(h/b) \times 1000$

SECTION $y/b = 0, 0.25, 0.5, 0.75, 1$



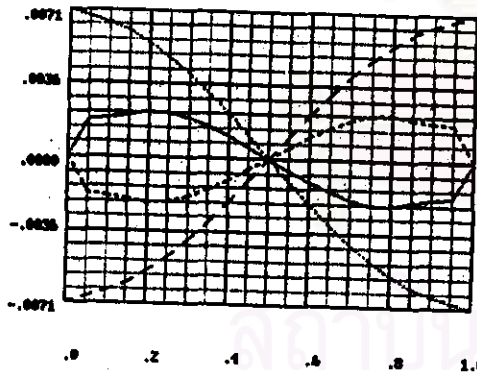
$w(h/b) \times 1000$

SECTION $x/h = 0, 0.25, 0.5, 0.75, 1$



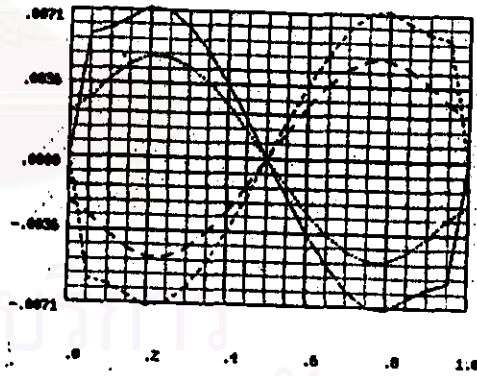
$\theta_{xz}/E \times 1000$

SECTION $y/b = 0, 0.25, 0.5, 0.75, 1$



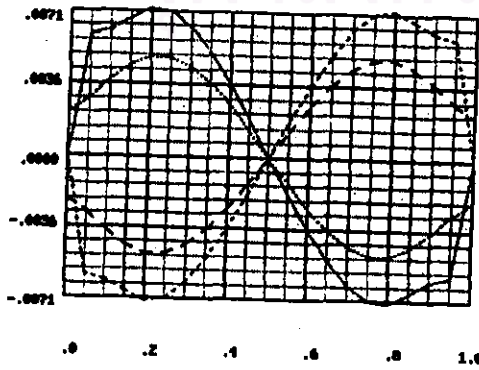
$\theta_{xz}/E \times 1000$

SECTION $x/h = 0, 0.25, 0.5, 0.75, 1$



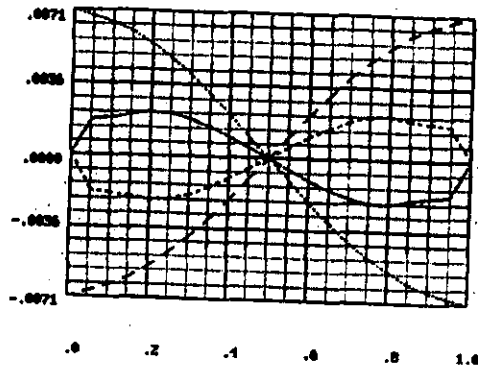
$\theta_{yz}/E \times 1000$

SECTION $y/b = 0, 0.25, 0.5, 0.75, 1$

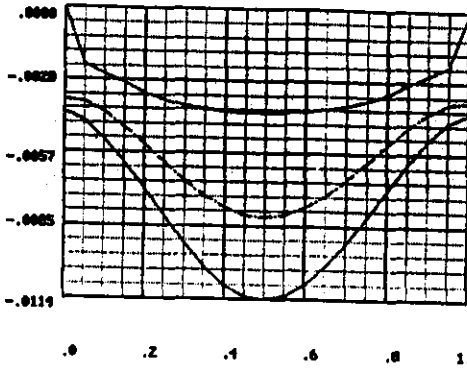


$\theta_{yz}/E \times 1000$

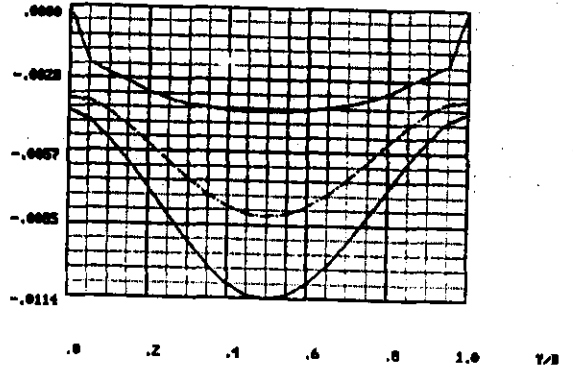
SECTION $x/h = 0, 0.25, 0.5, 0.75, 1$



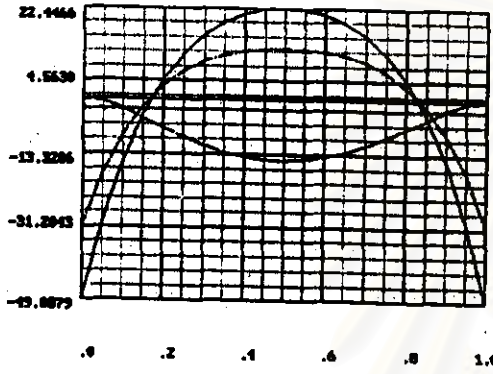
$R_{xy}/K \times 1000$ SECTION $Y/B = 0, 0.25, 0.5, 0.75, 1$



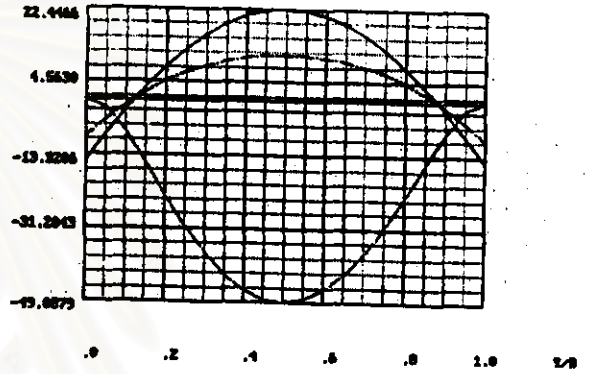
$R_{xy}/K \times 1000$ SECTION $X/A = 0, 0.25, 0.5, 0.75, 1$



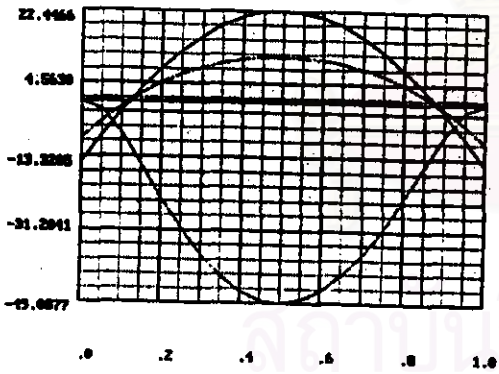
$R_{xz}/PAB \times 1000$ SECTION $Y/B = 0, 0.25, 0.5, 0.75, 1$



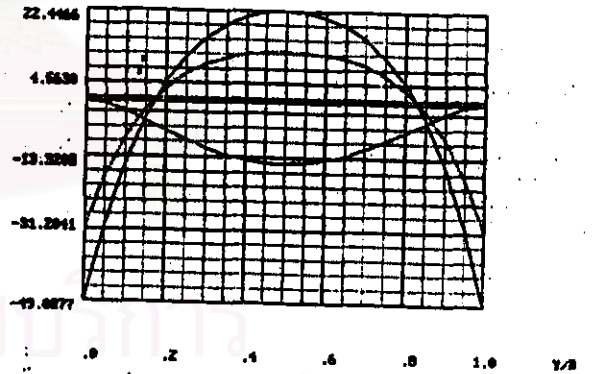
$R_{xz}/PAB \times 1000$ SECTION $X/A = 0, 0.25, 0.5, 0.75, 1$



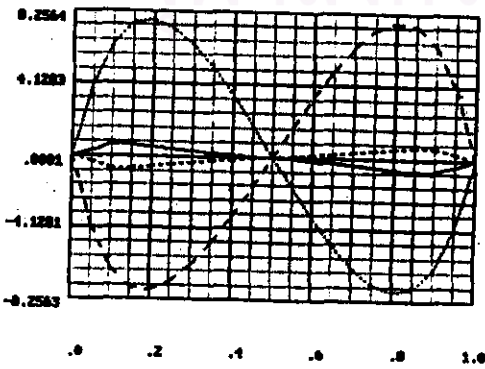
$R_{yz}/PAB \times 1000$ SECTION $Y/B = 0, 0.25, 0.5, 0.75, 1$



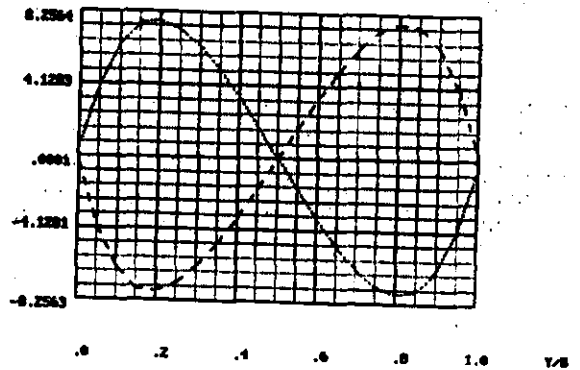
$R_{yz}/PAB \times 1000$ SECTION $X/A = 0, 0.25, 0.5, 0.75, 1$



$R_{xy}/PAB \times 1000$ SECTION $Y/B = 0, 0.25, 0.5, 0.75, 1$



$R_{xy}/PAB \times 1000$ SECTION $X/A = 0, 0.25, 0.5, 0.75, 1$



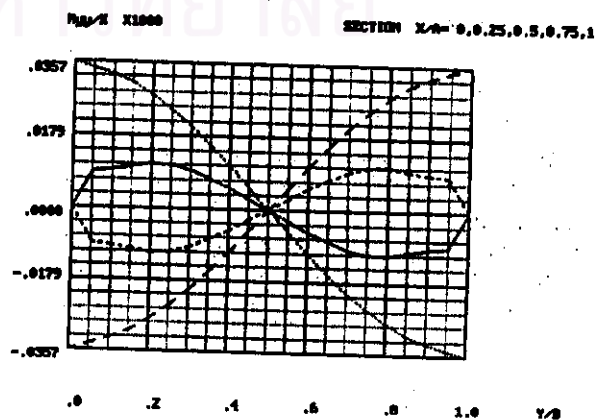
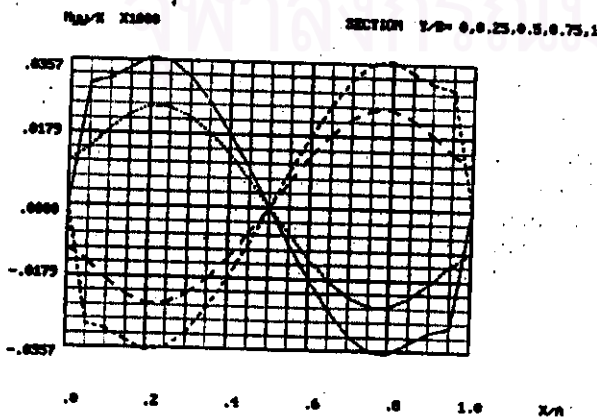
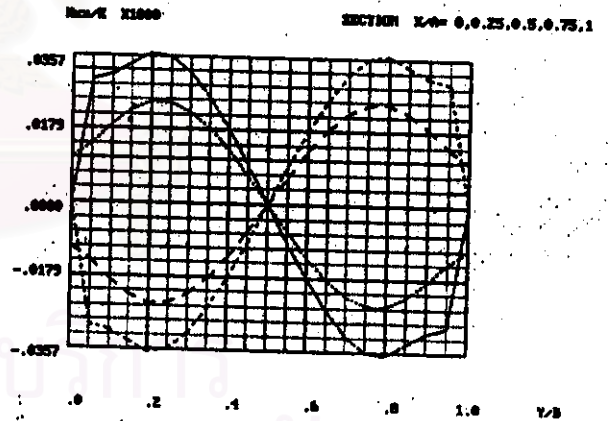
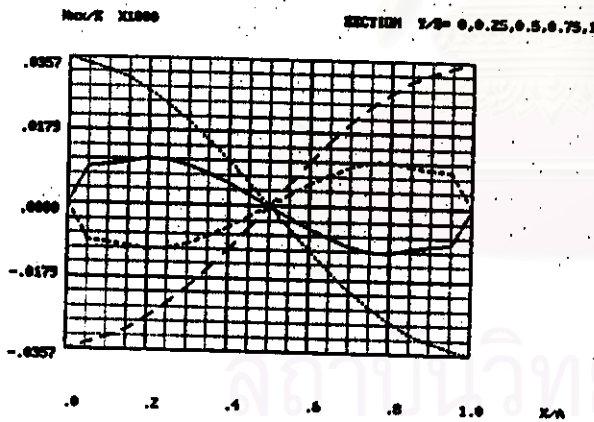
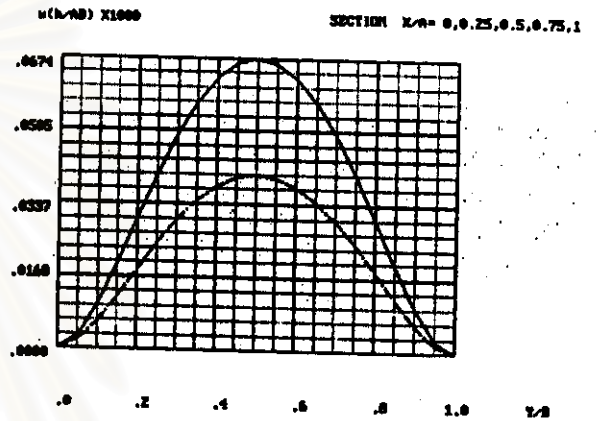
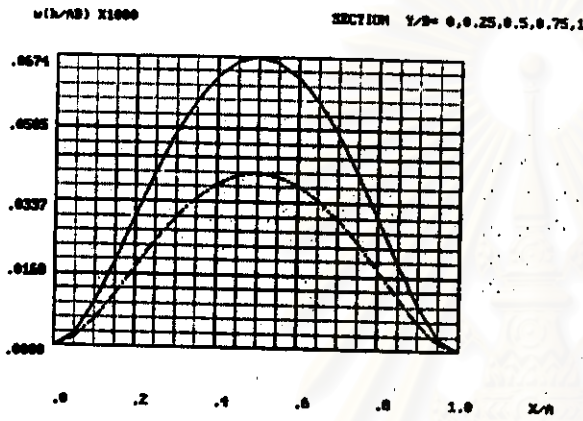
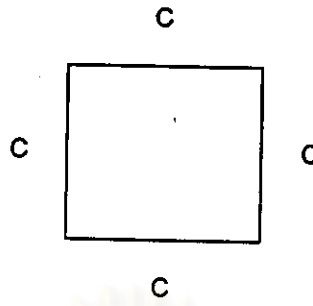
ผลของกรณีที่ 2 :

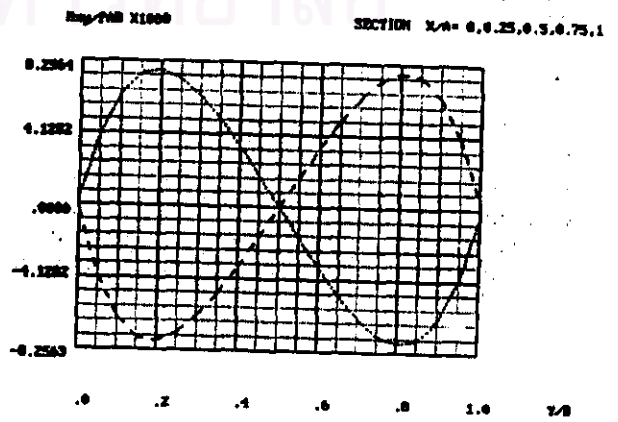
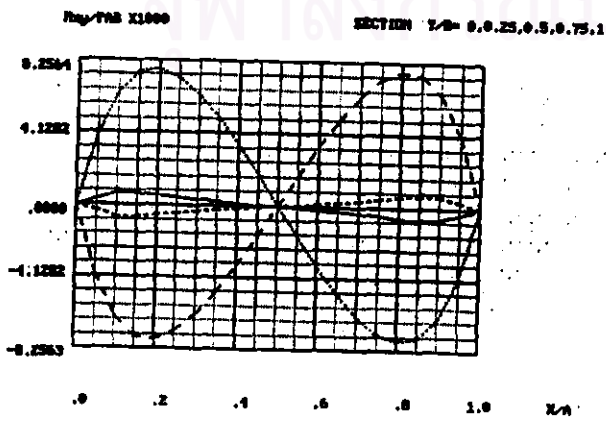
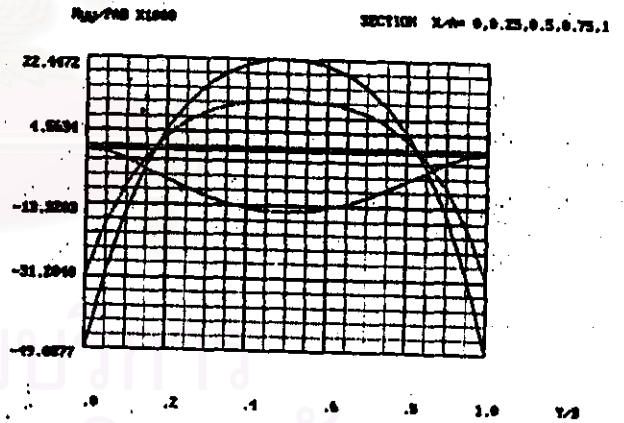
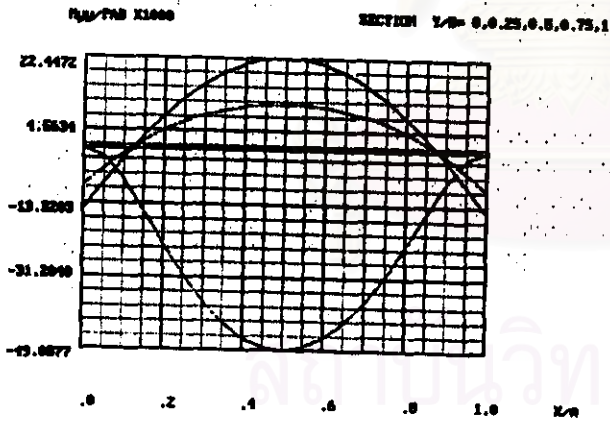
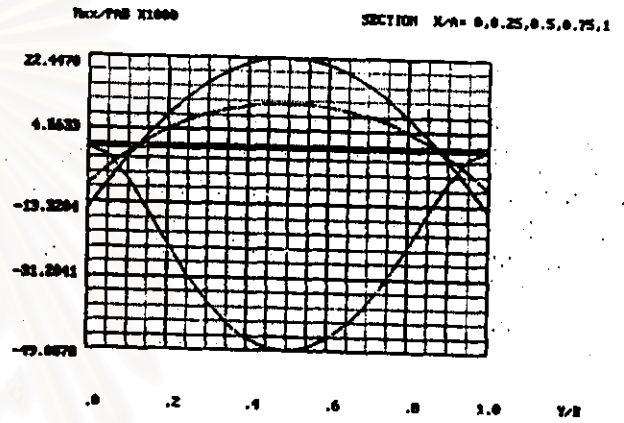
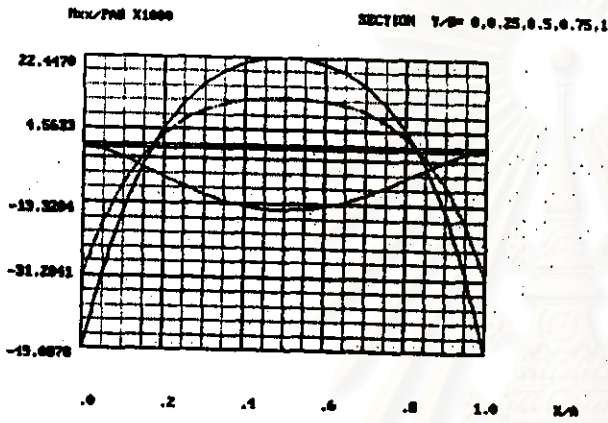
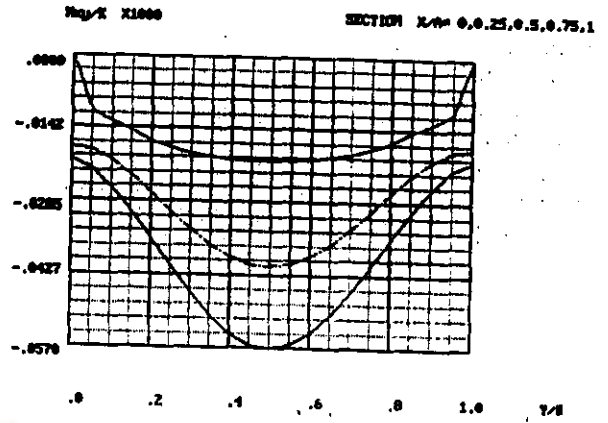
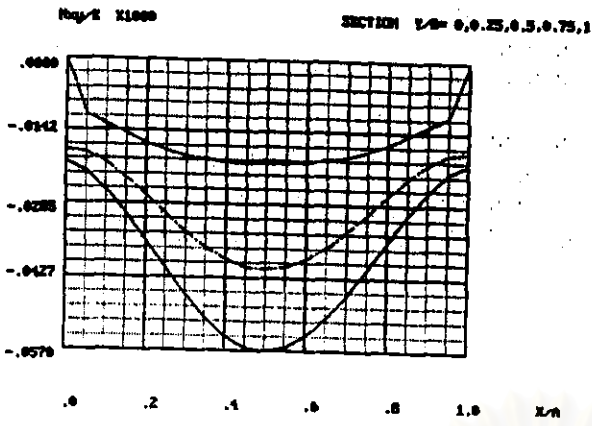
$$\frac{A}{B} = 1.0$$

$$\frac{f}{h} = 2.0$$

$$\frac{P_3 AB}{Eh^2} = 0.005$$

$$\nu = 0.3$$





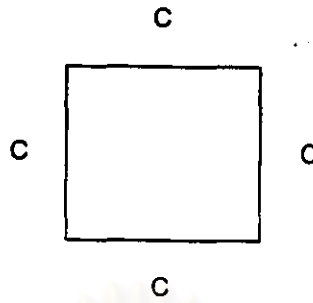
ผลของกรณีที่ 2 :

$$\frac{A}{B} = 1.0$$

$$\frac{f}{h} = 2.0$$

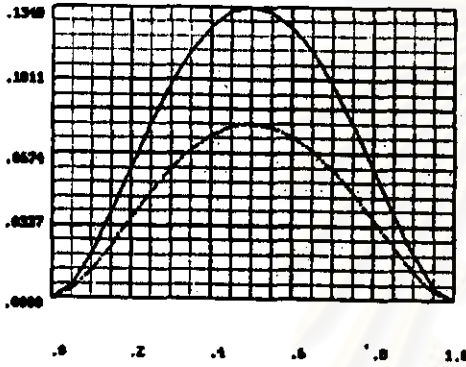
$$\frac{P_3 AB}{Eh^2} = 0.01$$

$$\nu = 0.3$$



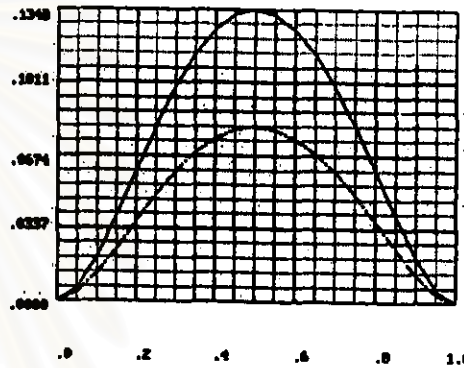
$w(h/\delta) \times 1000$

SECTION $y/\delta = 0, 0.25, 0.5, 0.75, 1$



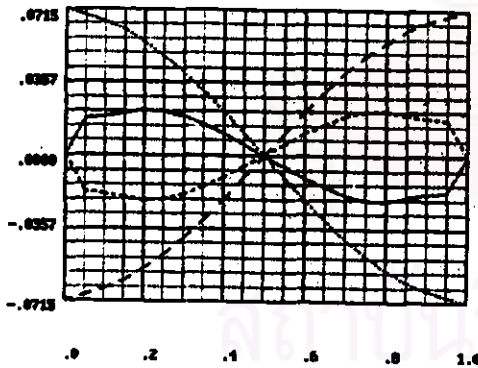
$w(h/\delta) \times 1000$

SECTION $x/\delta = 0, 0.25, 0.5, 0.75, 1$



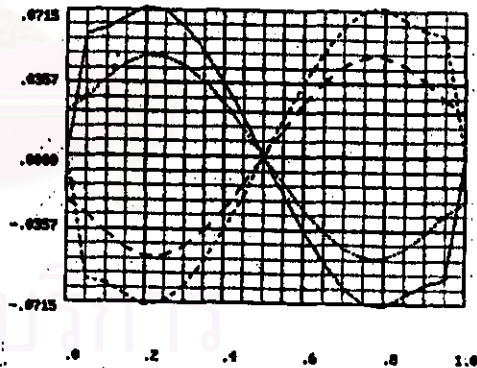
$\theta_{xx}/K \times 1000$

SECTION $y/\delta = 0, 0.25, 0.5, 0.75, 1$



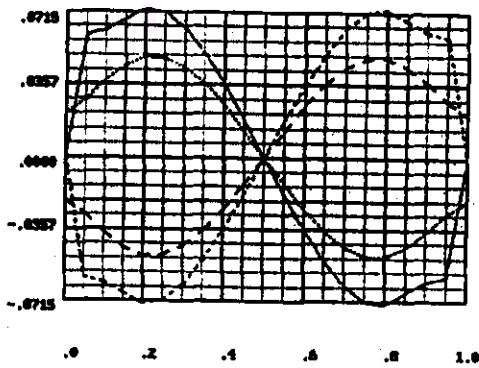
$\theta_{xx}/K \times 1000$

SECTION $x/\delta = 0, 0.25, 0.5, 0.75, 1$



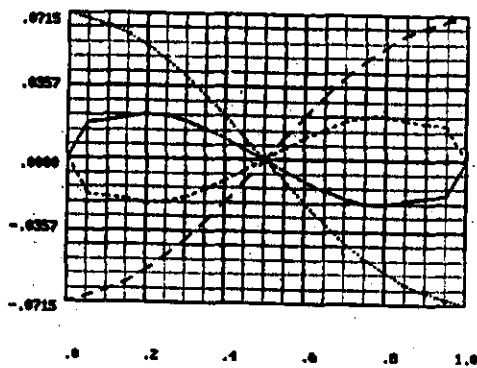
$\theta_{yy}/K \times 1000$

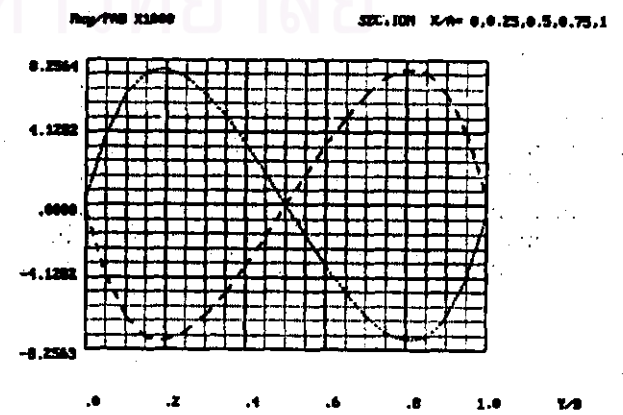
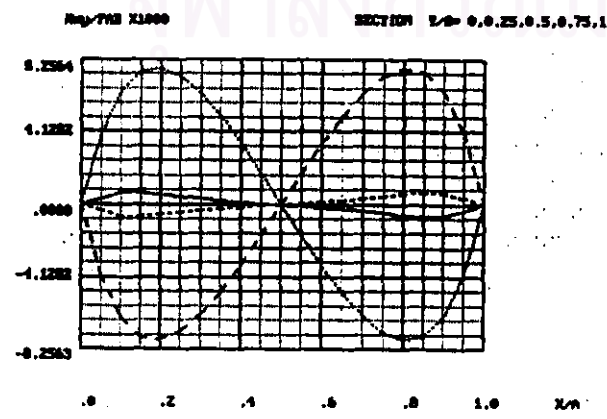
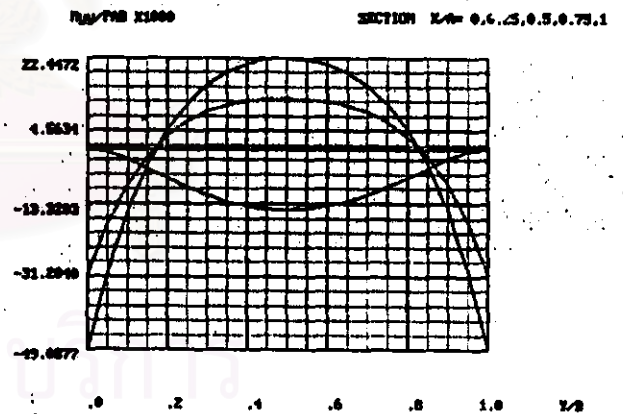
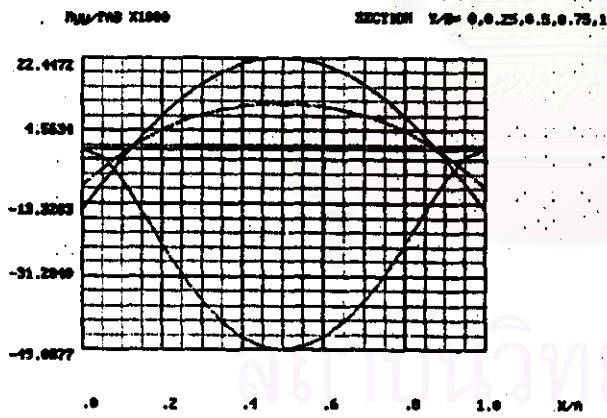
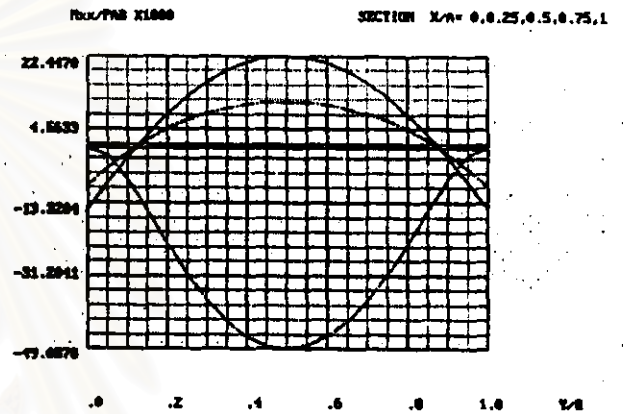
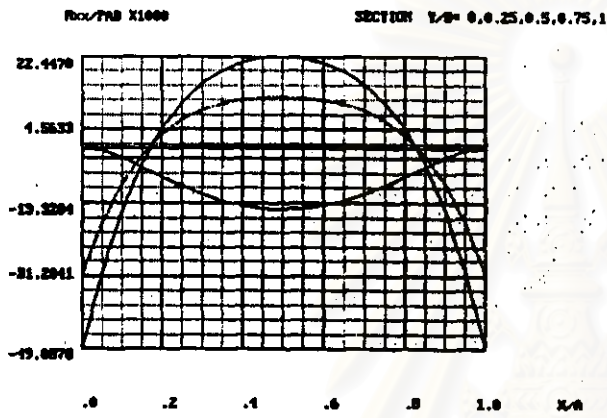
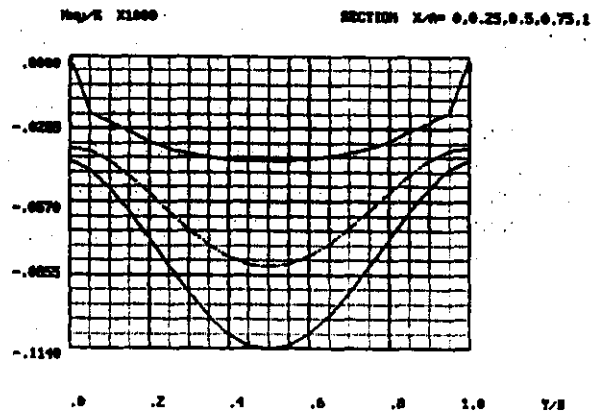
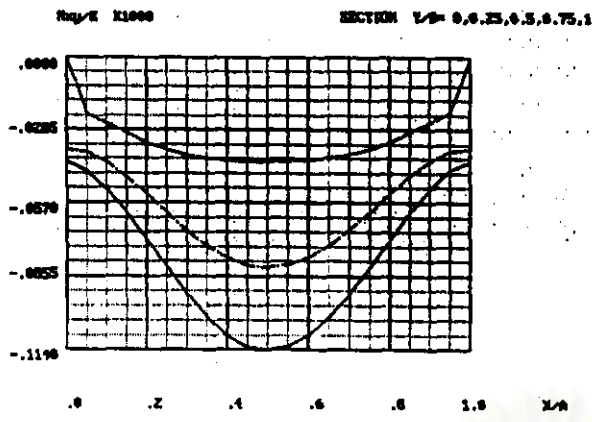
SECTION $y/\delta = 0, 0.25, 0.5, 0.75, 1$



$\theta_{yy}/K \times 1000$

SECTION $x/\delta = 0, 0.25, 0.5, 0.75, 1$





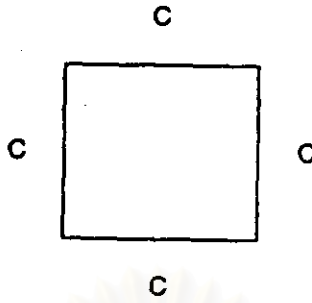
ผลของกรณีที่ 2 :

$$\frac{A}{B} = 1.0$$

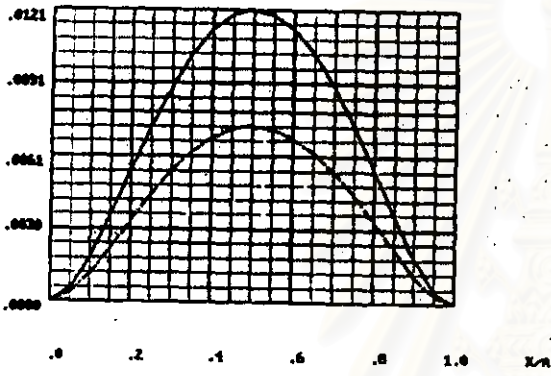
$$\frac{f}{h} = 4.0$$

$$\frac{P_1 AB}{Eh^2} = 0.001$$

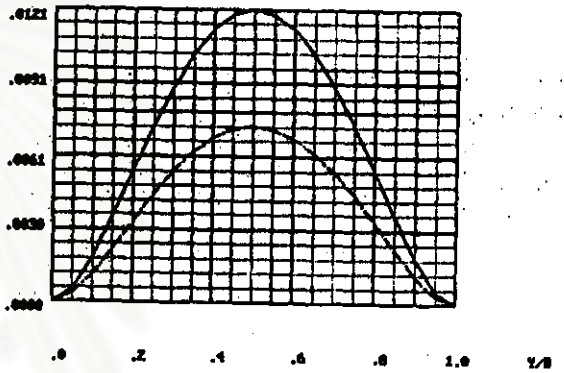
$$\nu = 0.3$$



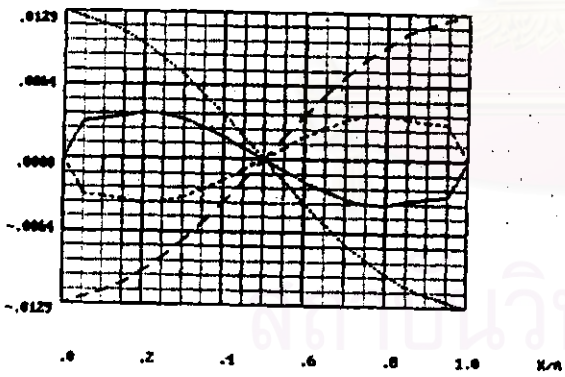
$w(z, \eta) \times 1000$ SECTION $\eta/\delta = 0, 0.25, 0.5, 0.75, 1$



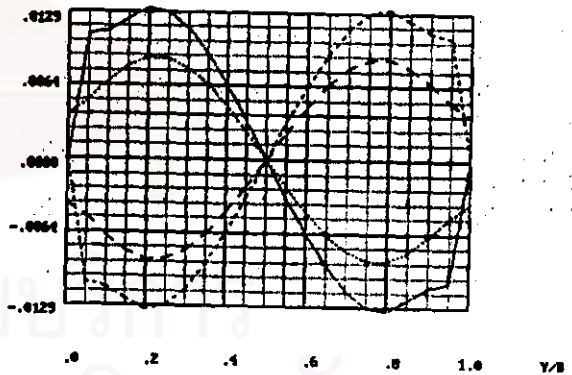
$w(z, \eta) \times 1000$ SECTION $\eta/\delta = 0, 0.25, 0.5, 0.75, 1$



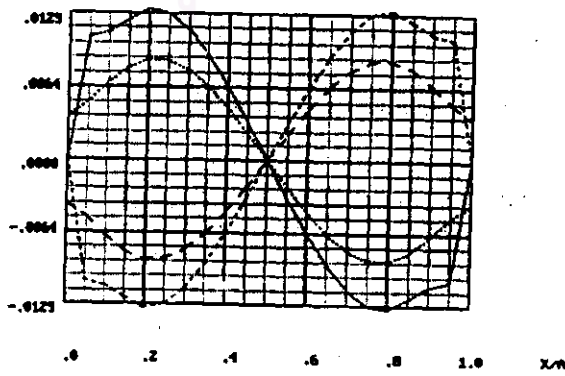
$\theta_{xz}/K \times 1000$ SECTION $\eta/\delta = 0, 0.25, 0.5, 0.75, 1$



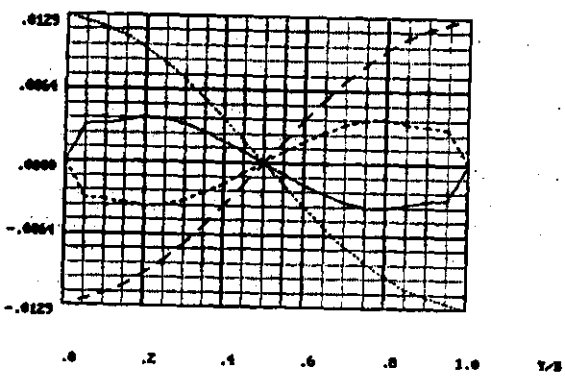
$\theta_{xz}/K \times 1000$ SECTION $\eta/\delta = 0, 0.25, 0.5, 0.75, 1$



$\theta_{yz}/K \times 1000$ SECTION $\eta/\delta = 0, 0.25, 0.5, 0.75, 1$

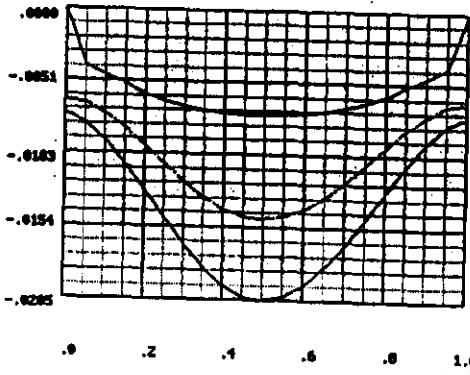


$\theta_{yz}/K \times 1000$ SECTION $\eta/\delta = 0, 0.25, 0.5, 0.75, 1$



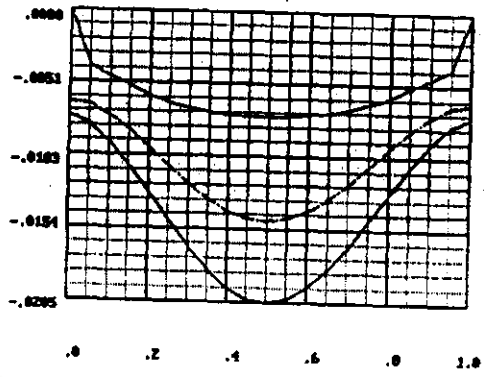
R_{xy}/K X1000

SECTION Y/B = 0,0.25,0.5,0.75,1



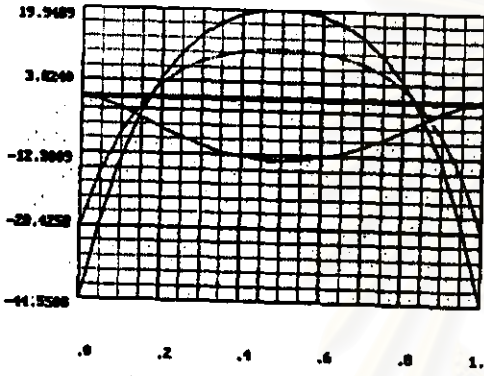
R_{xy}/K X1000

SECTION X/A = 0,0.25,0.5,0.75,1



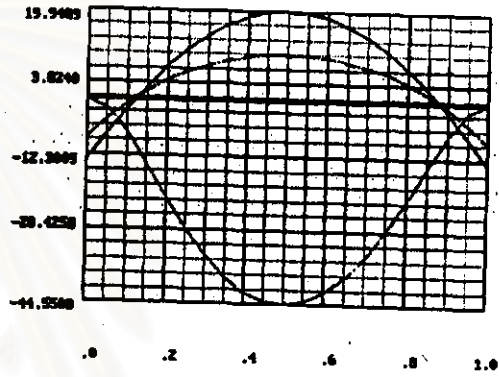
R_{xx}/PAB X1000

SECTION Y/B = 0,0.25,0.5,0.75,1



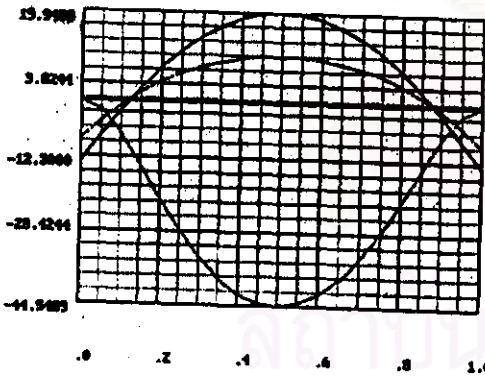
R_{xx}/PAB X1000

SECTION X/A = 0,0.25,0.5,0.75,1



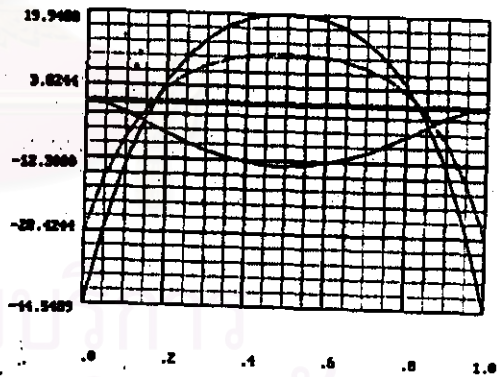
R_{yy}/PAB X1000

SECTION Y/B = 0,0.25,0.5,0.75,1



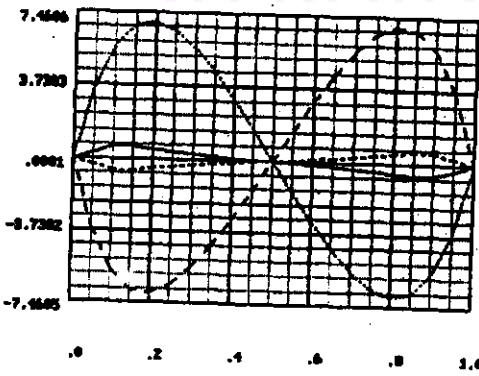
R_{yy}/PAB X1000

SECTION X/A = 0,0.25,0.5,0.75,1



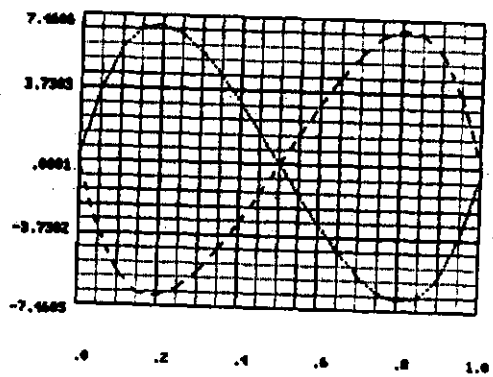
R_{xy}/PAB X1000

SECTION Y/B = 0,0.25,0.5,0.75,1



R_{xy}/PAB X1000

SECTION X/A = 0,0.25,0.5,0.75,1



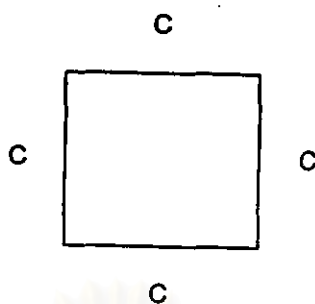
ผลของกรณีที่ 2 :

$$\frac{A}{B} = 1.0$$

$$\frac{f}{h} = 4.0$$

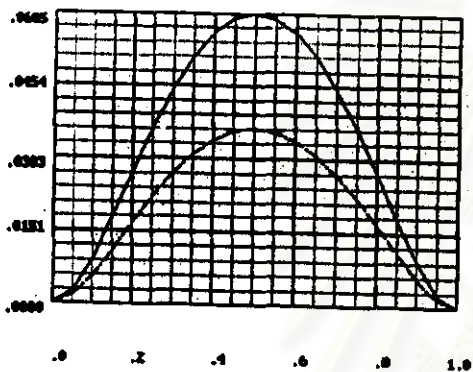
$$\frac{P_{3AB}}{Eh^2} = 0.005$$

$$\nu = 0.3$$



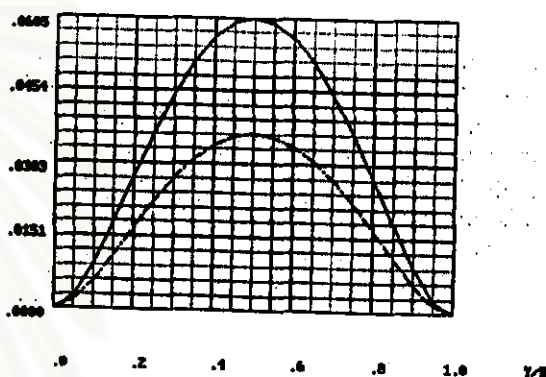
$w(h/\mu)$ X1000

SECTION $Y/B = 0, 0.25, 0.5, 0.75, 1$



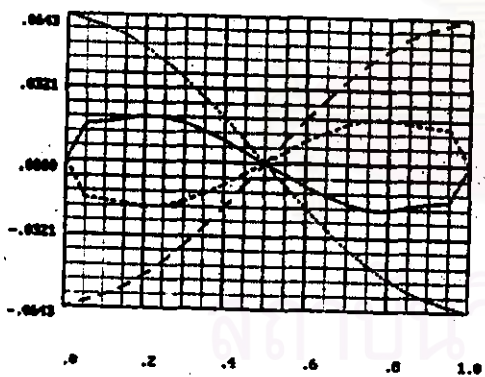
$w(h/\mu)$ X1000

SECTION $X/A = 0, 0.25, 0.5, 0.75, 1$



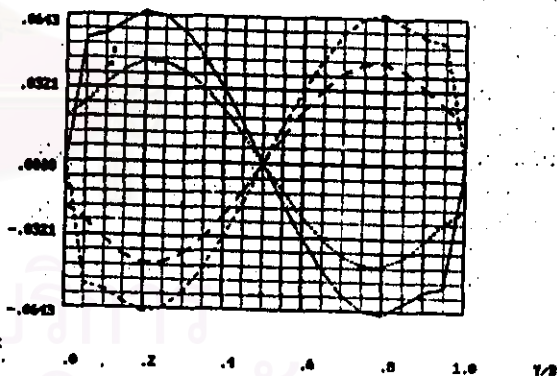
$u(x, Y)$ X1000

SECTION $Y/B = 0, 0.25, 0.5, 0.75, 1$



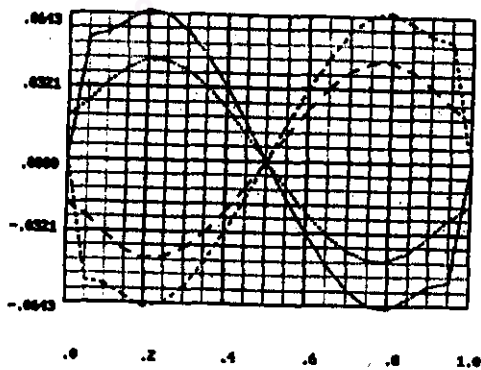
$u(x, Y)$ X1000

SECTION $X/A = 0, 0.25, 0.5, 0.75, 1$



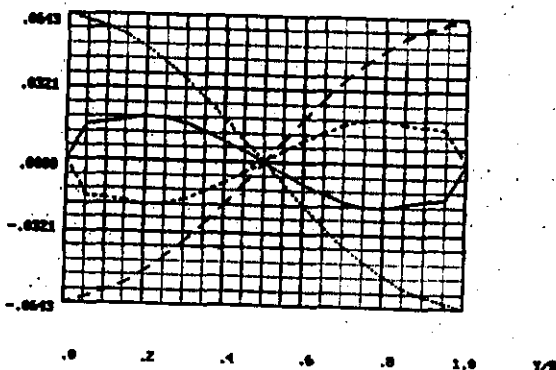
P_{3AB} X10.0

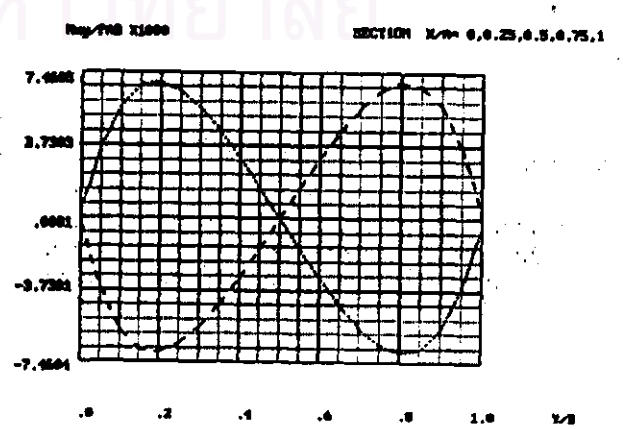
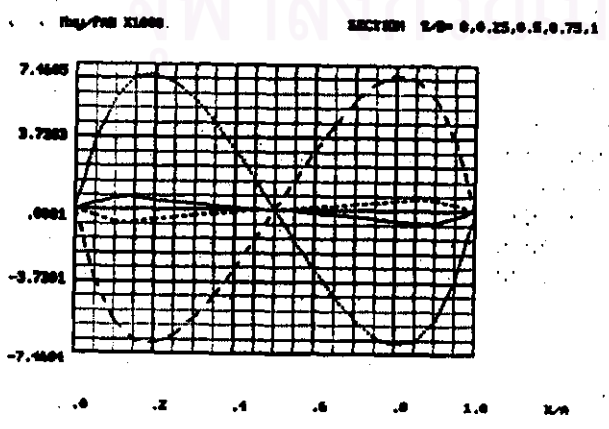
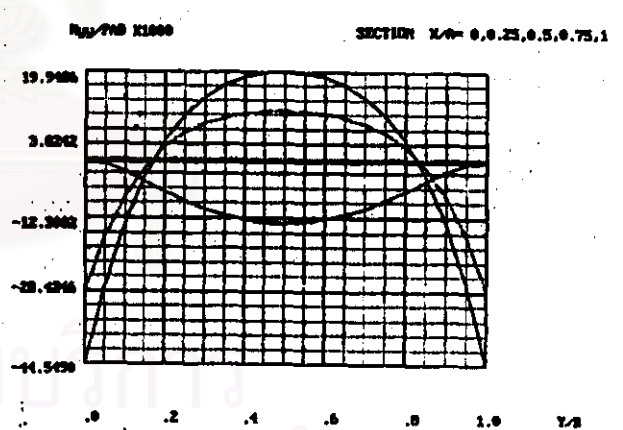
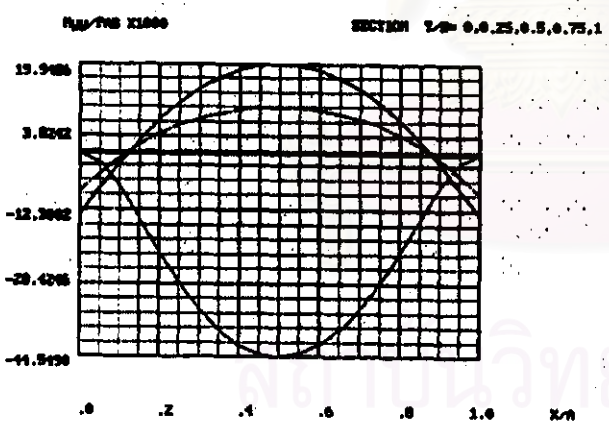
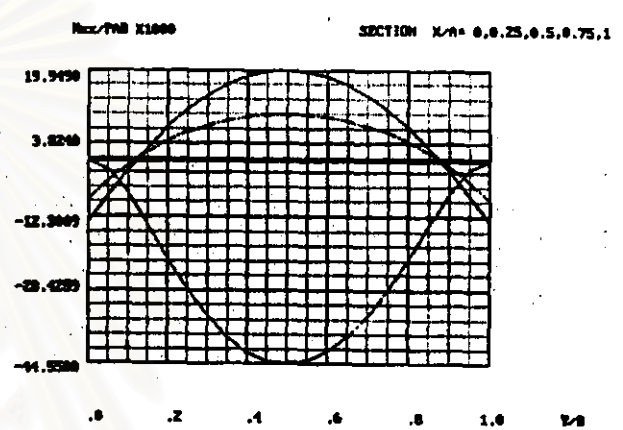
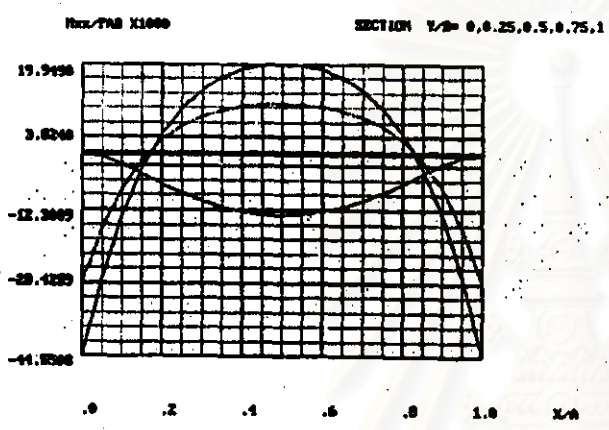
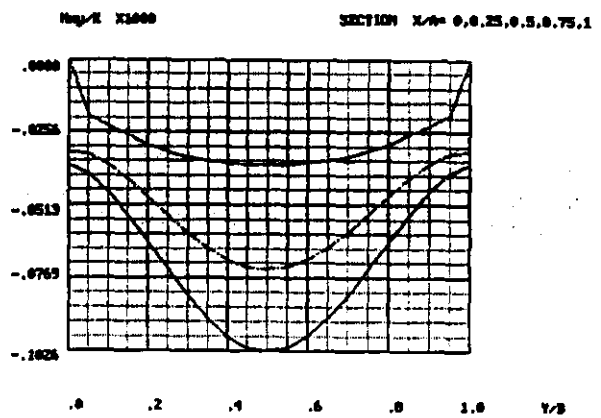
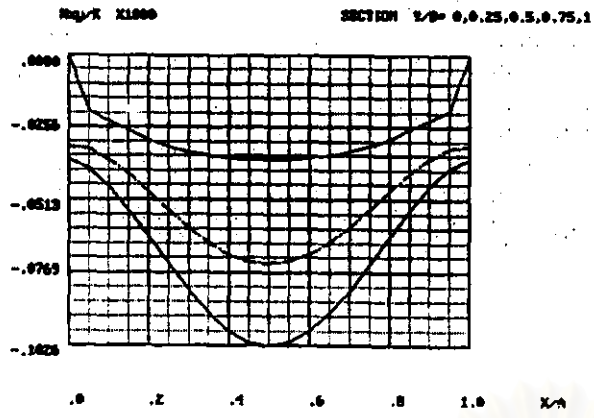
SECTION $Y/B = 0, 0.25, 0.5, 0.75, 1$



P_{3AB} X1000

SECTION $X/A = 0, 0.25, 0.5, 0.75, 1$





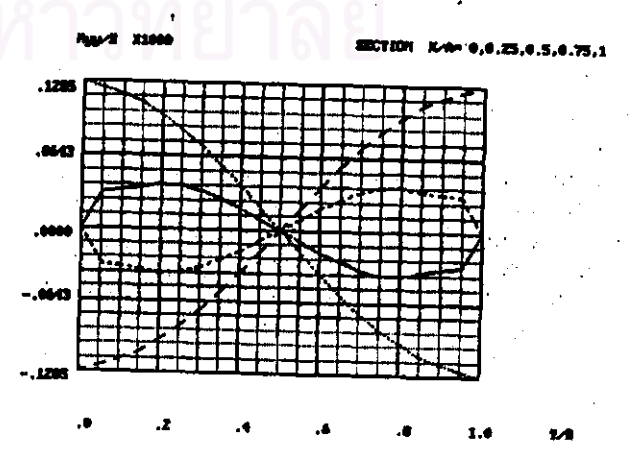
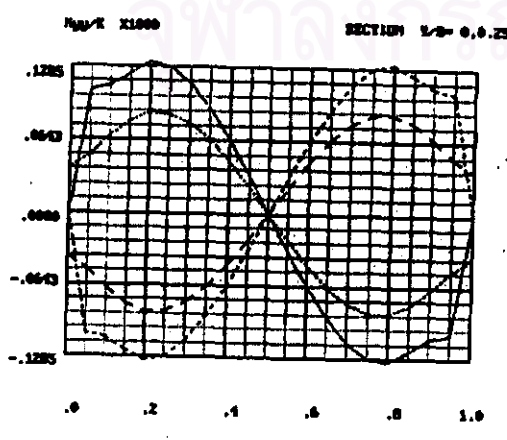
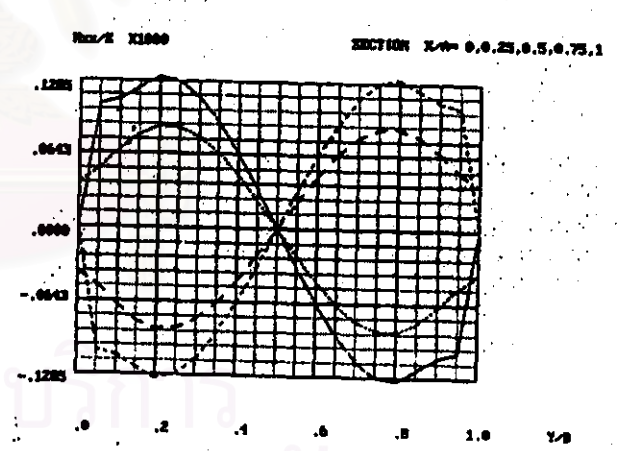
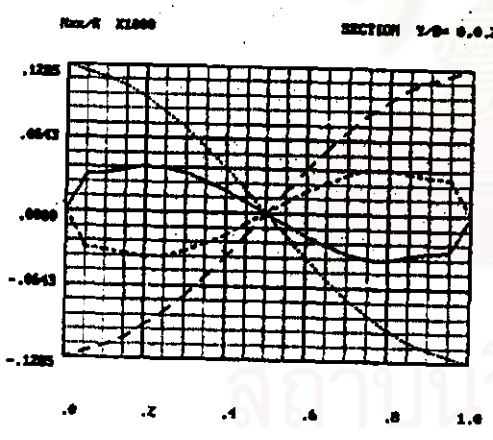
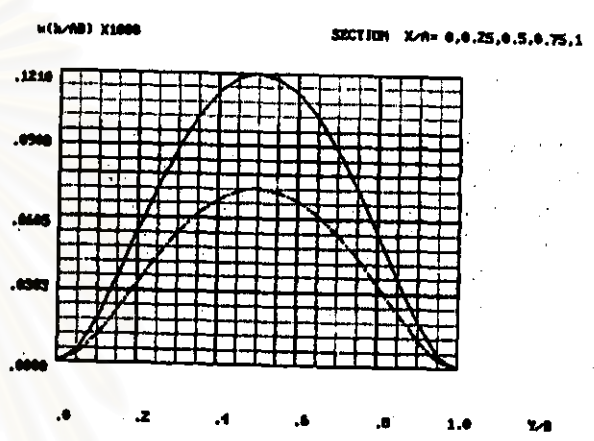
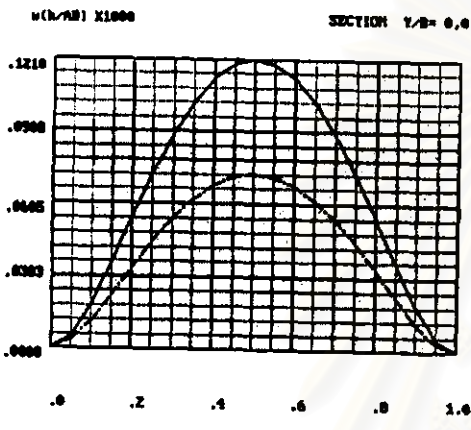
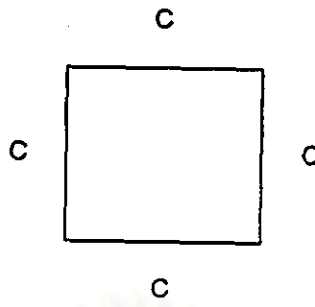
ผลของกรณีที่ 2 :

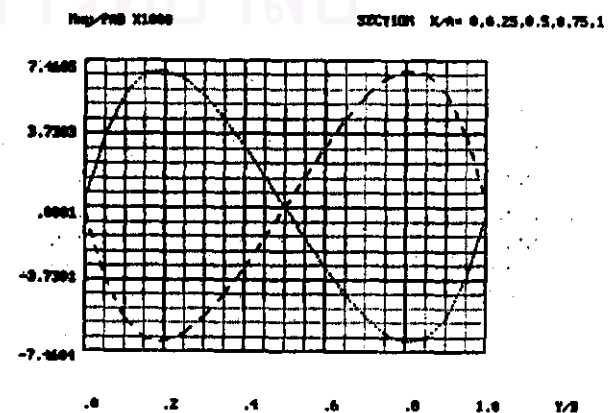
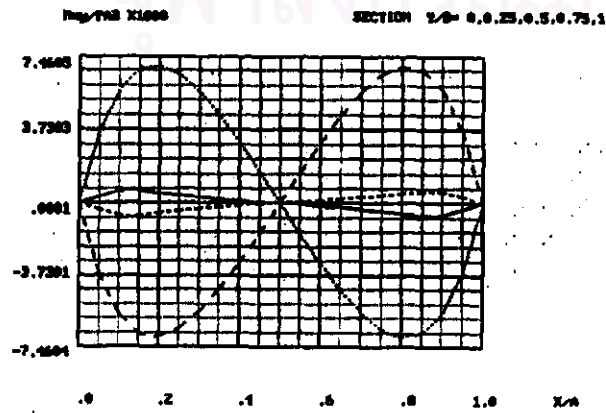
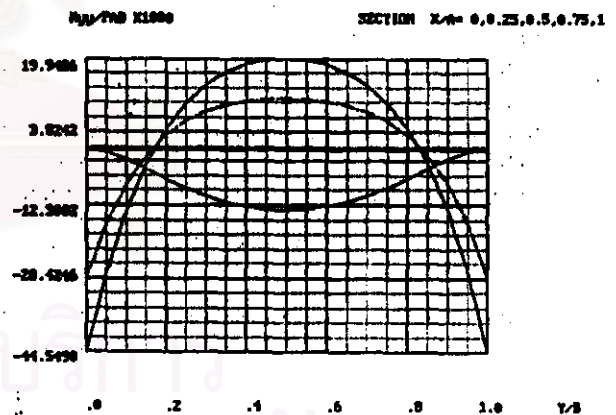
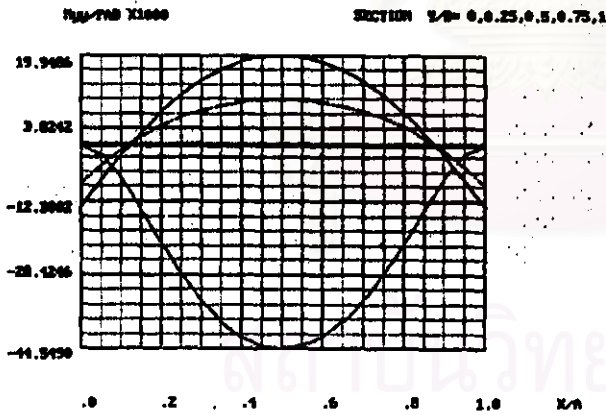
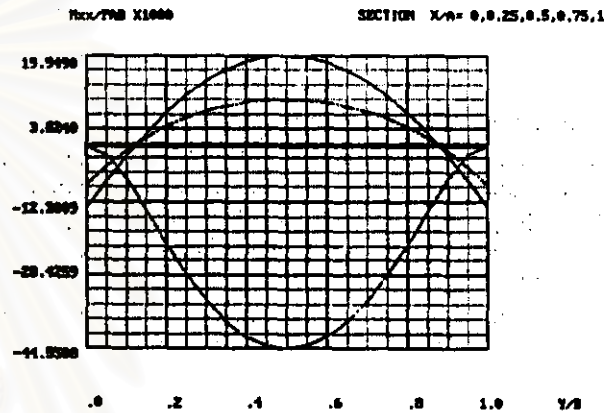
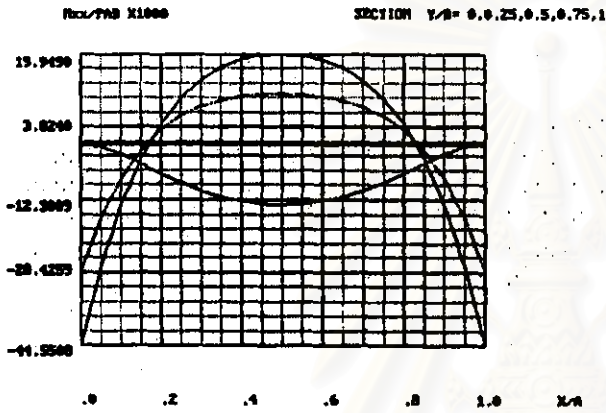
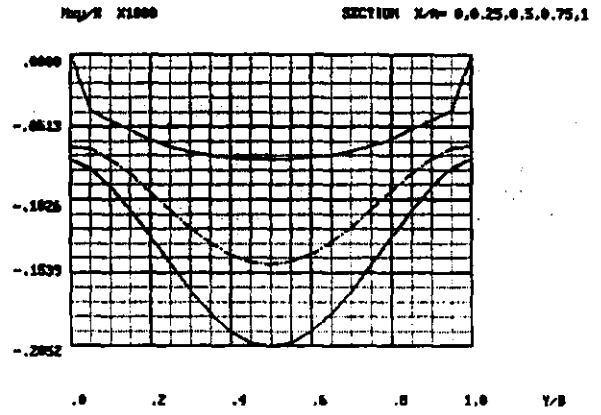
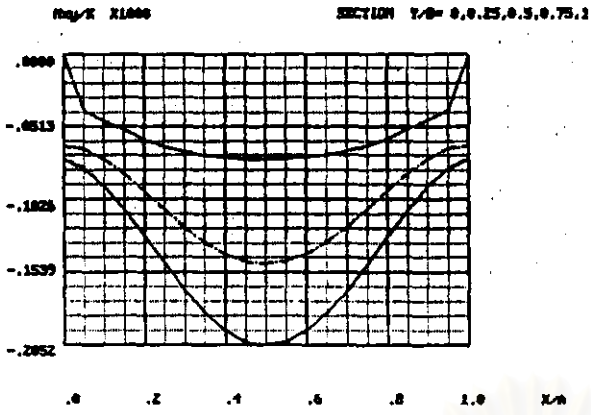
$$\frac{A}{B} = 1.0$$

$$\frac{f}{h} = 4.0$$

$$\frac{P_3 AB}{Eh^2} = 0.01$$

$$\nu = 0.3$$





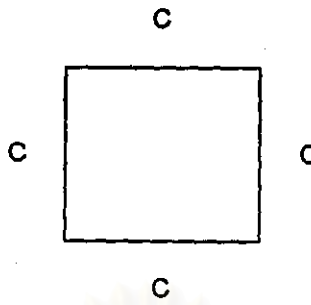
ผลของกรณีที่ 2 :

$$\frac{A}{B} = 1.0$$

$$\frac{f}{h} = 6.0$$

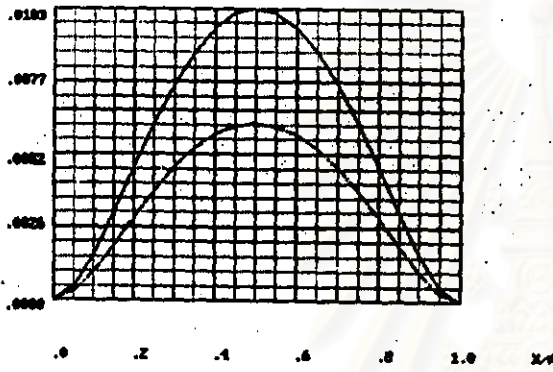
$$\frac{P_3 AB}{Eh^2} = 0.001$$

$$\nu = 0.3$$



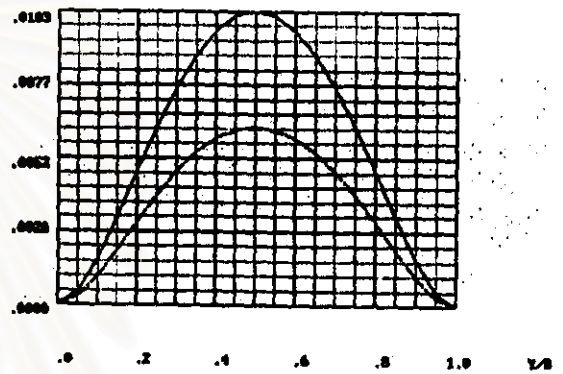
$w(h/\delta)$ X1000

SECTION $Y/\delta = 0, 0.25, 0.5, 0.75, 1$



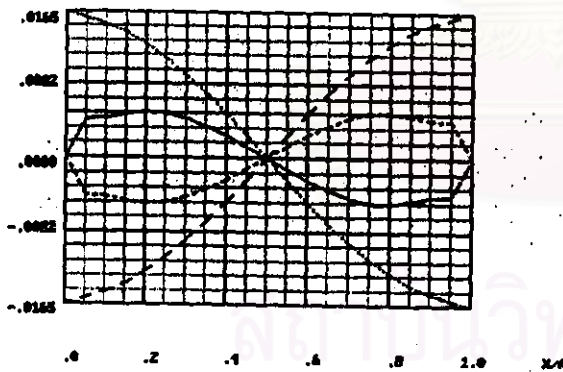
$w(h/\delta)$ X1000

SECTION $X/\delta = 0, 0.25, 0.5, 0.75, 1$



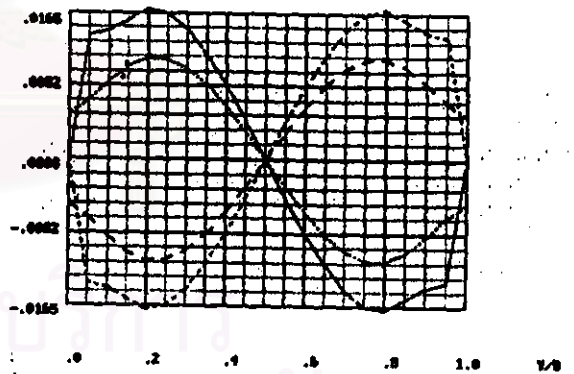
θ_{\max} X1000

SECTION $Y/\delta = 0, 0.25, 0.5, 0.75, 1$



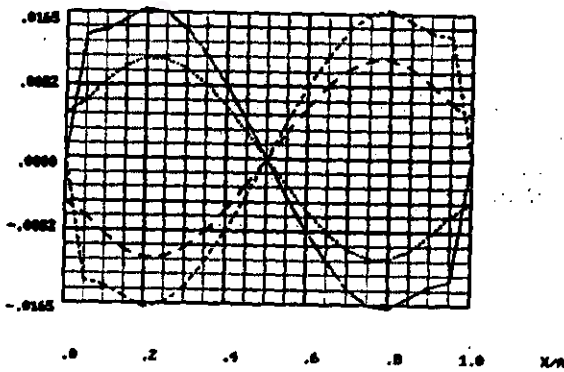
θ_{\max} X1000

SECTION $X/\delta = 0, 0.25, 0.5, 0.75, 1$



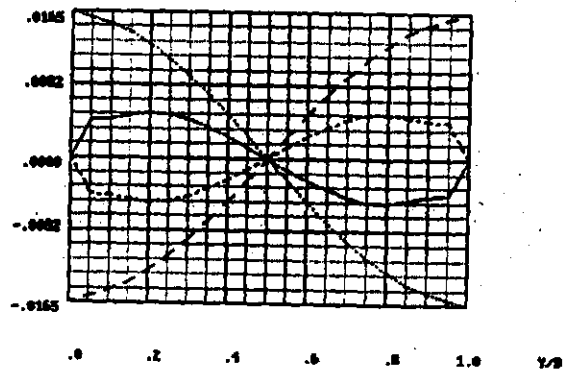
θ_{\min} X1000

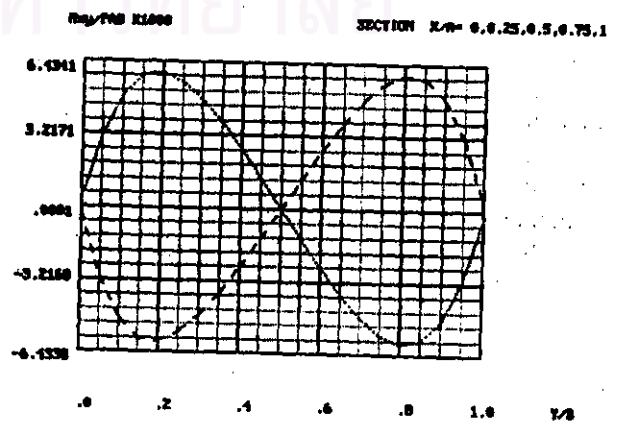
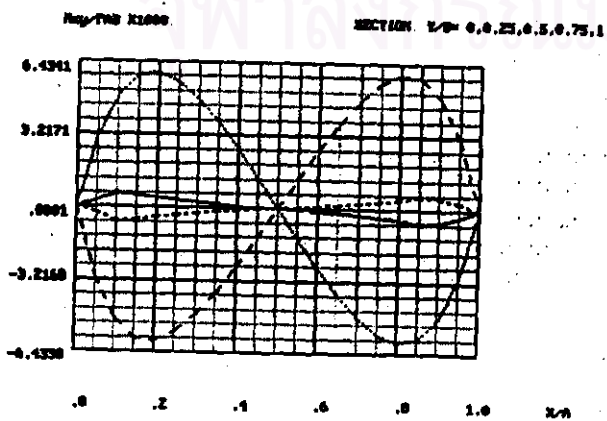
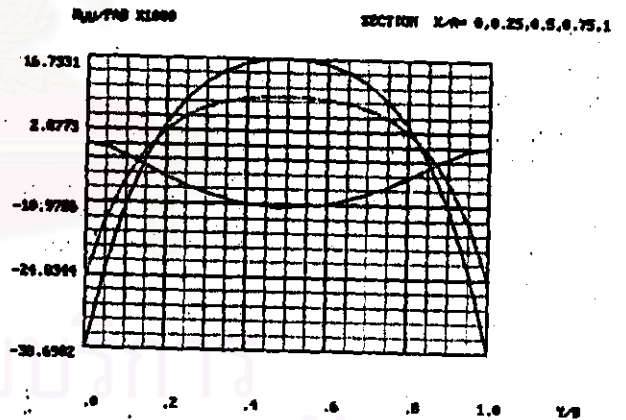
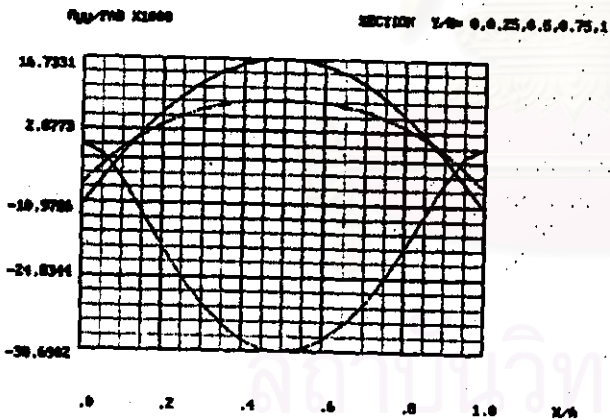
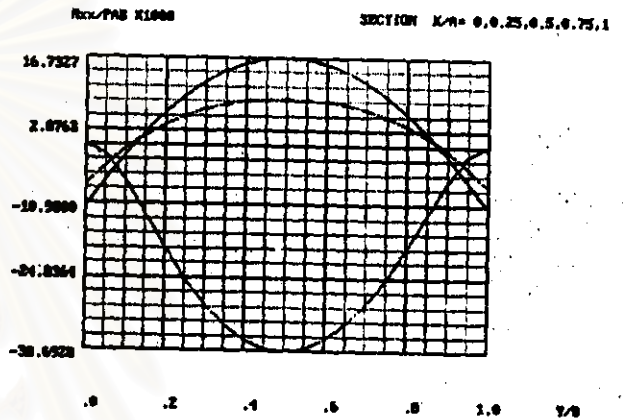
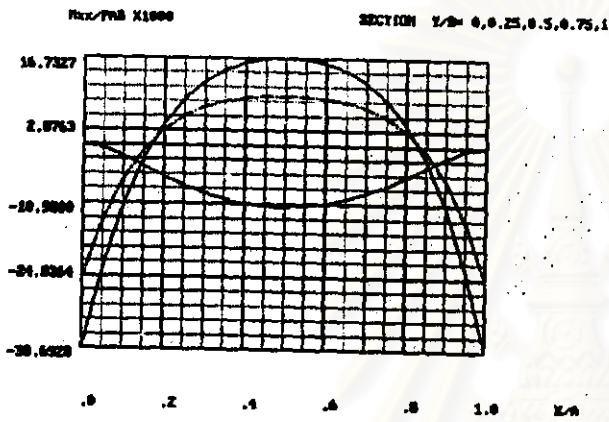
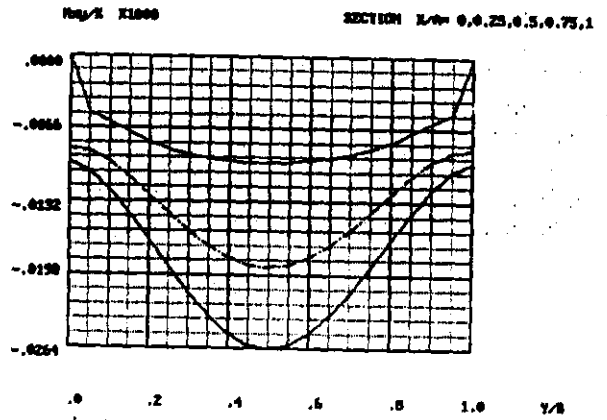
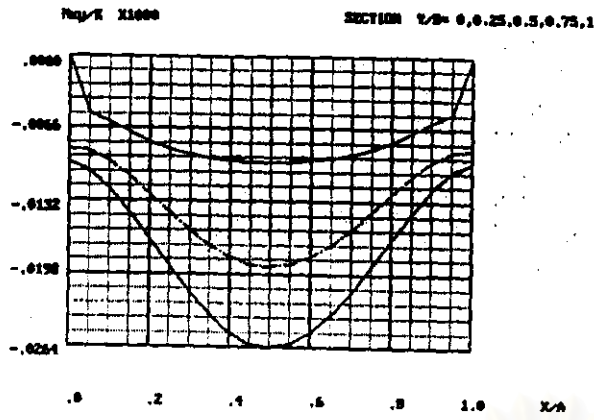
SECTION $Y/\delta = 0, 0.25, 0.5, 0.75, 1$



θ_{\min} X1000

SECTION $X/\delta = 0, 0.25, 0.5, 0.75, 1$





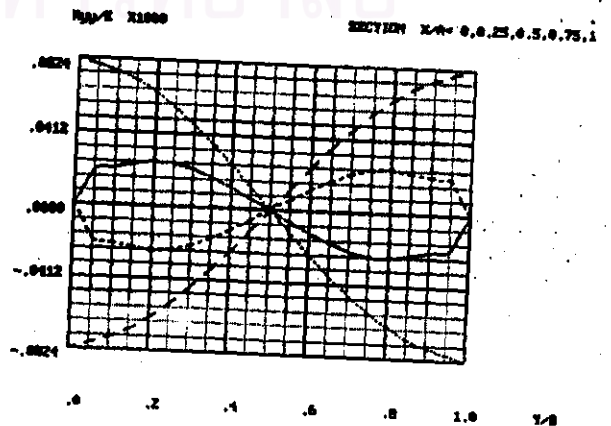
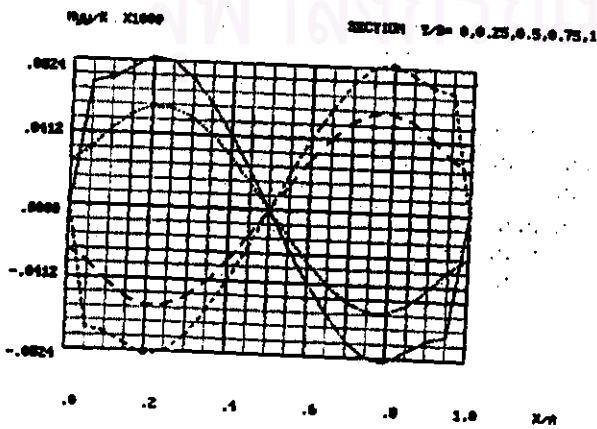
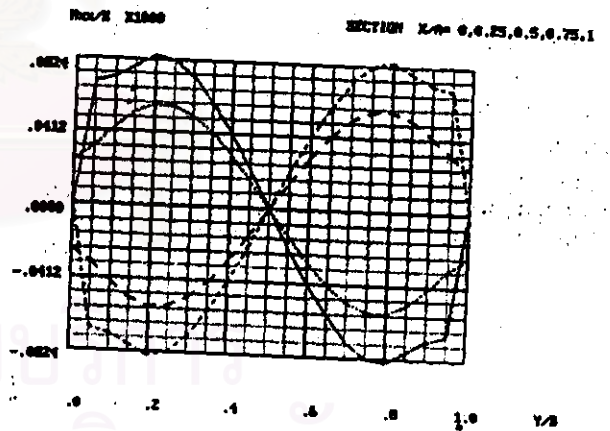
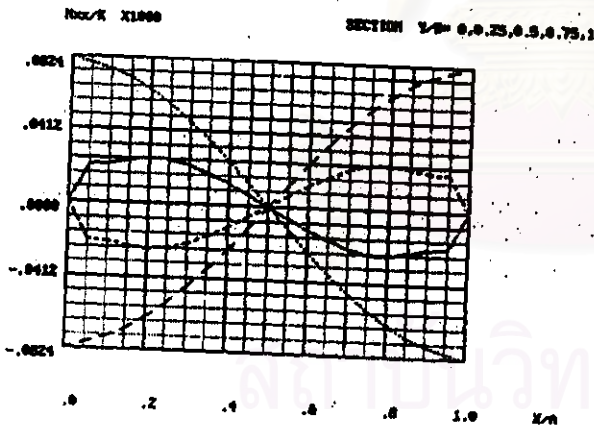
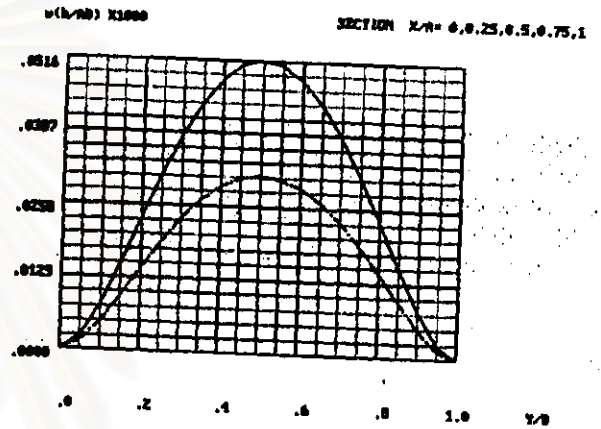
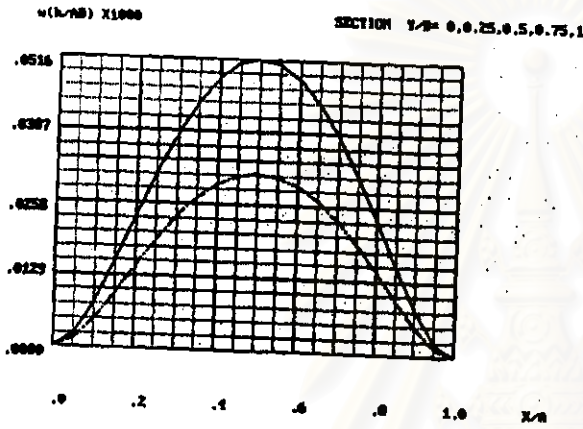
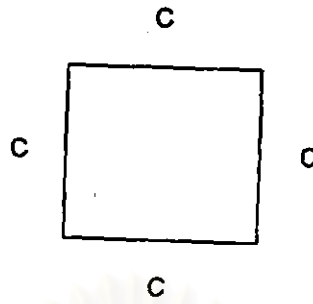
ผลของกรณีที่ 2 :

$$\frac{A}{B} = 1.0$$

$$\frac{f}{h} = 6.0$$

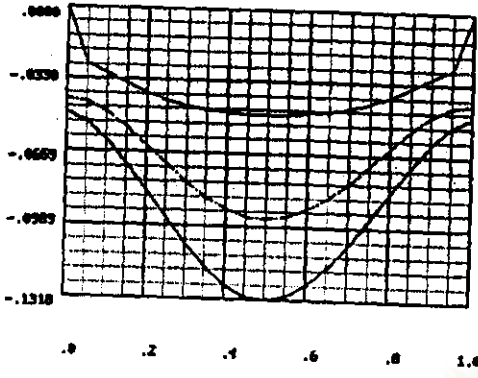
$$\frac{P_3 AB}{Eh^2} = 0.005$$

$$\nu = 0.3$$



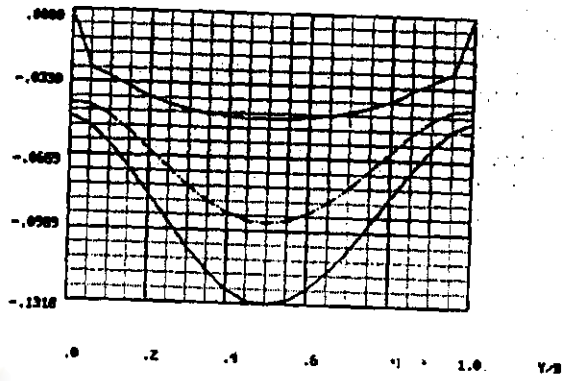
$\eta_{ij}/K \times 1000$

SECTION $L/a = 0.0, 0.25, 0.5, 0.75, 1$



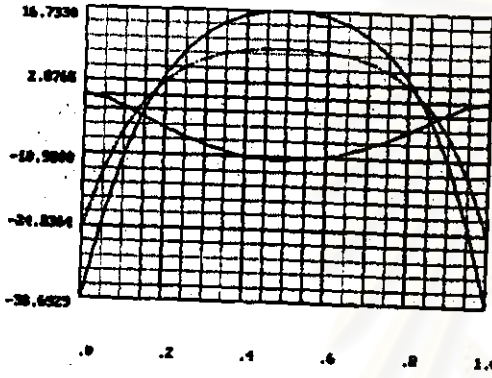
$\eta_{ij}/K \times 1000$

SECTION $L/a = 0.0, 0.25, 0.5, 0.75, 1$



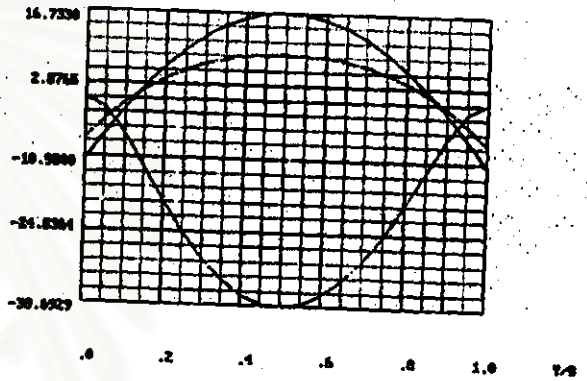
$\eta_{00}/T_{00} \times 1000$

SECTION $L/a = 0.0, 0.25, 0.5, 0.75, 1$



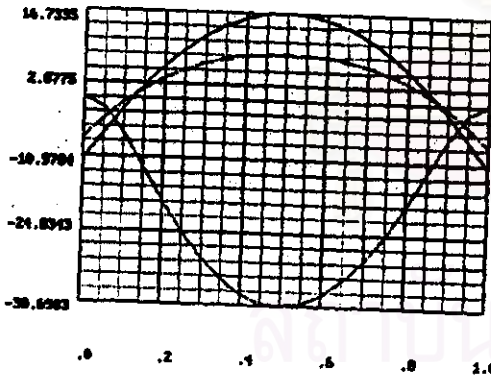
$\eta_{00}/T_{00} \times 1000$

SECTION $L/a = 0.0, 0.25, 0.5, 0.75, 1$



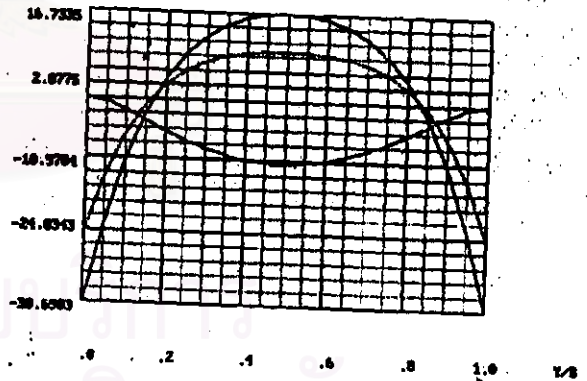
$\eta_{ij}/T_{00} \times 1000$

SECTION $L/a = 0.0, 0.25, 0.5, 0.75, 1$



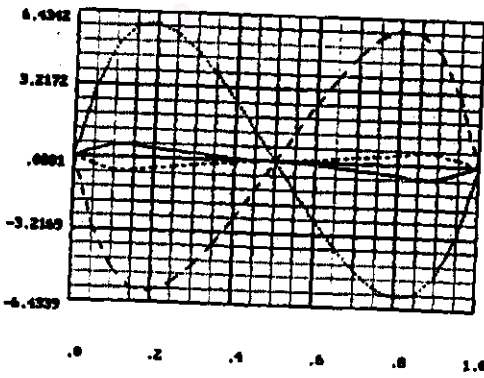
$\eta_{ij}/T_{00} \times 1000$

SECTION $L/a = 0.0, 0.25, 0.5, 0.75, 1$



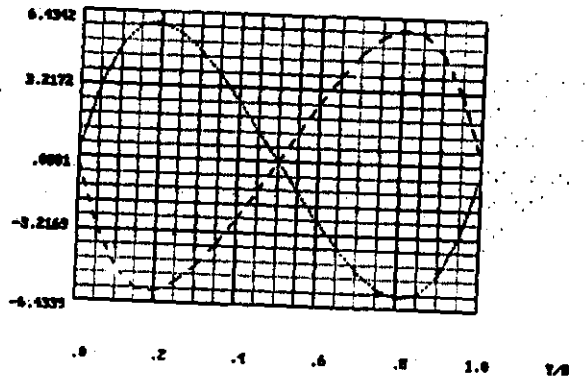
$\eta_{ij}/T_{00} \times 1000$

SECTION $L/a = 0.0, 0.25, 0.5, 0.75, 1$



$\eta_{ij}/T_{00} \times 1000$

SECTION $L/a = 0.0, 0.25, 0.5, 0.75, 1$



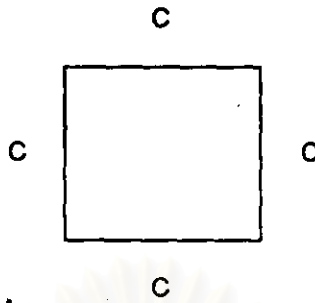
ผลของกรณีที่ 2 :

$$\frac{A}{B} = 1.0$$

$$\frac{f}{h} = 6.0$$

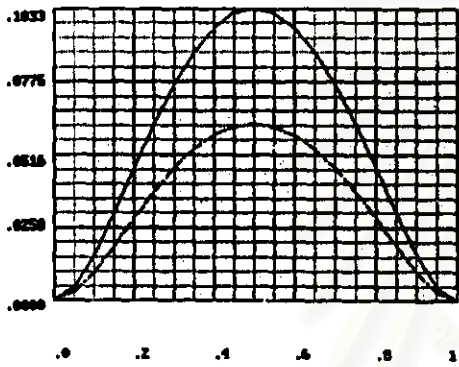
$$\frac{P_3 AB}{Eh^2} = 0.01$$

$$\nu = 0.3$$



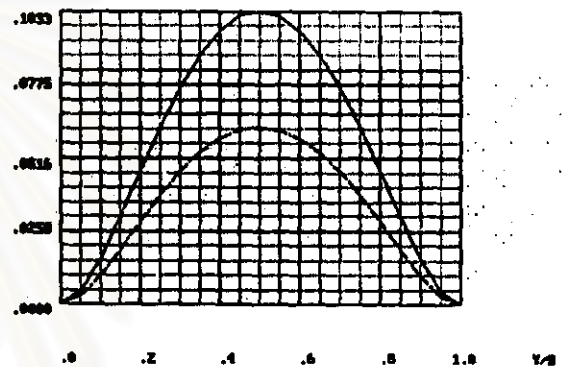
$w(h/8) \times 1000$

SECTION $Y/B = 0.0, 0.25, 0.5, 0.75, 1$



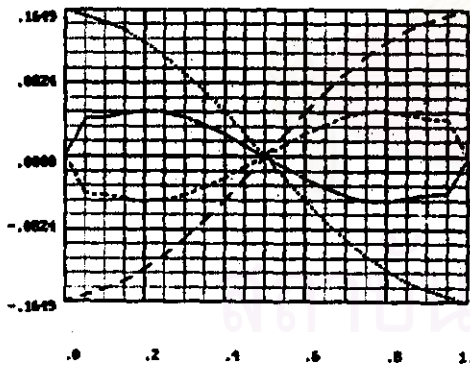
$w(h/8) \times 1000$

SECTION $X/A = 0.0, 0.25, 0.5, 0.75, 1$



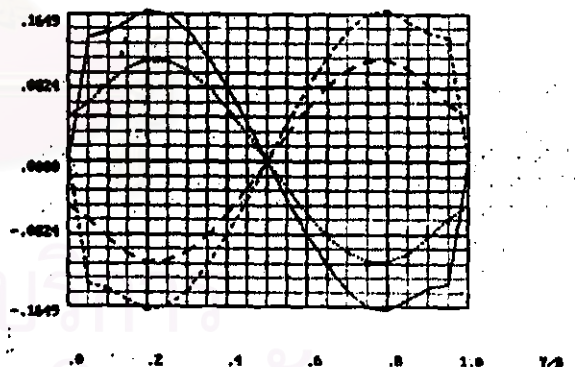
$\theta_{max}/K \times 1000$

SECTION $Y/B = 0.0, 0.25, 0.5, 0.75, 1$



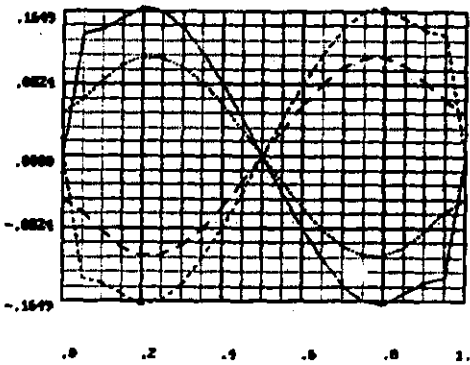
$\theta_{max}/K \times 1000$

SECTION $X/A = 0.0, 0.25, 0.5, 0.75, 1$



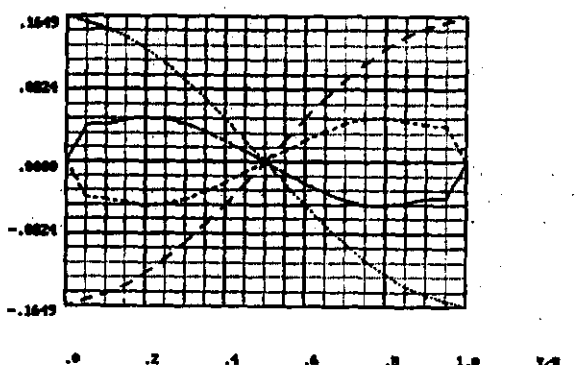
$\theta_{max}/K \times 1000$

SECTION $Y/B = 0.0, 0.25, 0.5, 0.75, 1$



$\theta_{max}/K \times 1000$

SECTION $X/A = 0.0, 0.25, 0.5, 0.75, 1$



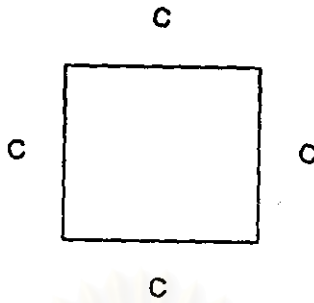
ผลของกรณีที่ 2 :

$$\frac{A}{B} = 2.0$$

$$\frac{f}{h} = 2.0$$

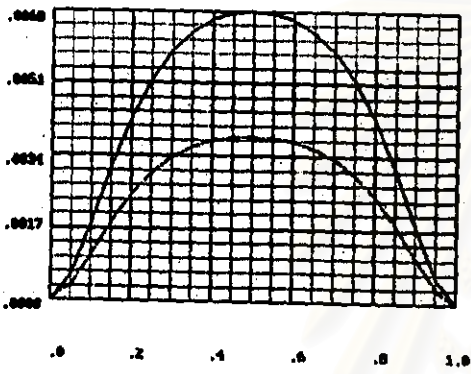
$$\frac{P_3 AB}{Eh^2} = 0.001$$

$$\nu = 0.3$$



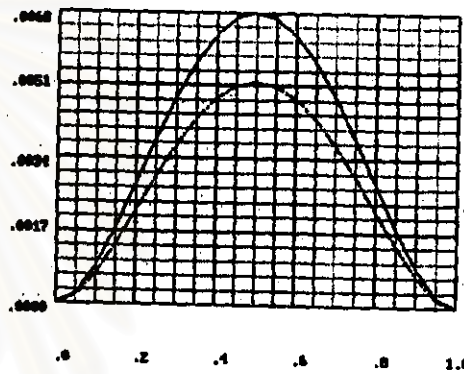
$u(h/8) \times 1000$

SECTION $Y/h = 0, 0.25, 0.5, 0.75, 1$



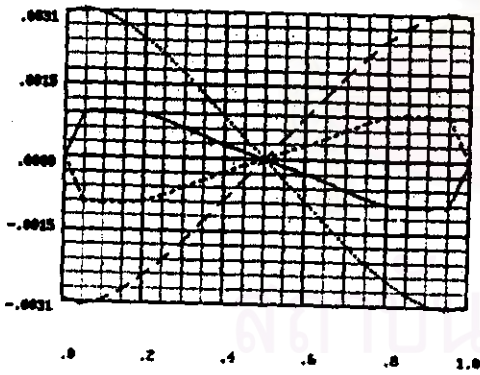
$u(h/8) \times 1000$

SECTION $X/h = 0, 0.25, 0.5, 0.75, 1$



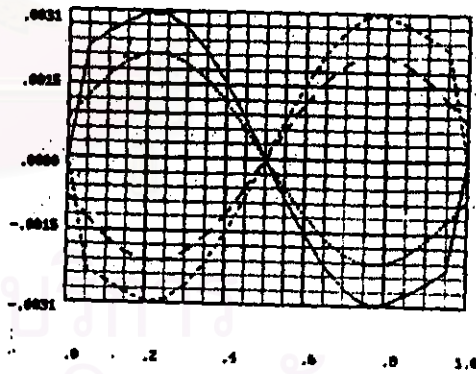
$w(h/8) \times 1000$

SECTION $Y/h = 0, 0.25, 0.5, 0.75, 1$



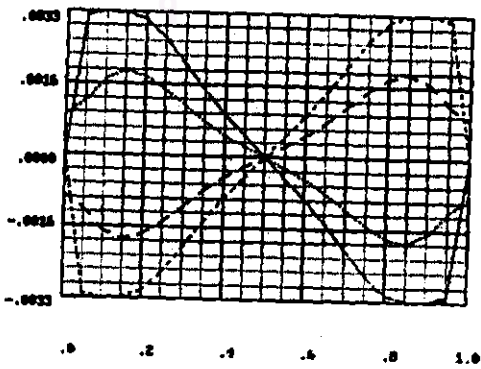
$w(h/8) \times 1000$

SECTION $X/h = 0, 0.25, 0.5, 0.75, 1$



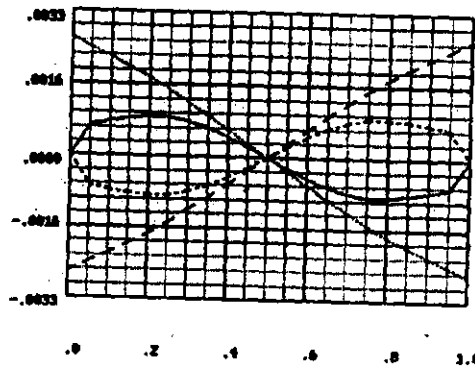
$\theta_{xx}(h/8) \times 1000$

SECTION $Y/h = 0, 0.25, 0.5, 0.75, 1$



$\theta_{xx}(h/8) \times 1000$

SECTION $X/h = 0, 0.25, 0.5, 0.75, 1$



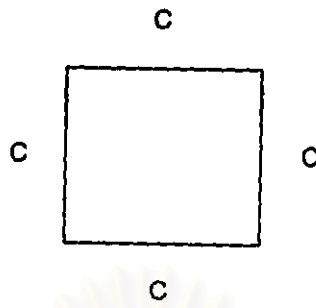
ผลของกรณีที่ 2 :

$$\frac{A}{B} = 2.0$$

$$\frac{f}{h} = 2.0$$

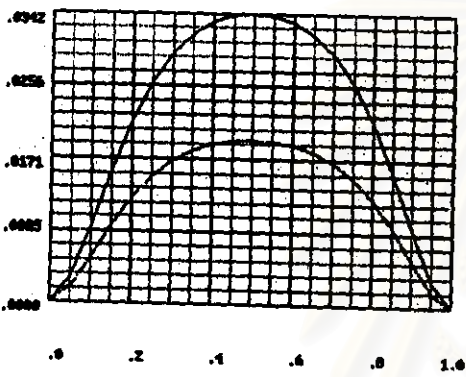
$$\frac{P_3 AB}{Eh^2} = 0.005$$

$$\nu = 0.3$$



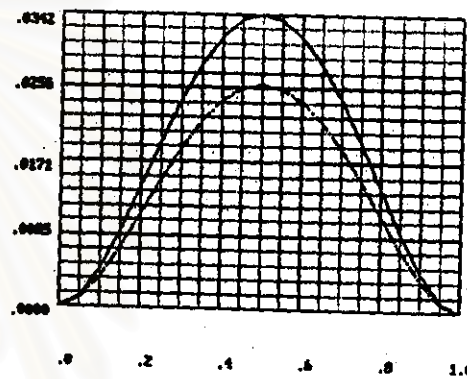
$w(h/\delta) \times 1000$

SECTION $Y/\delta = 0, 0.25, 0.5, 0.75, 1$



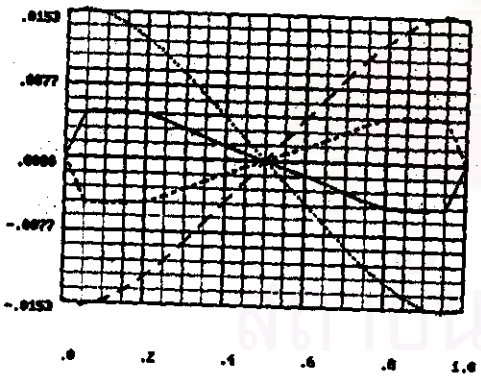
$w(h/\delta) \times 1000$

SECTION $X/\delta = 0, 0.25, 0.5, 0.75, 1$



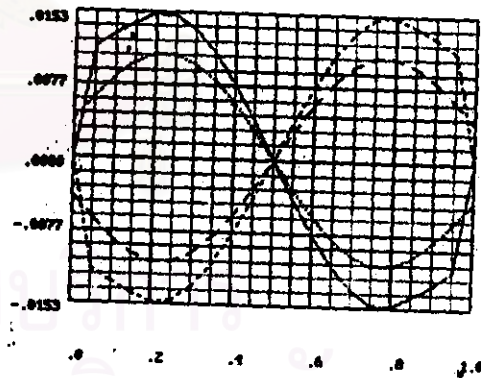
$\theta_{xx}/K \times 1000$

SECTION $Y/\delta = 0, 0.25, 0.5, 0.75, 1$



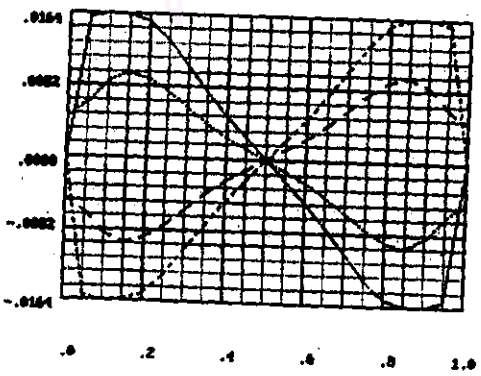
$\theta_{xx}/K \times 1000$

SECTION $X/\delta = 0, 0.25, 0.5, 0.75, 1$



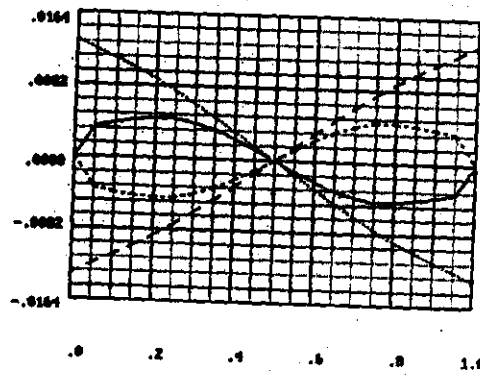
$\theta_{yy}/K \times 1000$

SECTION $Y/\delta = 0, 0.25, 0.5, 0.75, 1$



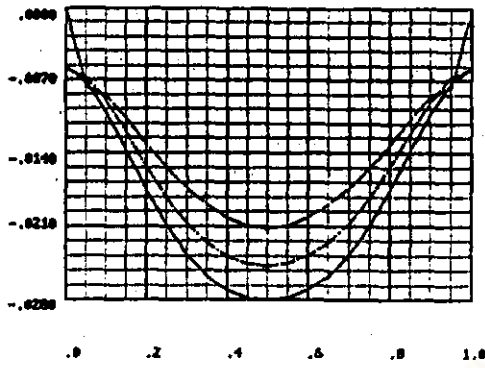
$\theta_{yy}/K \times 1000$

SECTION $X/\delta = 0, 0.25, 0.5, 0.75, 1$



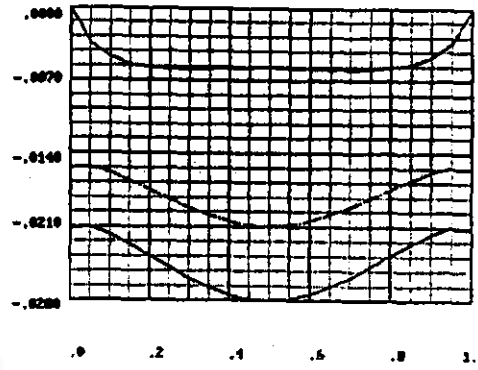
$\eta_{xy}/K \times 1000$

SECTION $Y/B = 0, 0.25, 0.5, 0.75, 1$



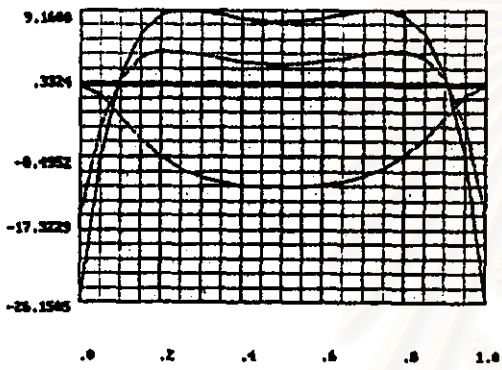
$\eta_{xy}/K \times 1000$

SECTION $X/a = 0, 0.25, 0.5, 0.75, 1$



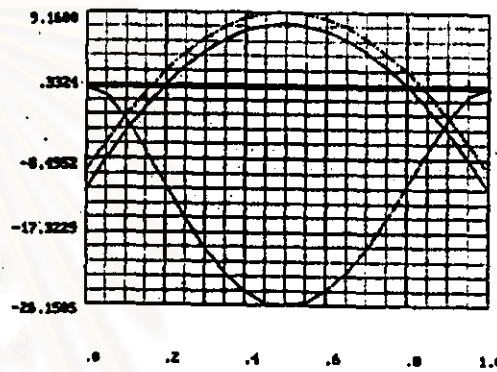
$\eta_{yz}/T \times 1000$

SECTION $Y/B = 0, 0.25, 0.5, 0.75, 1$



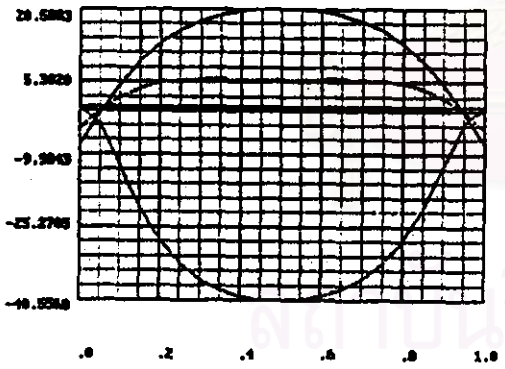
$\eta_{yz}/T \times 1000$

SECTION $X/a = 0, 0.25, 0.5, 0.75, 1$



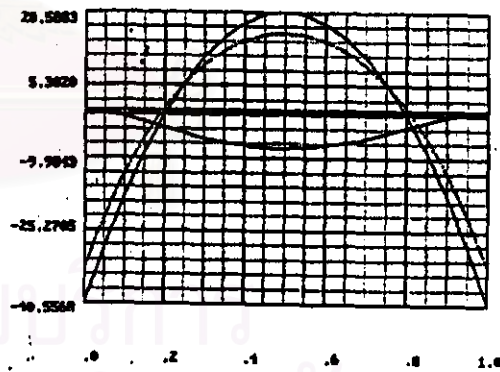
$\eta_{yz}/T \times 1000$

SECTION $Y/B = 0, 0.25, 0.5, 0.75, 1$



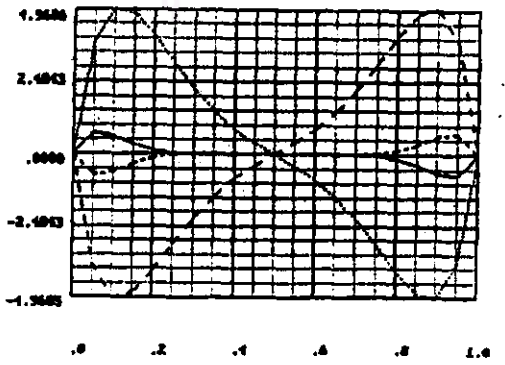
$\eta_{yz}/T \times 1000$

SECTION $X/a = 0, 0.25, 0.5, 0.75, 1$



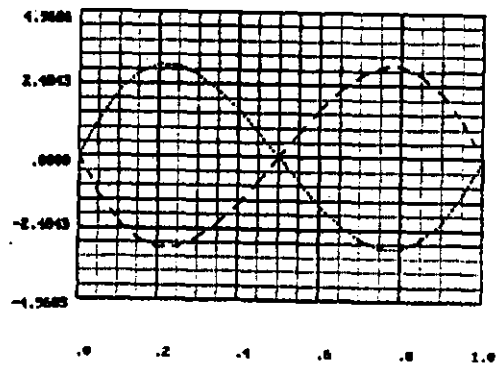
$\eta_{yz}/T \times 1000$

SECTION $Y/B = 0, 0.25, 0.5, 0.75, 1$



$\eta_{yz}/T \times 1000$

SECTION $X/a = 0, 0.25, 0.5, 0.75, 1$



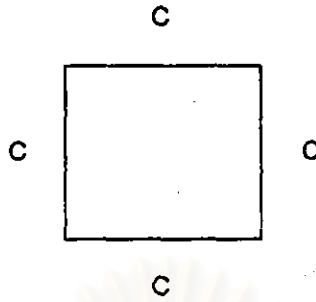
ผลของกรณีที่ 2 :

$$\frac{A}{B} = 2.0$$

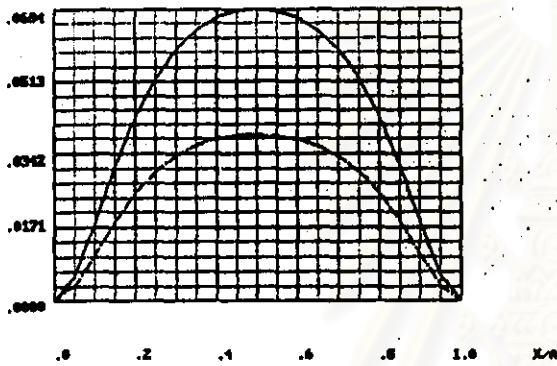
$$\frac{f}{h} = 2.0$$

$$\frac{P_3 AB}{Eh^2} = 0.01$$

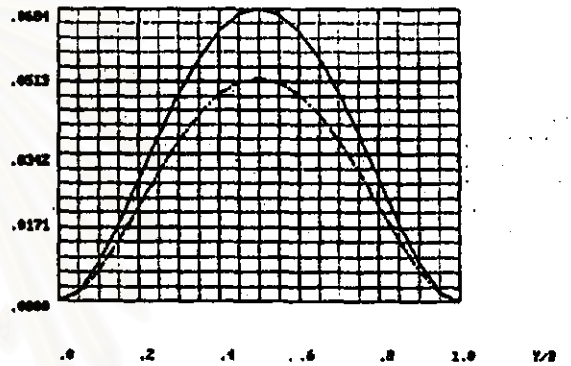
$$\nu = 0.3$$



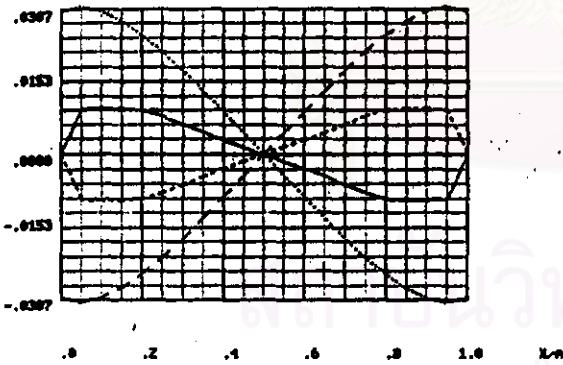
u(h/AB) X1000 SECTION Y/B = 0,0.25,0.5,0.75,1



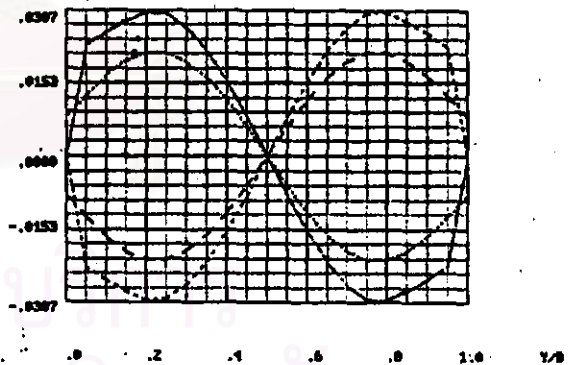
u(h/AB) X1000 SECTION X/h = 0,0.25,0.5,0.75,1



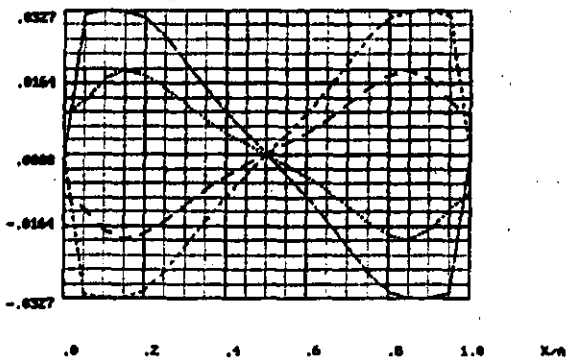
Rot/K X1000 SECTION Y/B = 0,0.25,0.5,0.75,1



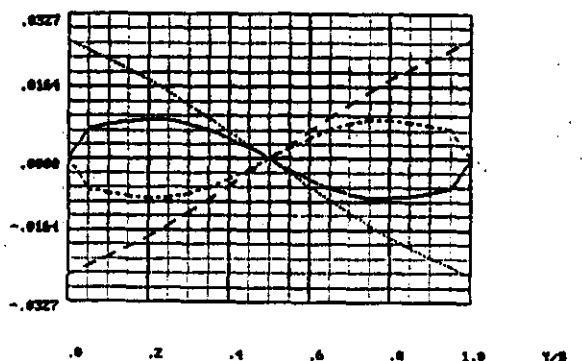
Rot/K X1000 SECTION X/h = 0,0.25,0.5,0.75,1



Wp/K X1000 SECTION Y/B = 0,0.25,0.5,0.75,1

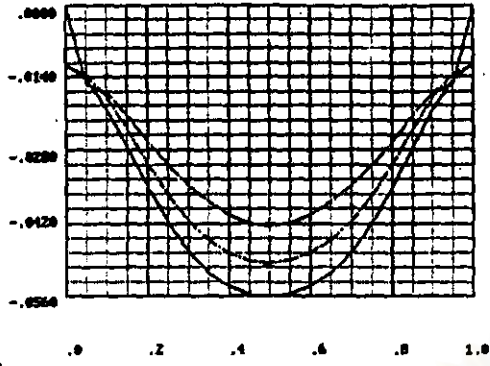


Wp/K X1000 SECTION X/h = 0,0.25,0.5,0.75,1



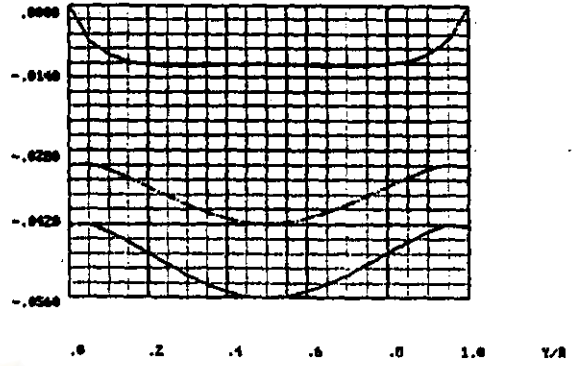
$\sigma_{xy}/E \times 10^{-6}$

SECTION $Y/B = 0.0, 0.25, 0.5, 0.75, 1$



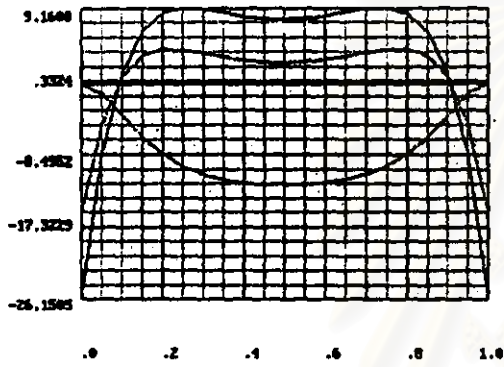
$\sigma_{xy}/E \times 10^{-6}$

SECTION $X/A = 0.0, 0.25, 0.5, 0.75, 1$



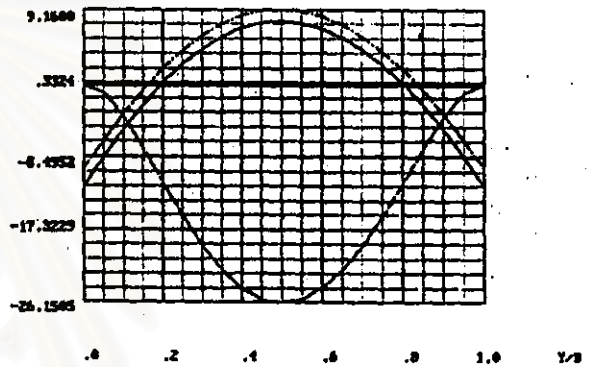
$\sigma_{xz}/E \times 10^{-6}$

SECTION $Y/B = 0.0, 0.25, 0.5, 0.75, 1$



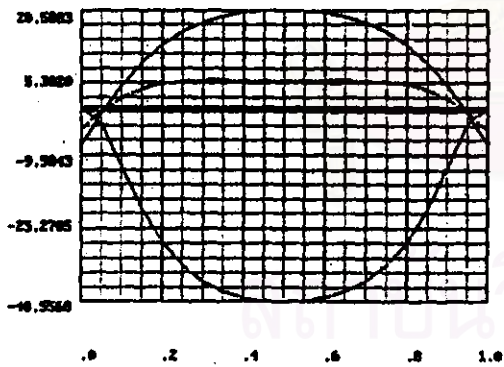
$\sigma_{xz}/E \times 10^{-6}$

SECTION $X/A = 0.0, 0.25, 0.5, 0.75, 1$



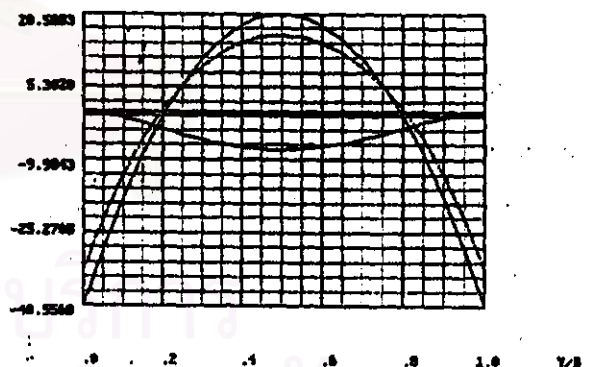
$\sigma_{yz}/E \times 10^{-6}$

SECTION $Y/B = 0.0, 0.25, 0.5, 0.75, 1$



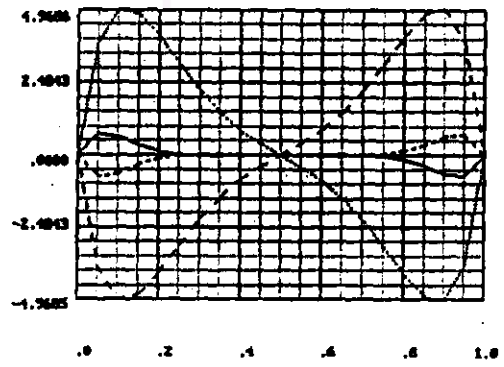
$\sigma_{yz}/E \times 10^{-6}$

SECTION $X/A = 0.0, 0.25, 0.5, 0.75, 1$



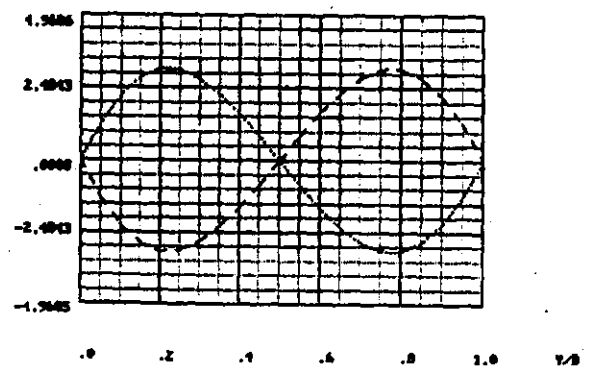
$\sigma_{yz}/E \times 10^{-6}$

SECTION $Y/B = 0.0, 0.25, 0.5, 0.75, 1$



$\sigma_{yz}/E \times 10^{-6}$

SECTION $X/A = 0.0, 0.25, 0.5, 0.75, 1$



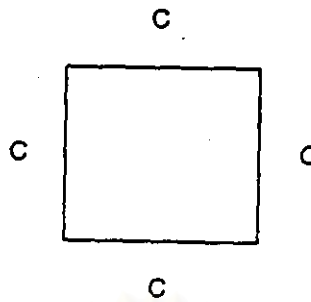
ผลของกรณีที่ 2 :

$$\frac{A}{B} = 2.0$$

$$\frac{f}{h} = 4.0$$

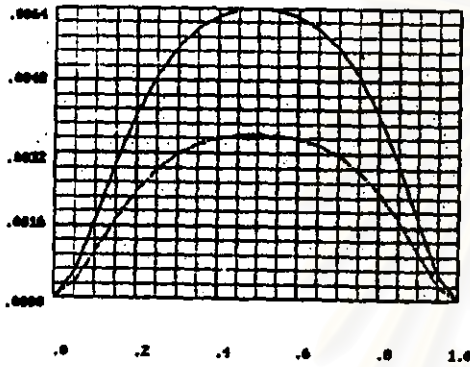
$$\frac{P_3 AB}{Eh^2} = 0.001$$

$$\nu = 0.3$$



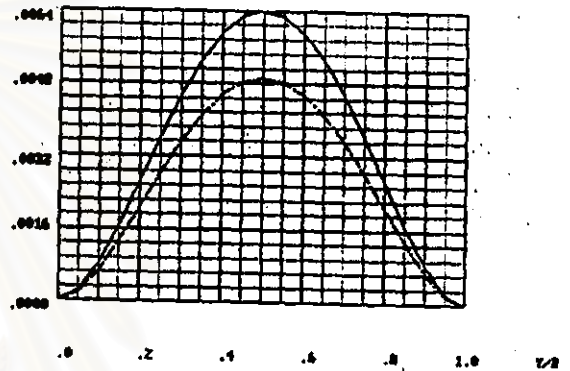
$v(h/\delta) \times 1000$

SECTION $Y/\delta = 0, 0.25, 0.5, 0.75, 1$



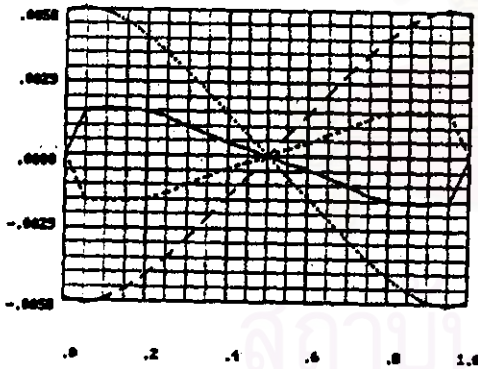
$w(h/\delta) \times 1000$

SECTION $X/\delta = 0, 0.25, 0.5, 0.75, 1$



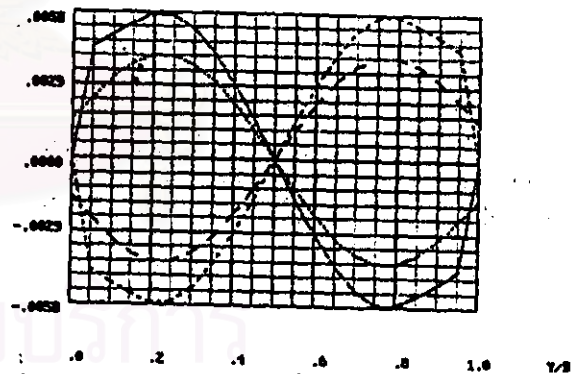
$u(x, z) \times 1000$

SECTION $Y/\delta = 0, 0.25, 0.5, 0.75, 1$



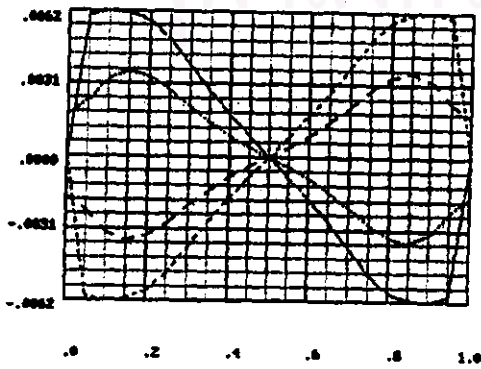
$w(x, z) \times 1000$

SECTION $X/\delta = 0, 0.25, 0.5, 0.75, 1$



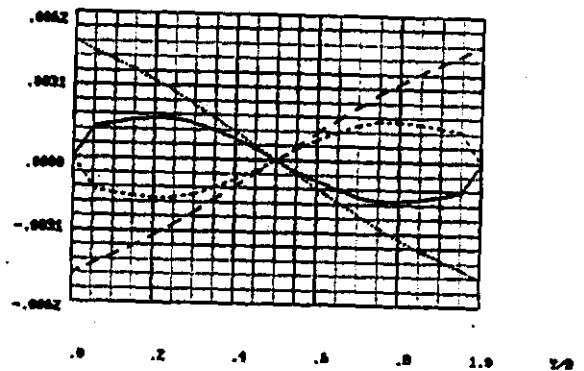
$v(x, z) \times 1000$

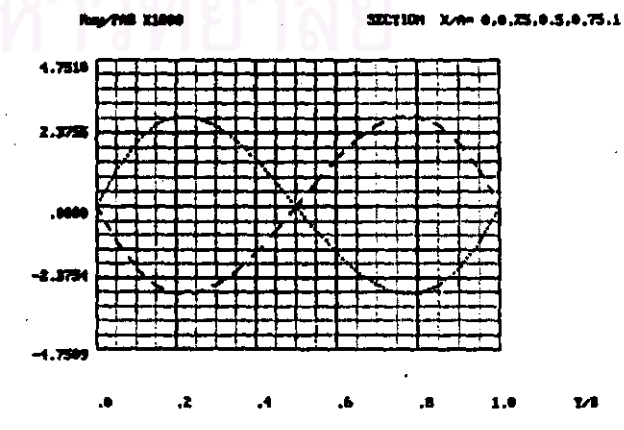
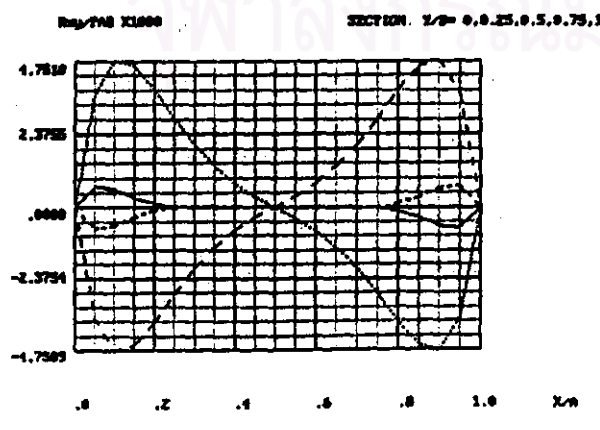
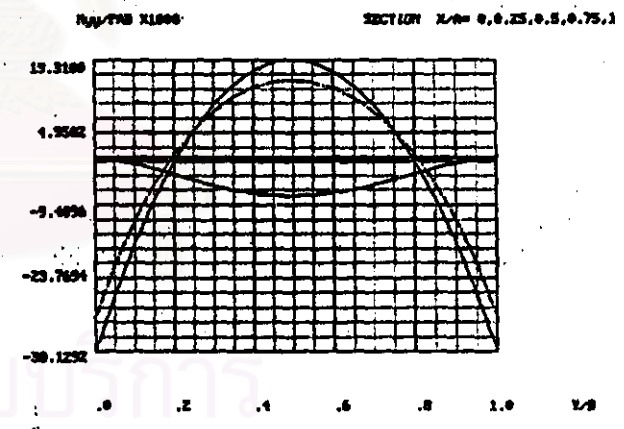
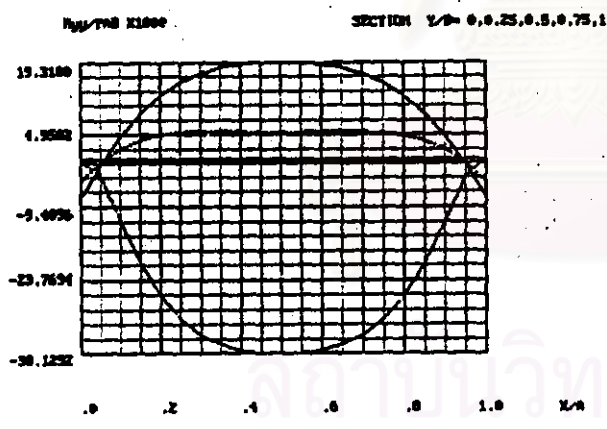
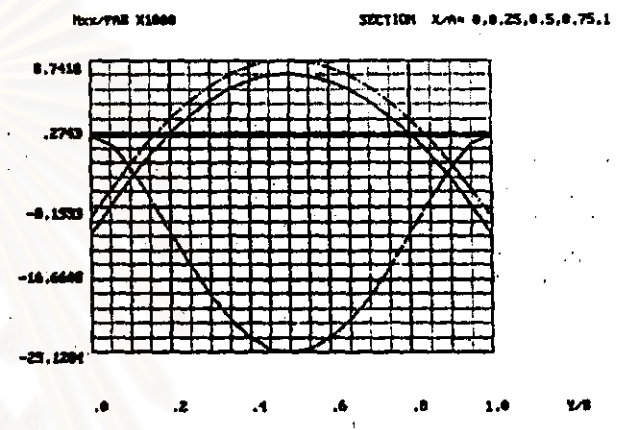
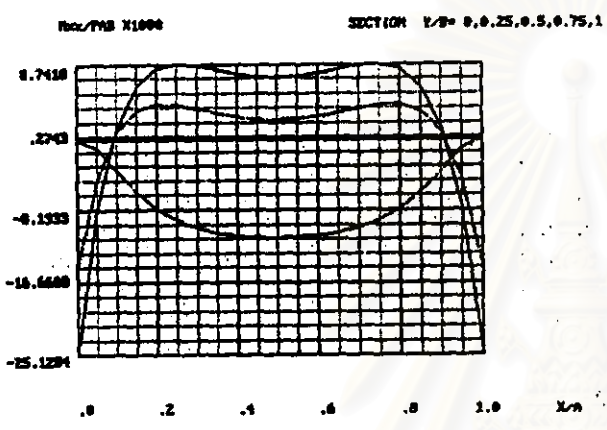
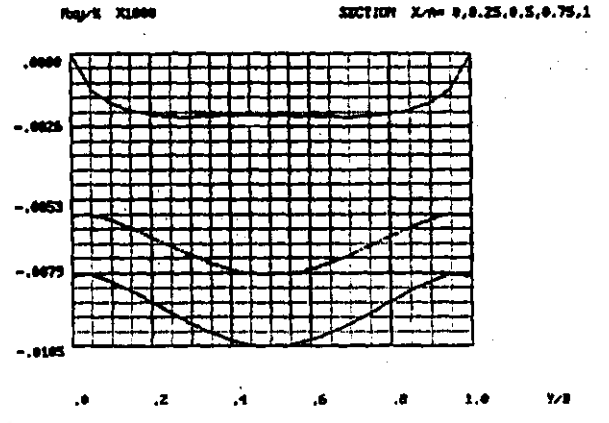
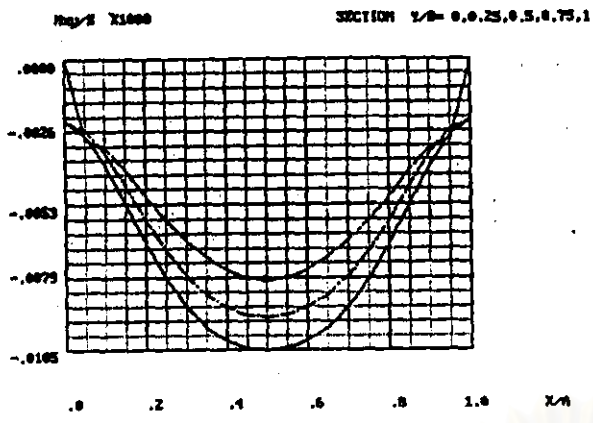
SECTION $Y/\delta = 0, 0.25, 0.5, 0.75, 1$



$w(x, z) \times 1000$

SECTION $X/\delta = 0, 0.25, 0.5, 0.75, 1$





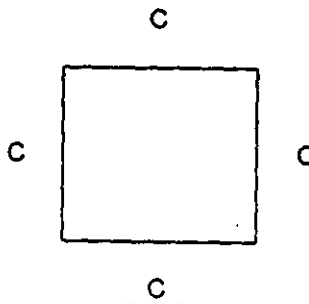
ผลของกรณีที่ ๒ :

$$\frac{A}{B} = 2.0$$

$$\frac{f}{h} = 4.0$$

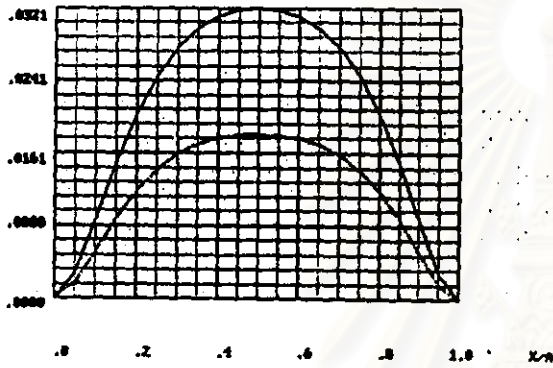
$$\frac{P_3 AB}{Eh^2} = 0.005$$

$$\nu = 0.3$$



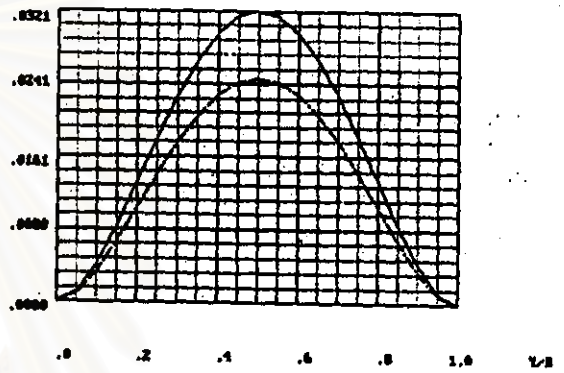
$w(h/\alpha B) \times 1000$

SECTION $\lambda/\alpha = 0.0, 0.25, 0.5, 0.75, 1$



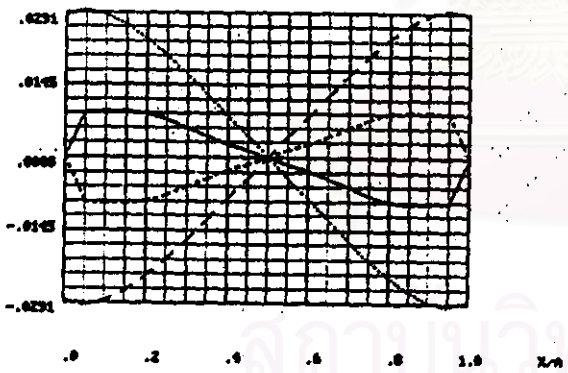
$w(h/\alpha B) \times 1000$

SECTION $\lambda/\alpha = 0.0, 0.25, 0.5, 0.75, 1$



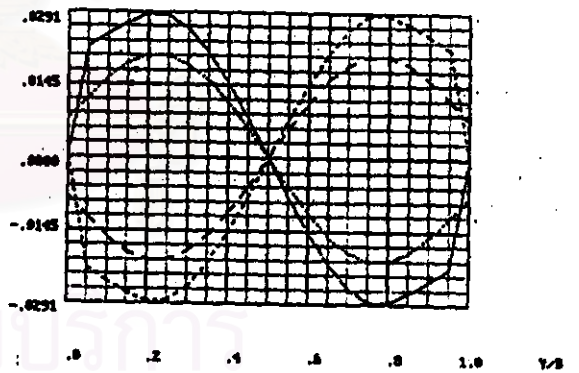
$\theta_{\alpha X}/K \times 1000$

SECTION $\lambda/\alpha = 0.0, 0.25, 0.5, 0.75, 1$



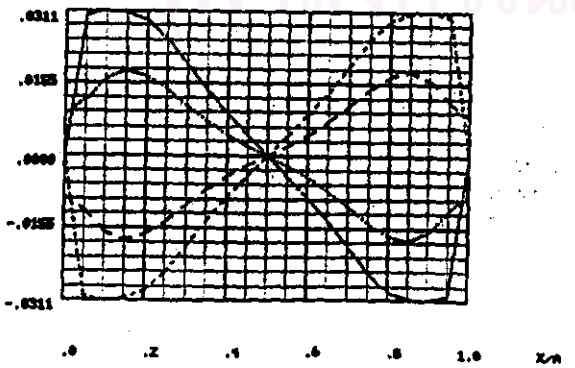
$\theta_{\alpha X}/K \times 1000$

SECTION $\lambda/\alpha = 0.0, 0.25, 0.5, 0.75, 1$



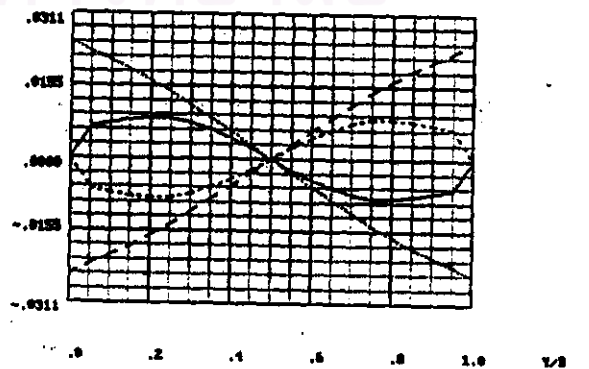
$\theta_{\beta X}/K \times 1000$

SECTION $\lambda/\alpha = 0.0, 0.25, 0.5, 0.75, 1$



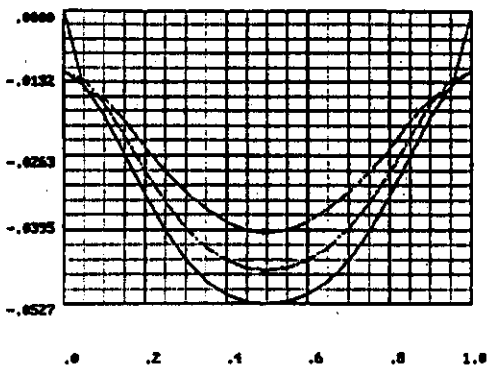
$\theta_{\beta X}/K \times 1000$

SECTION $\lambda/\alpha = 0.0, 0.25, 0.5, 0.75, 1$



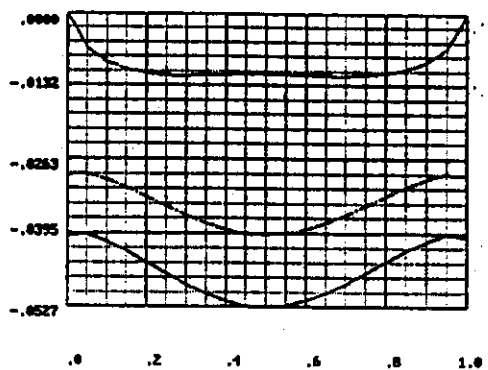
$R_{xy}/K \times 1000$

SECTION $Y/B = 0, 0.25, 0.5, 0.75, 1$



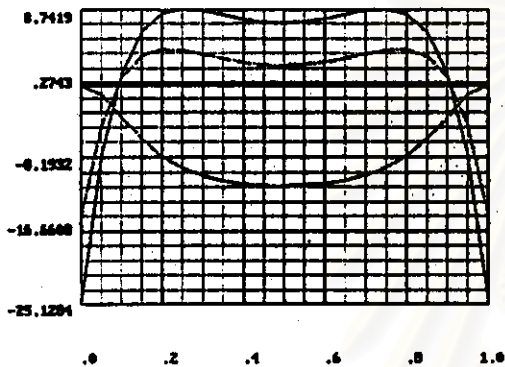
$R_{xy}/K \times 1000$

SECTION $X/A = 0, 0.25, 0.5, 0.75, 1$



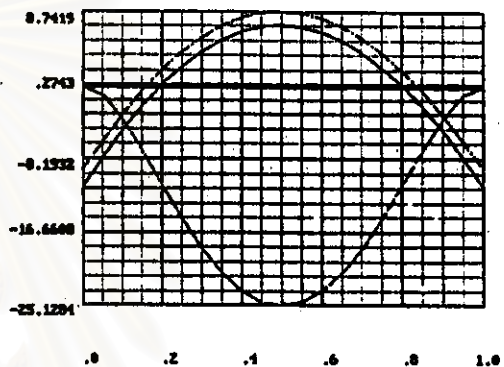
$R_{xz}/PAB \times 1000$

SECTION $Y/B = 0, 0.25, 0.5, 0.75, 1$



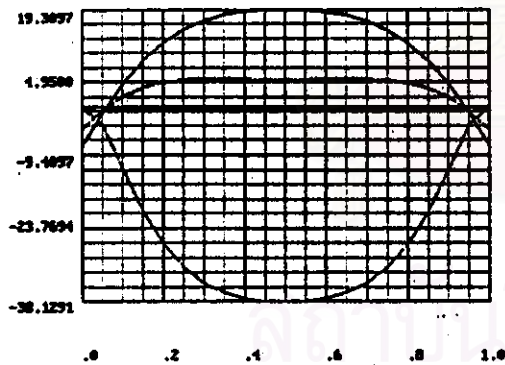
$R_{xz}/PAB \times 1000$

SECTION $X/A = 0, 0.25, 0.5, 0.75, 1$



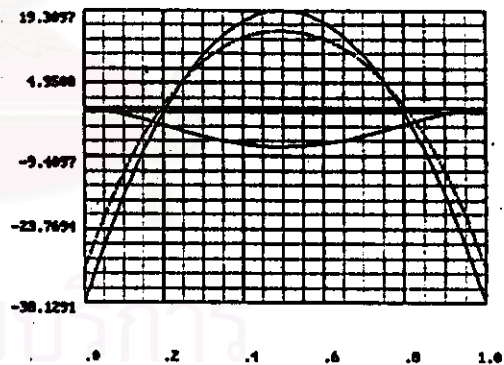
$R_{yy}/PAB \times 1000$

SECTION $Y/B = 0, 0.25, 0.5, 0.75, 1$



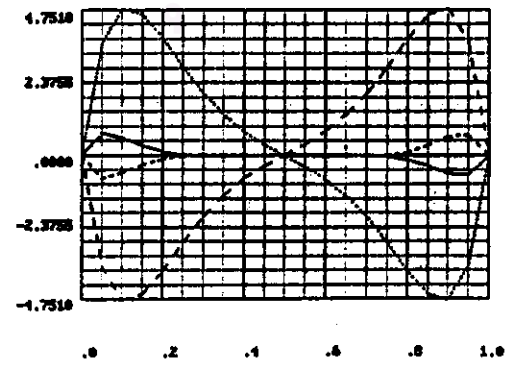
$R_{yy}/PAB \times 1000$

SECTION $X/A = 0, 0.25, 0.5, 0.75, 1$



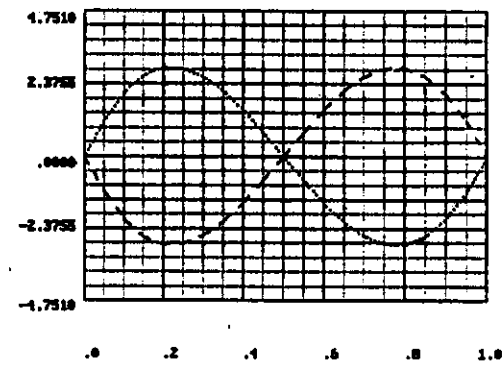
$R_{zz}/PAB \times 1000$

SECTION $Y/B = 0, 0.25, 0.5, 0.75, 1$



$R_{zz}/PAB \times 1000$

SECTION $X/A = 0, 0.25, 0.5, 0.75, 1$



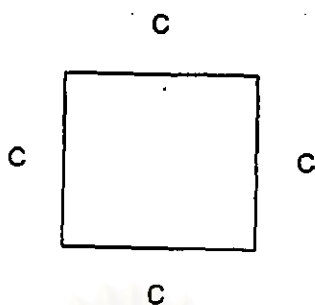
ผลของกรณีที่ 2 :

$$\frac{A}{B} = 2.0$$

$$\frac{f}{h} = 4.0$$

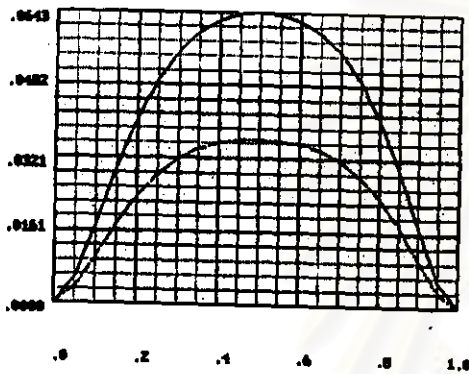
$$\frac{P_3 AB}{Eh^2} = 0.01$$

$$\nu = 0.3$$



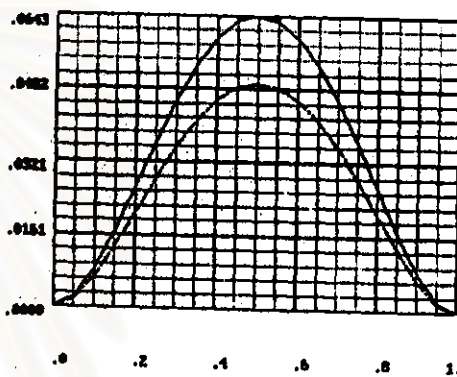
$v(h/AB) \times 1000$

SECTION $l/b = 0.0, 0.25, 0.5, 0.75, 1$



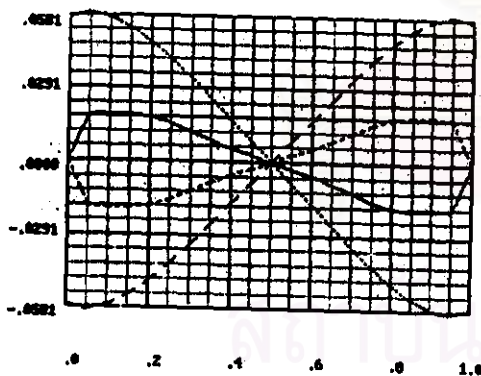
$v(h/AB) \times 1000$

SECTION $l/b = 0.0, 0.25, 0.5, 0.75, 1$



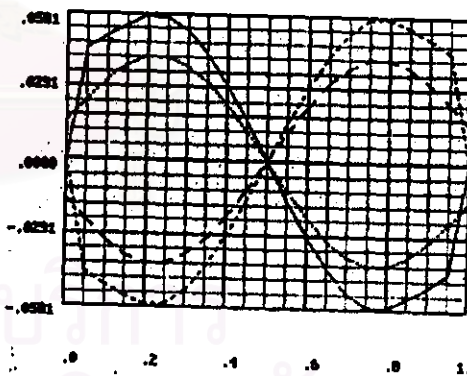
$w(x/z) \times 1000$

SECTION $l/b = 0.0, 0.25, 0.5, 0.75, 1$



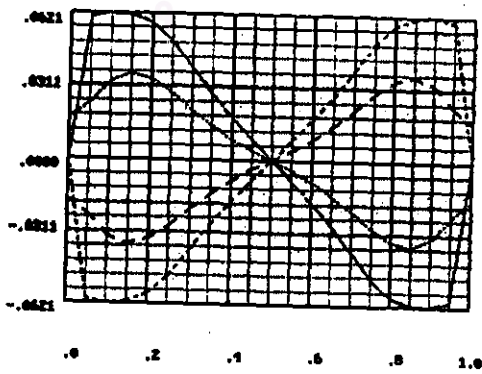
$w(x/z) \times 1000$

SECTION $l/b = 0.0, 0.25, 0.5, 0.75, 1$



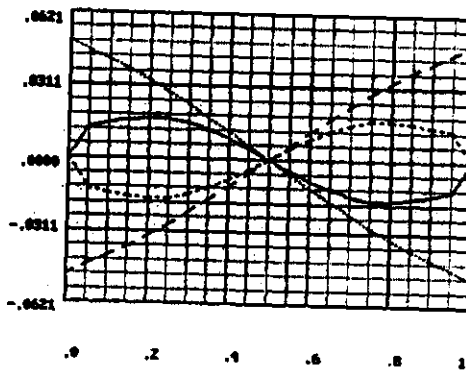
$\theta_{xy}(z) \times 1000$

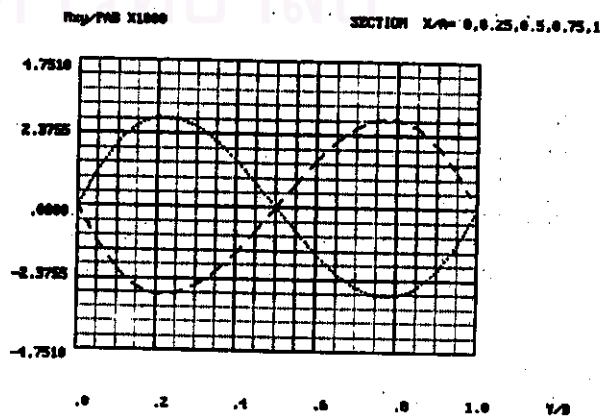
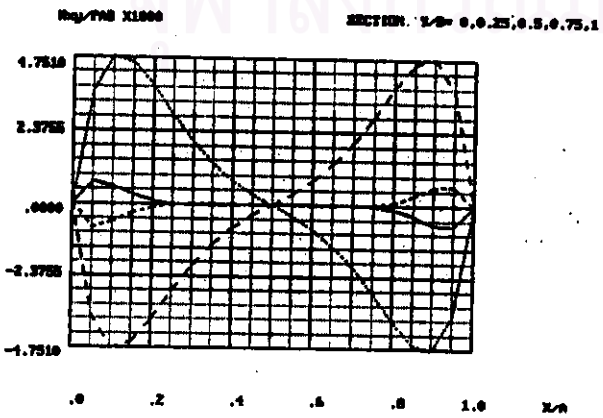
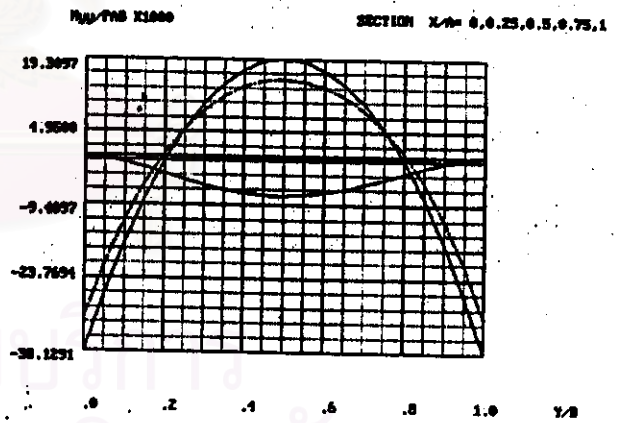
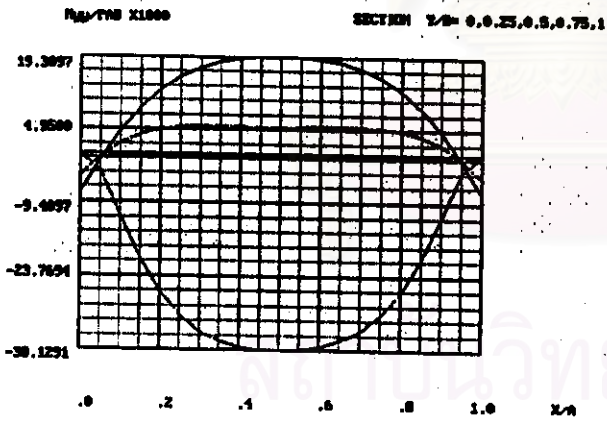
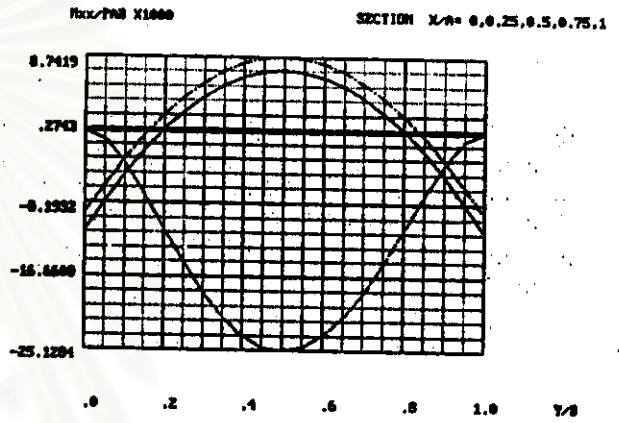
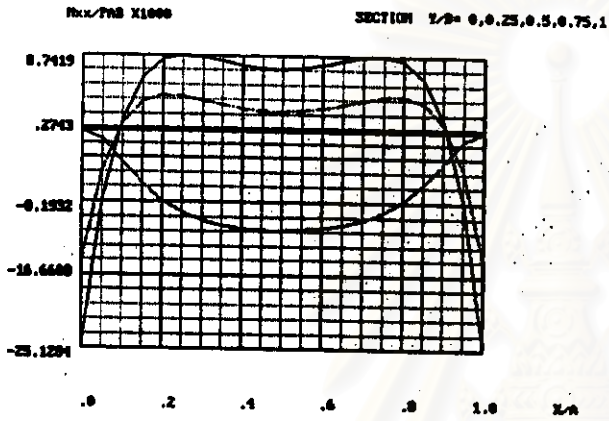
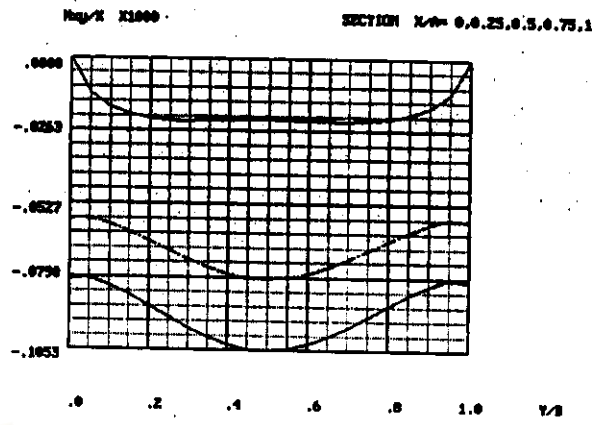
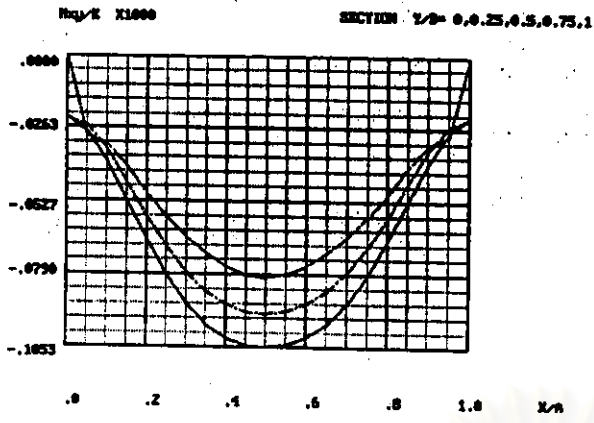
SECTION $l/b = 0.0, 0.25, 0.5, 0.75, 1$



$\theta_{xy}(z) \times 1000$

SECTION $l/b = 0.0, 0.25, 0.5, 0.75, 1$





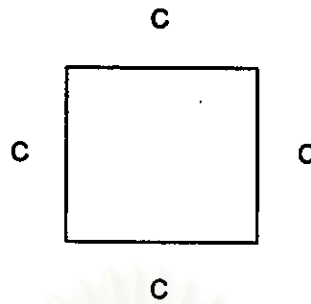
ผลของกรณีที่ 2 :

$$\frac{A}{B} = 2.0$$

$$\frac{f}{h} = 6.0$$

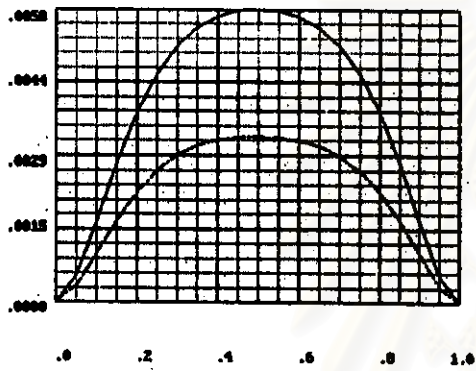
$$\frac{P_3 AB}{Eh^2} = 0.001$$

$$\nu = 0.3$$



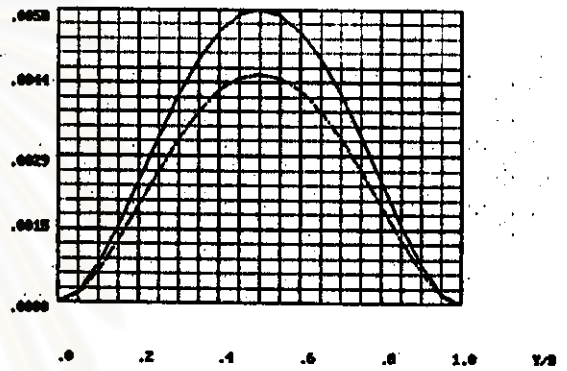
$u(h/AB) \times 1000$

SECTION $Y/B = 0, 0.25, 0.5, 0.75, 1$



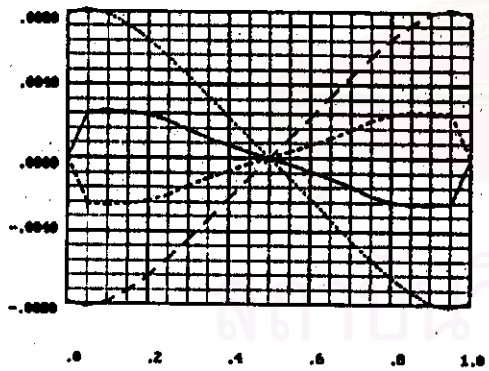
$u(h/AB) \times 1000$

SECTION $X/A = 0, 0.25, 0.5, 0.75, 1$



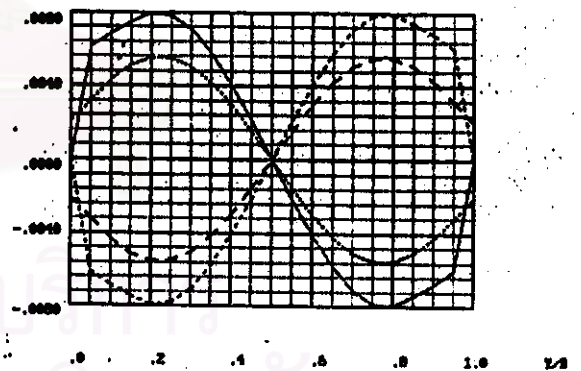
$\theta_{xx}/K \times 1000$

SECTION $Y/B = 0, 0.25, 0.5, 0.75, 1$



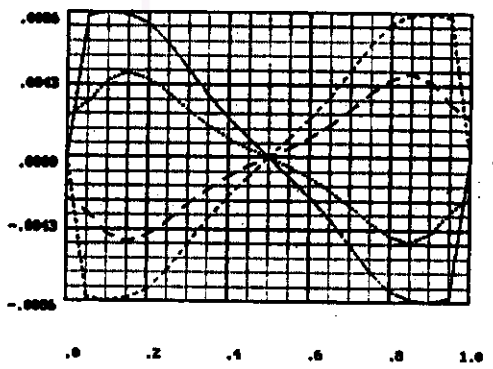
$\theta_{xx}/K \times 1000$

SECTION $X/A = 0, 0.25, 0.5, 0.75, 1$



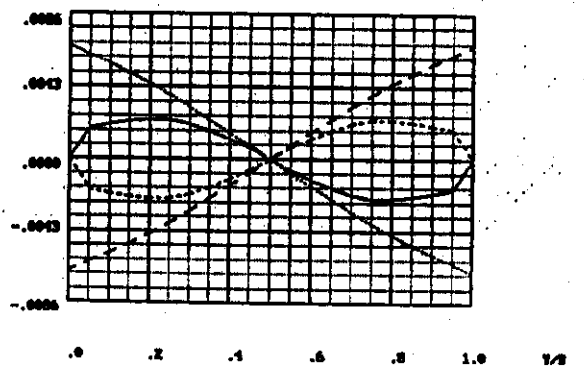
$\theta_{yy}/K \times 1000$

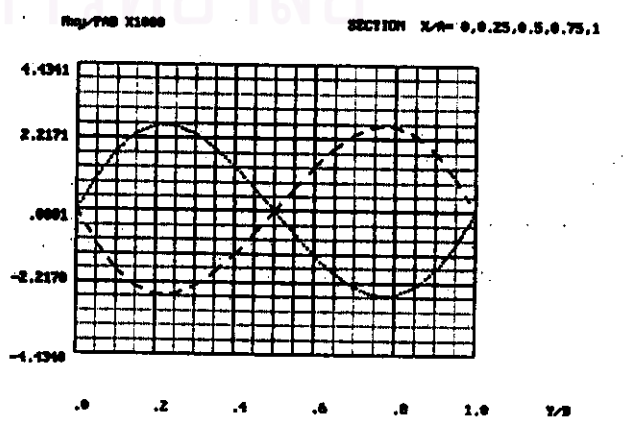
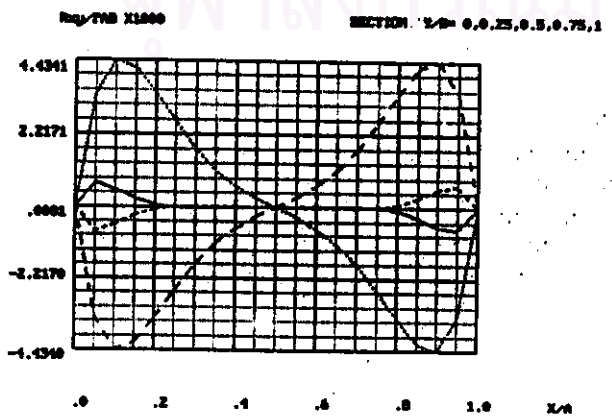
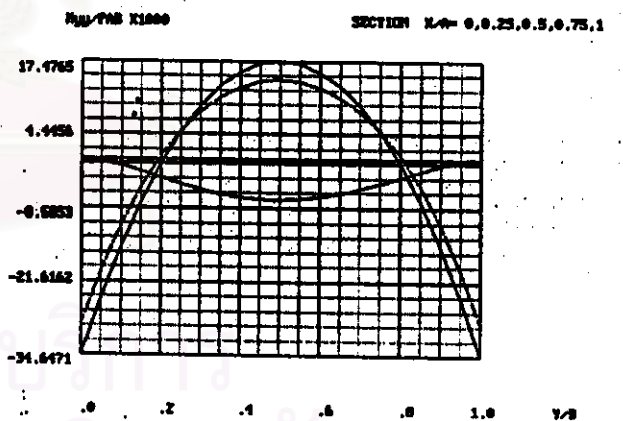
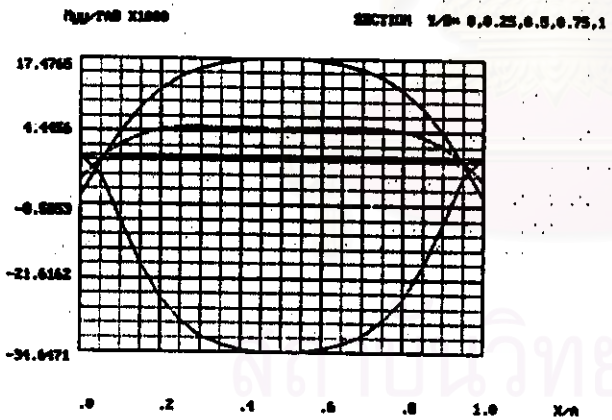
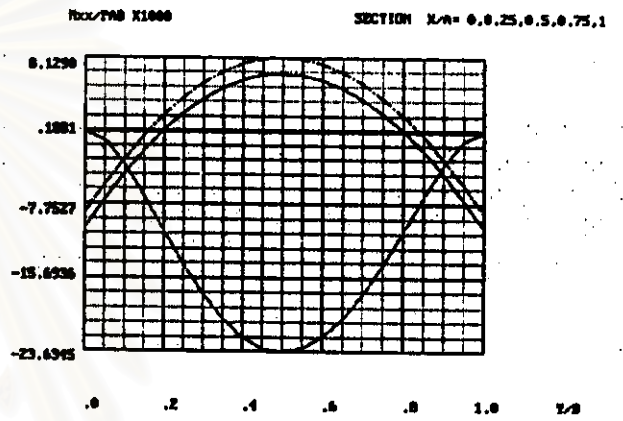
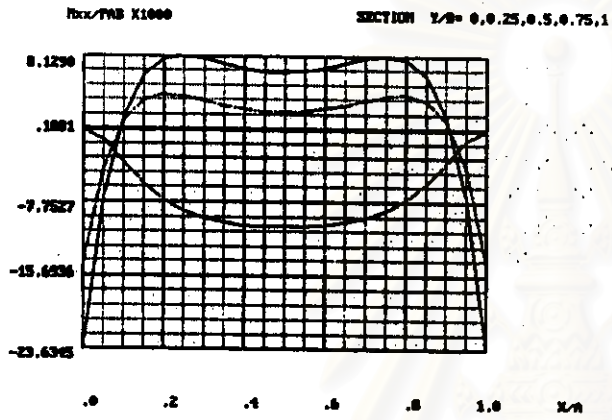
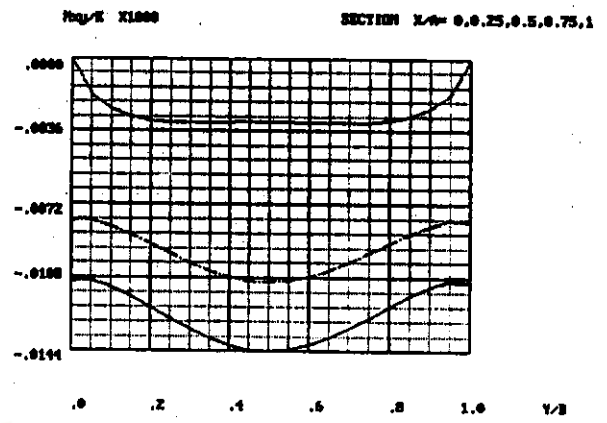
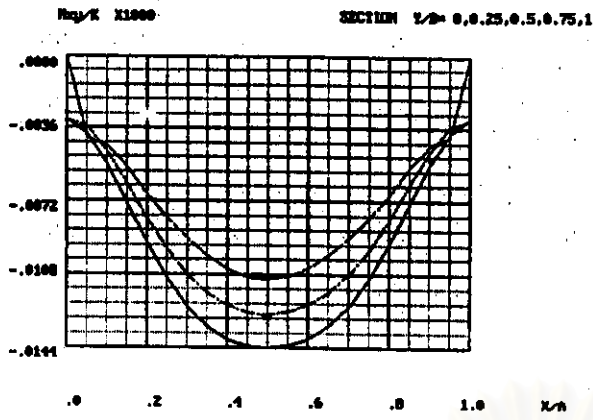
SECTION $Y/B = 0, 0.25, 0.5, 0.75, 1$



$\theta_{yy}/K \times 1000$

SECTION $X/A = 0, 0.25, 0.5, 0.75, 1$





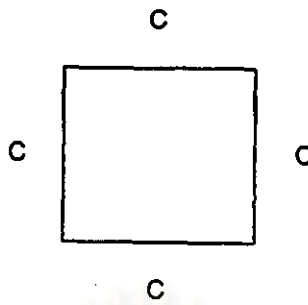
ผลของกรณีที่ 2 :

$$\frac{A}{B} = 2.0$$

$$\frac{f}{h} = 6.0$$

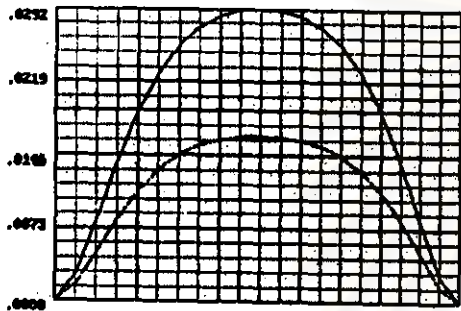
$$\frac{P_3 AB}{Eh^2} = 0.005$$

$$\nu = 0.3$$



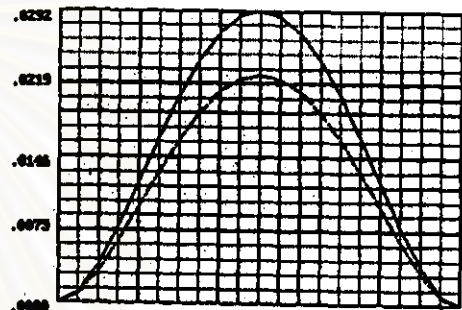
$u(h/AB) \times 1000$

SECTION $Y/B = 0, 0.25, 0.5, 0.75, 1$



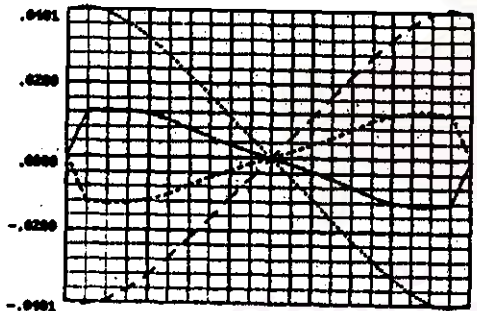
$u(h/AB) \times 1000$

SECTION $X/h = 0, 0.25, 0.5, 0.75, 1$



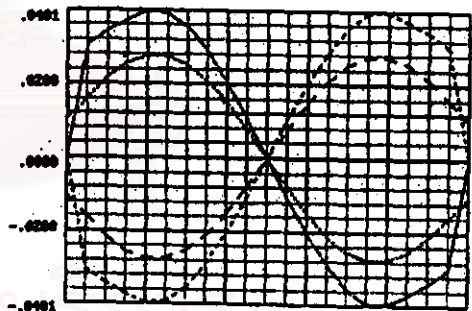
$w/h \times 1000$

SECTION $Y/B = 0, 0.25, 0.5, 0.75, 1$



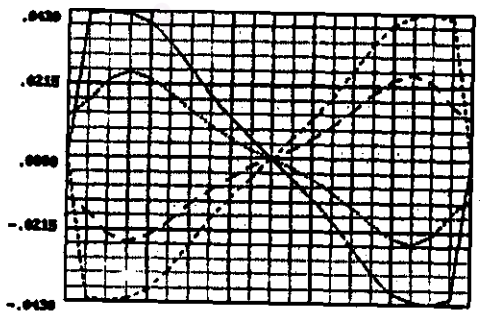
$w/h \times 1000$

SECTION $X/h = 0, 0.25, 0.5, 0.75, 1$



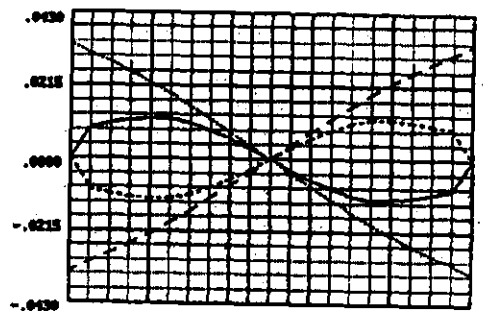
$\theta/h \times 1000$

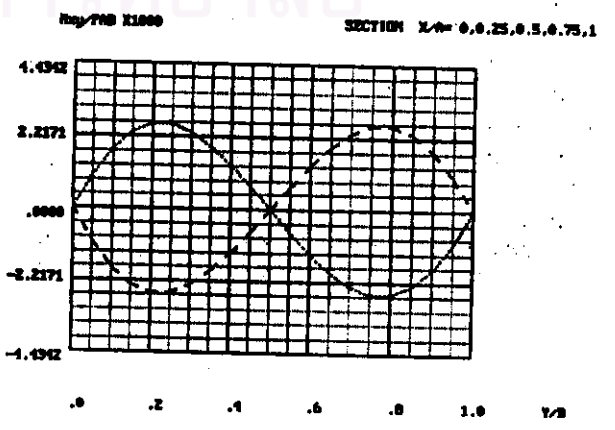
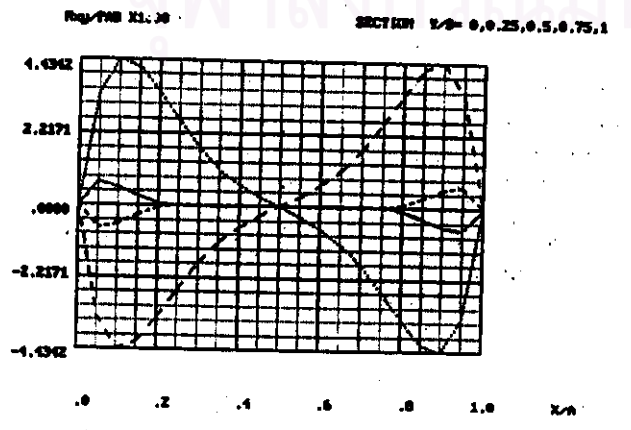
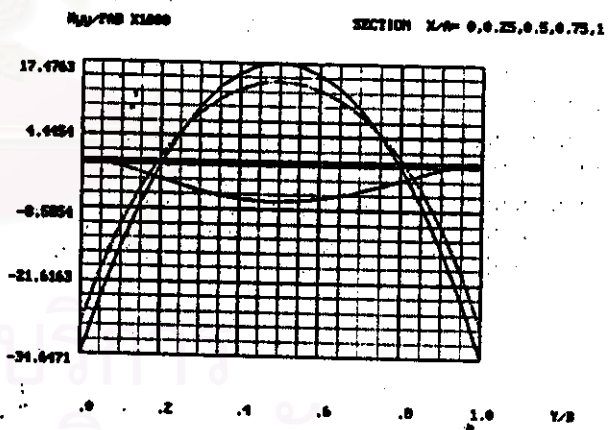
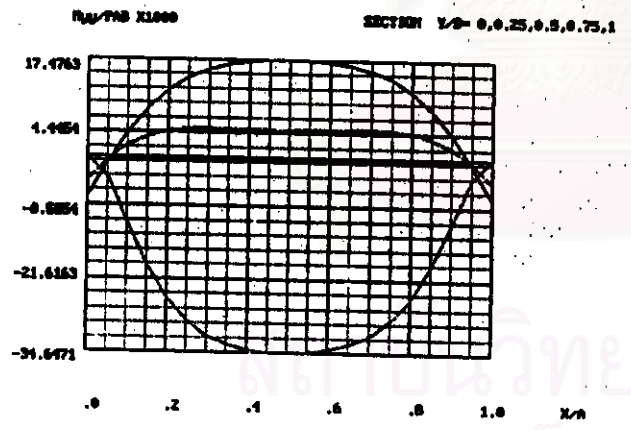
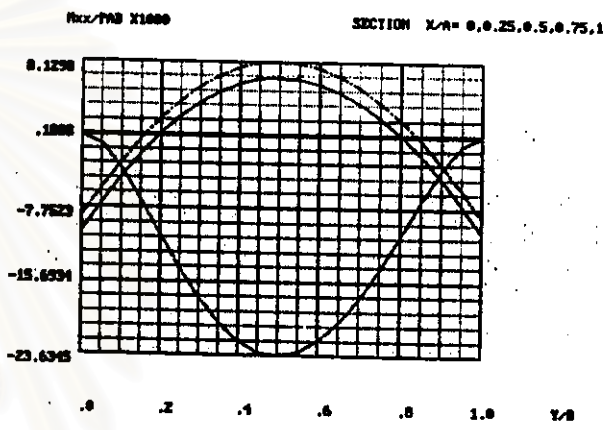
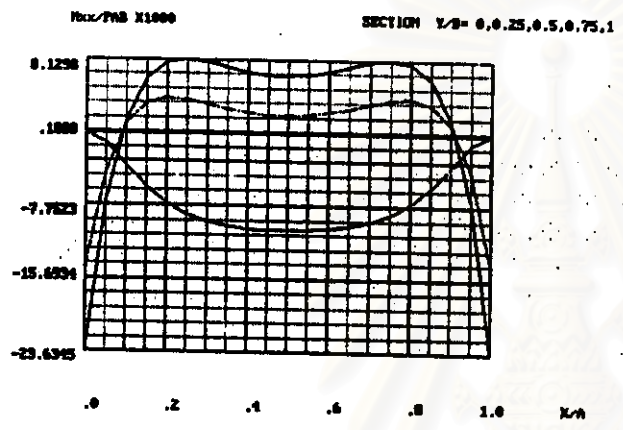
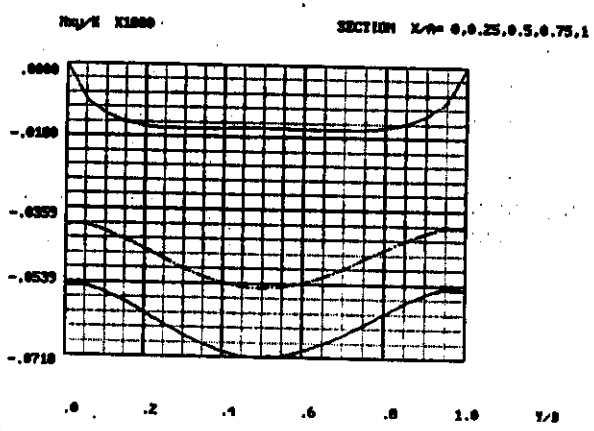
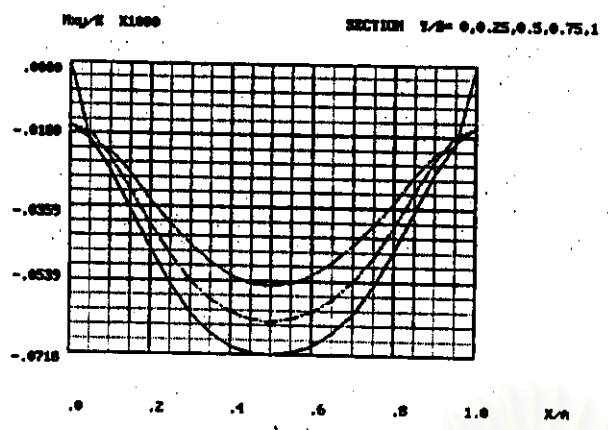
SECTION $Y/B = 0, 0.25, 0.5, 0.75, 1$



$\theta/h \times 1000$

SECTION $X/h = 0, 0.25, 0.5, 0.75, 1$





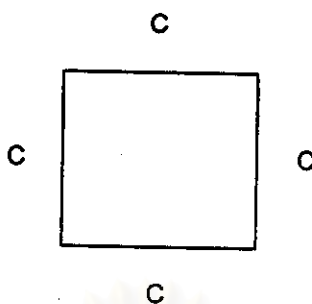
ผลของกรณีที่ 2 :

$$\frac{A}{B} = 2.0$$

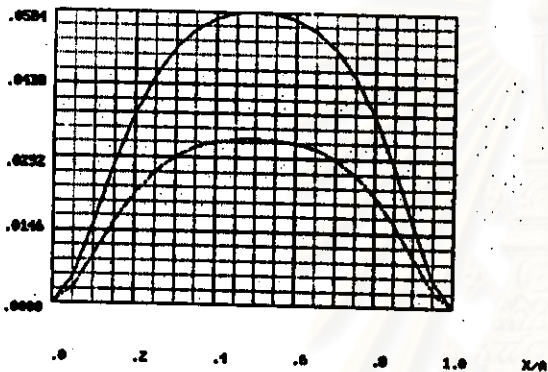
$$\frac{f}{h} = 6.0$$

$$\frac{P_3 AB}{Eh^2} = 0.01$$

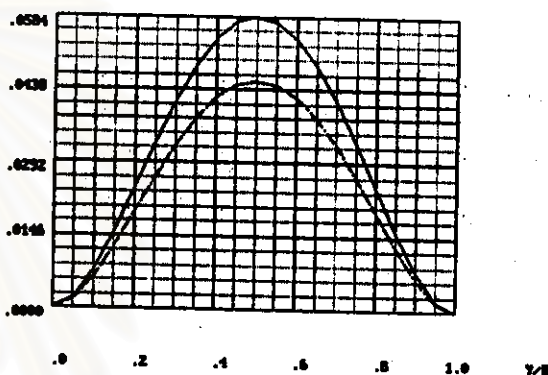
$$\nu = 0.3$$



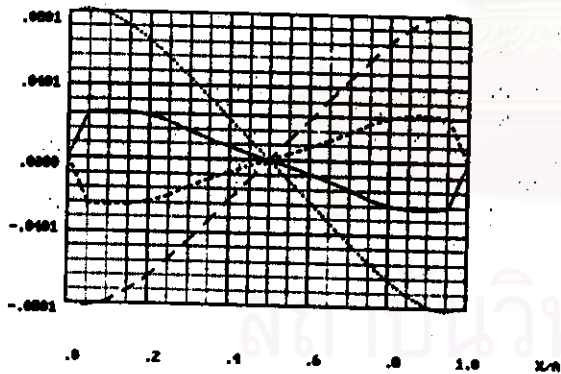
$w(h/AB) \times 1000$ SECTION $Y/B = 0, 0.25, 0.5, 0.75, 1$



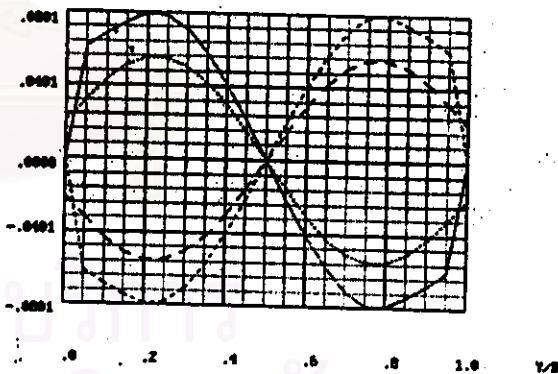
$w(h/AB) \times 1000$ SECTION $X/A = 0, 0.25, 0.5, 0.75, 1$



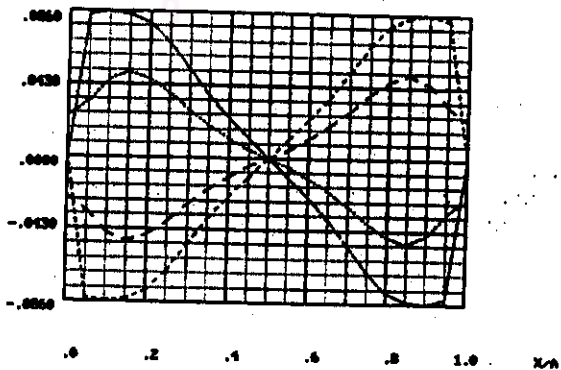
$u(x)/K \times 1000$ SECTION $Y/B = 0, 0.25, 0.5, 0.75, 1$



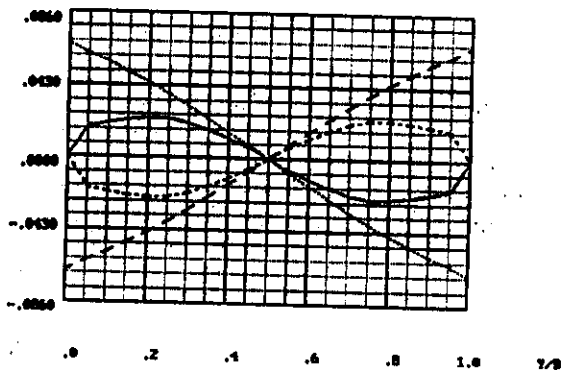
$u(x)/K \times 1000$ SECTION $X/A = 0, 0.25, 0.5, 0.75, 1$



$v(y)/K \times 1000$ SECTION $Y/B = 0, 0.25, 0.5, 0.75, 1$



$v(y)/K \times 1000$ SECTION $X/A = 0, 0.25, 0.5, 0.75, 1$





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Fig. 1 X1000 SECTION $Y/\delta = 0.0, 0.25, 0.5, 0.75, 1$

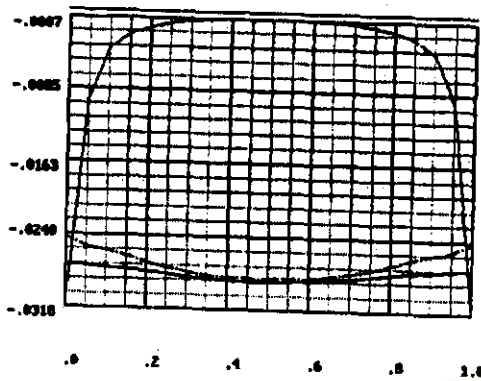


Fig. 2 X1000 SECTION $X/\delta = 0.0, 0.25, 0.5, 0.75, 1$

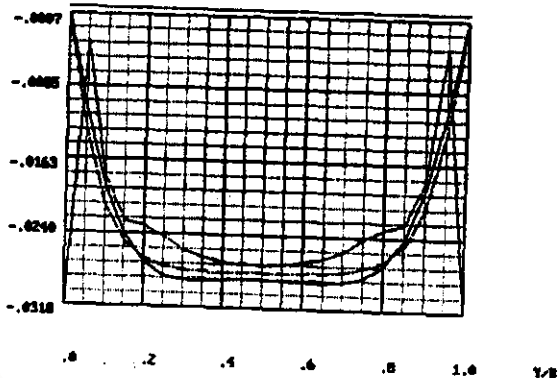


Fig. 3 TAB X1000 SECTION $Y/\delta = 0.0, 0.25, 0.5, 0.75, 1$

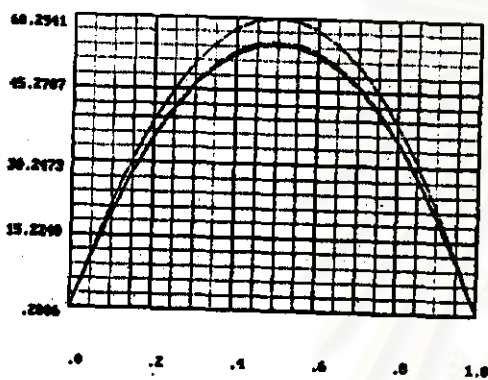


Fig. 4 TAB X1000 SECTION $X/\delta = 0.0, 0.25, 0.5, 0.75, 1$

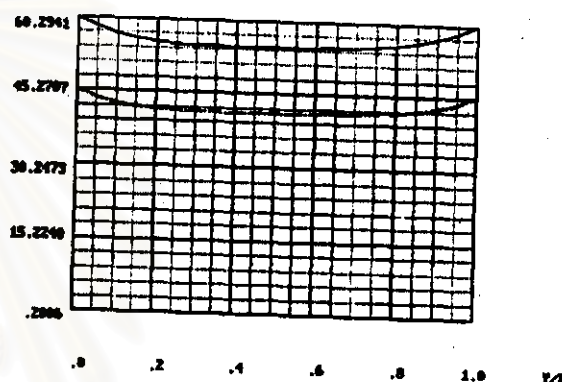


Fig. 5 TAB X1000 SECTION $Y/\delta = 0.0, 0.25, 0.5, 0.75, 1$

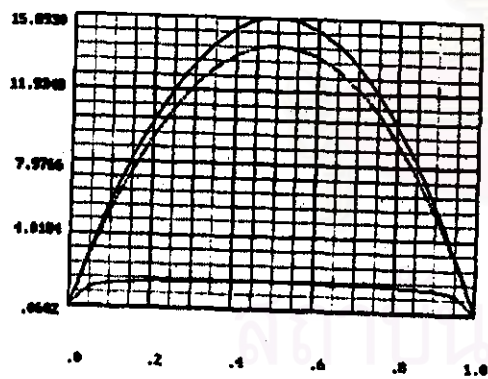


Fig. 6 TAB X1000 SECTION $X/\delta = 0.0, 0.25, 0.5, 0.75, 1$

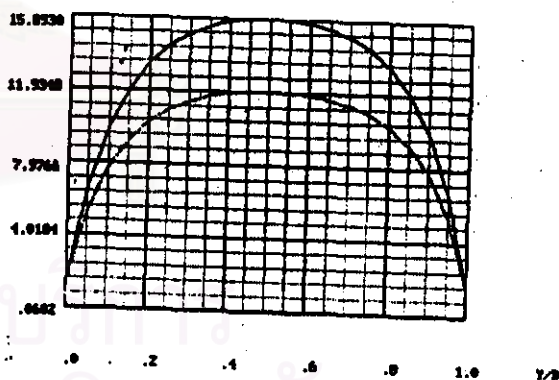


Fig. 7 TAB X1000 SECTION $Y/\delta = 0.0, 0.25, 0.5, 0.75, 1$

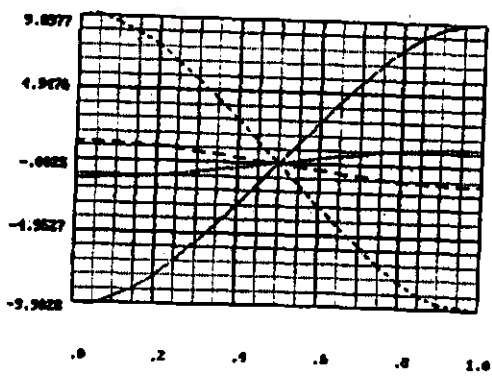
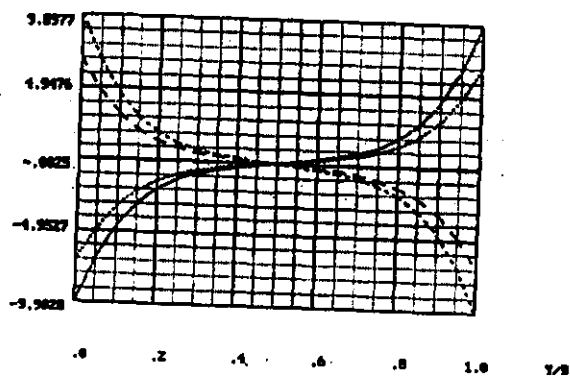


Fig. 8 TAB X1000 SECTION $X/\delta = 0.0, 0.25, 0.5, 0.75, 1$

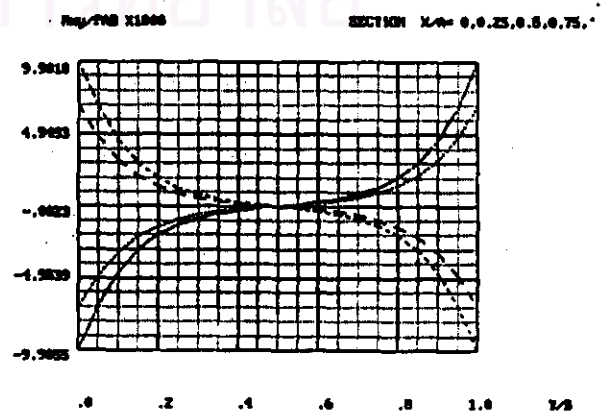
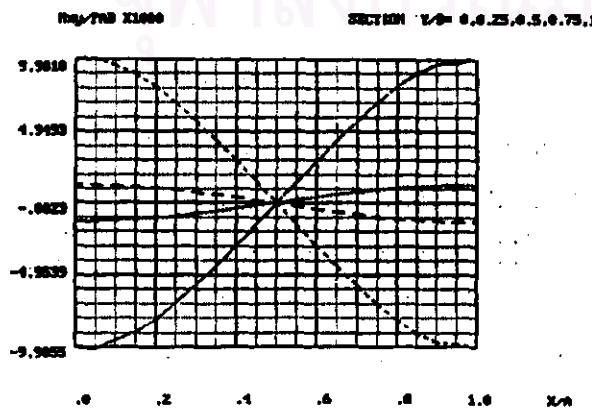
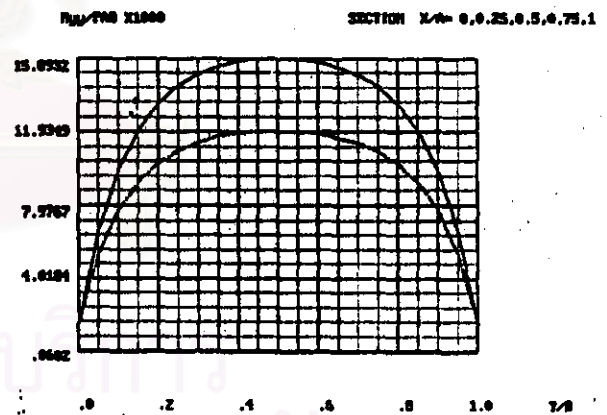
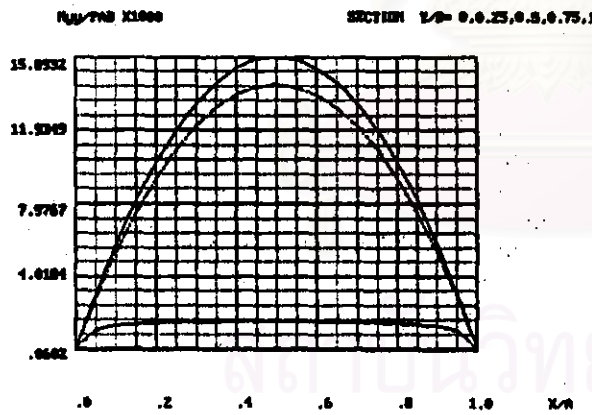
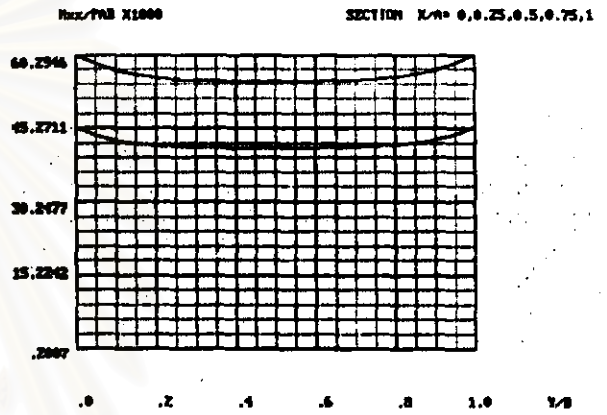
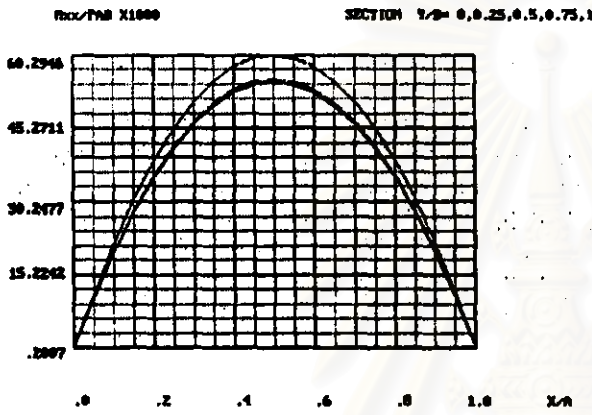
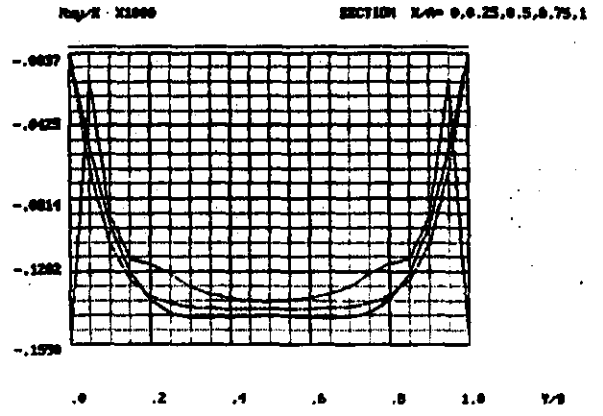
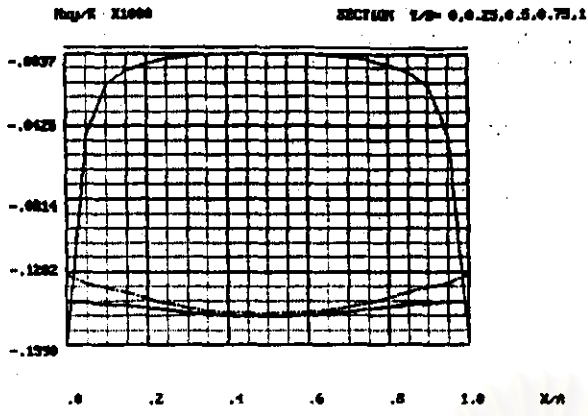




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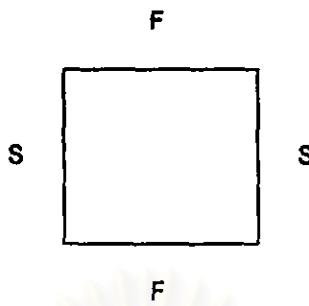
ผลของกรณีที่ 3 :

$$\frac{A}{B} = 0.5$$

$$\frac{f}{h} = 2.0$$

$$\frac{P_3 AB}{Eh^2} = 0.01$$

$$\nu = 0.3$$

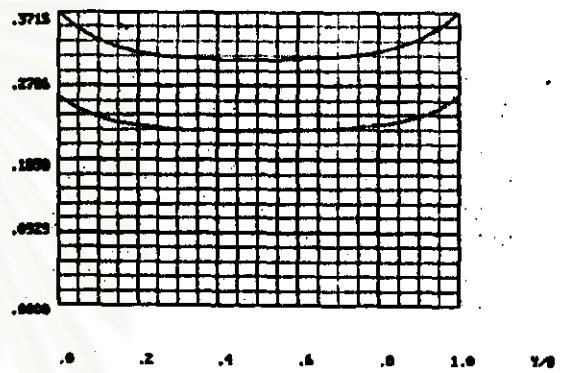
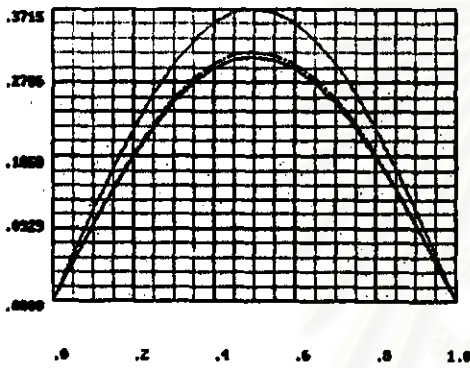


$w(h/AB) \times 1000$

SECTION $L/h = 0, 0.25, 0.5, 0.75, 1$

$w(h/AB) \times 1000$

SECTION $L/h = 0, 0.25, 0.5, 0.75, 1$

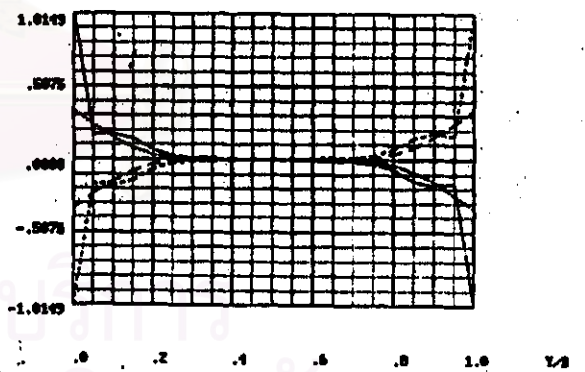
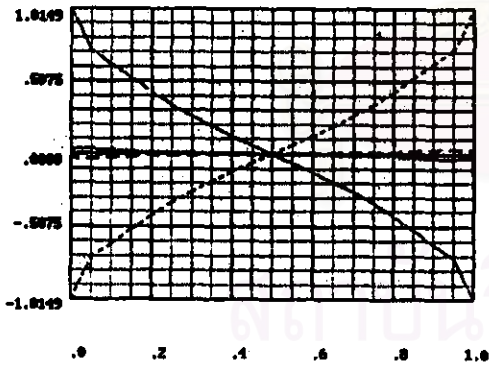


$M_x/h^2 \times 1000$

SECTION $L/h = 0, 0.25, 0.5, 0.75, 1$

$M_x/h^2 \times 1000$

SECTION $L/h = 0, 0.25, 0.5, 0.75, 1$

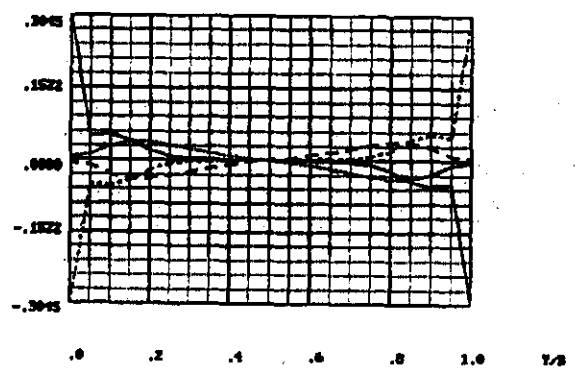
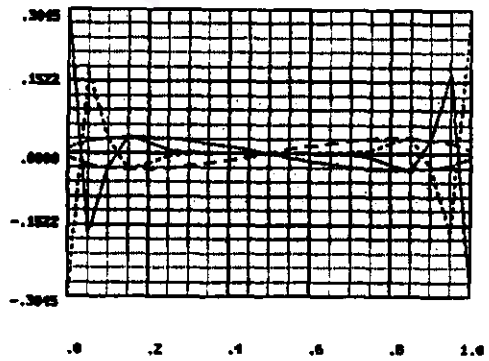


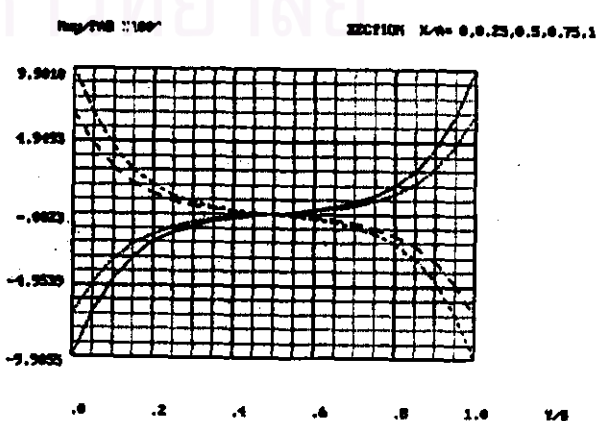
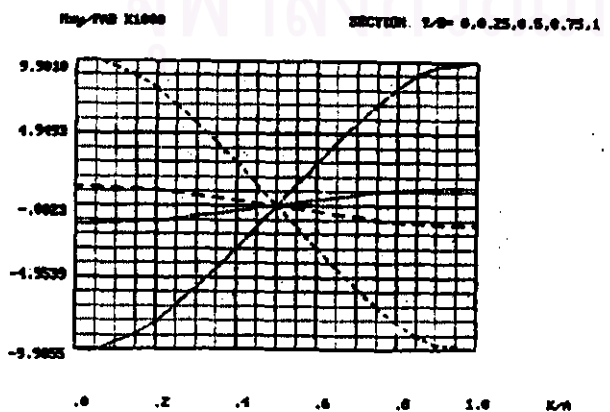
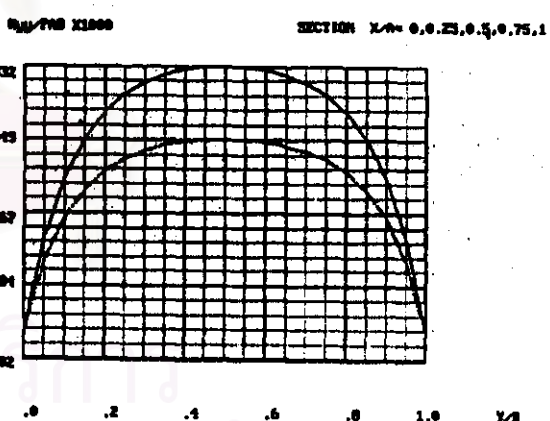
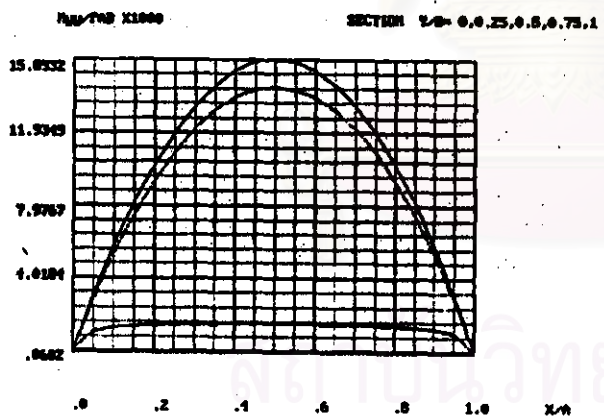
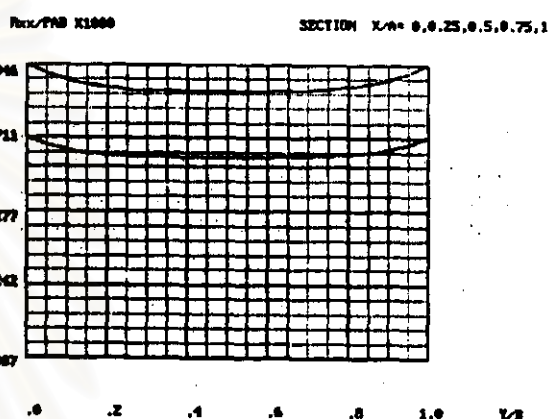
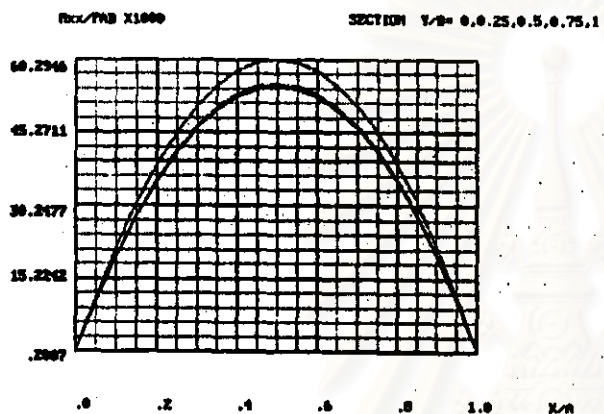
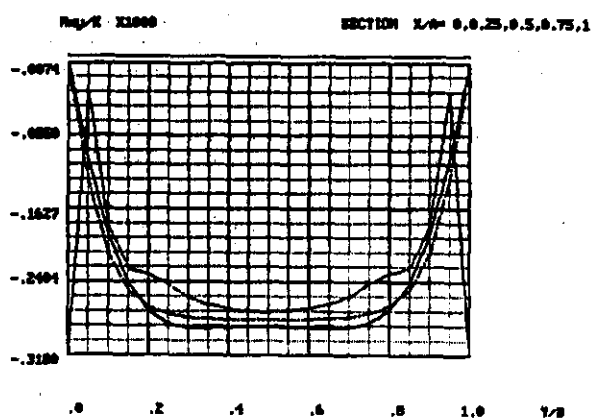
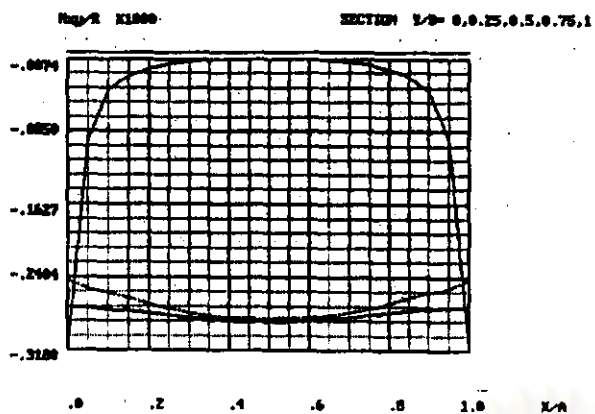
$N_y/h \times 1000$

SECTION $L/h = 0, 0.25, 0.5, 0.75, 1$

$N_y/h \times 1000$

SECTION $L/h = 0, 0.25, 0.5, 0.75, 1$



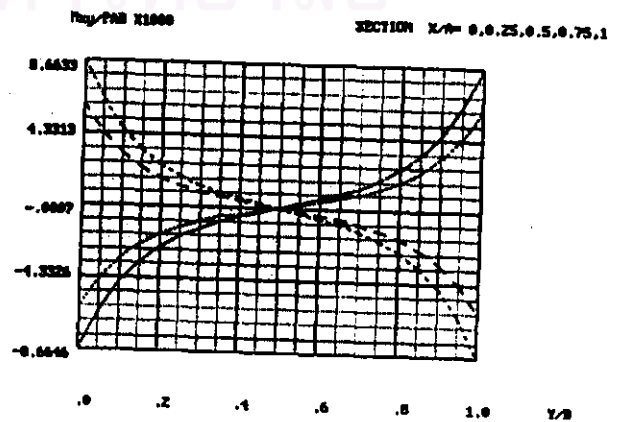
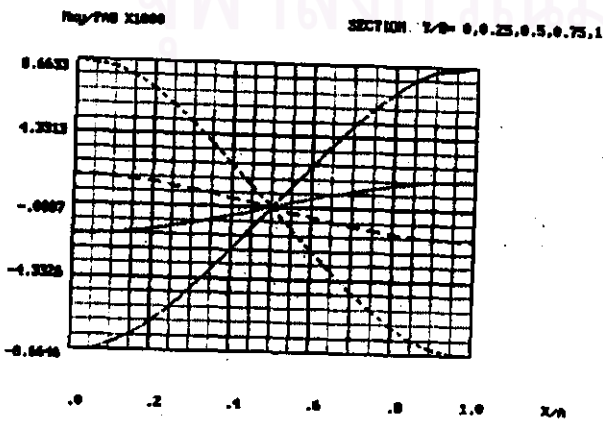
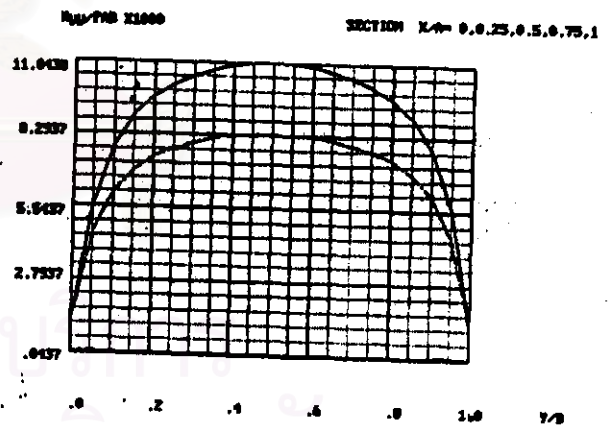
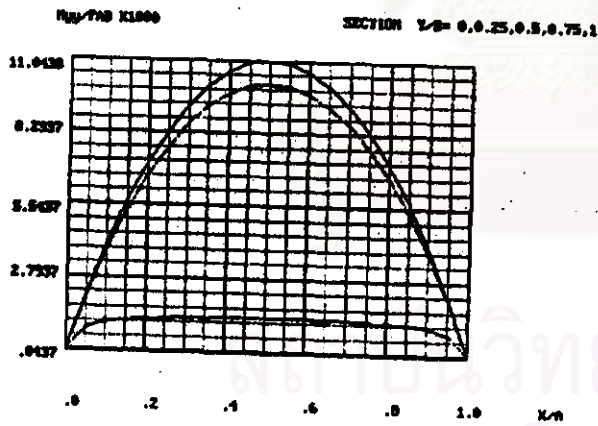
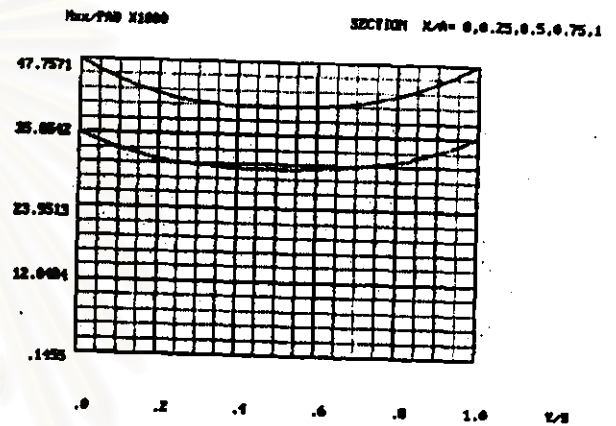
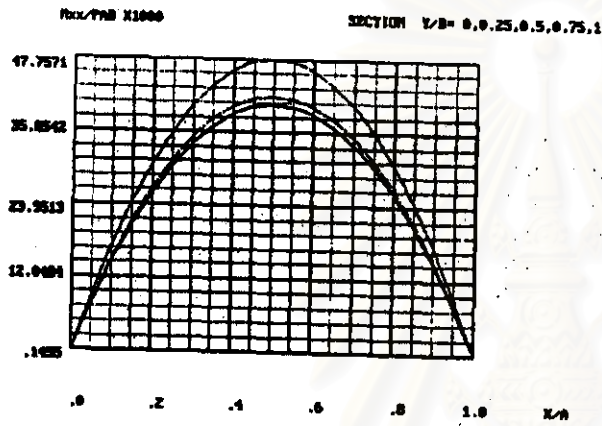
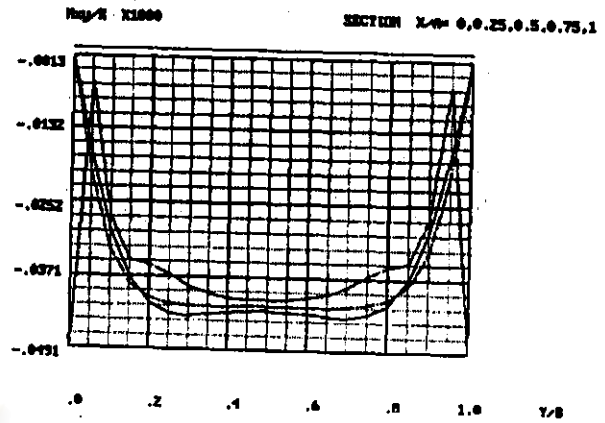
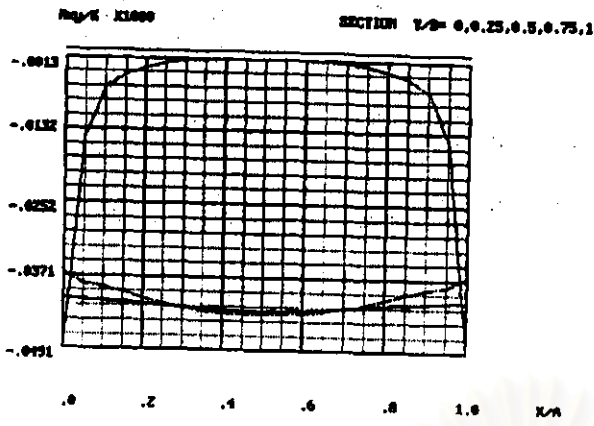




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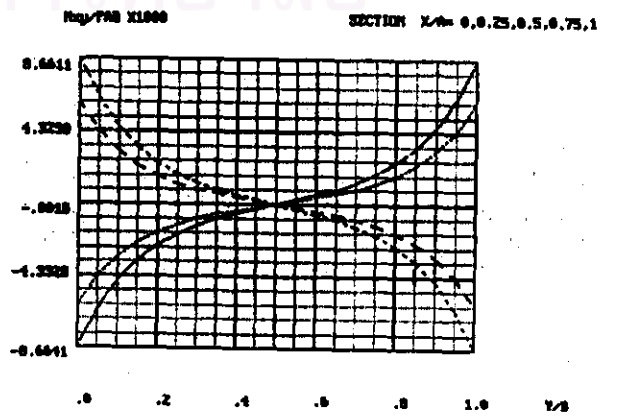
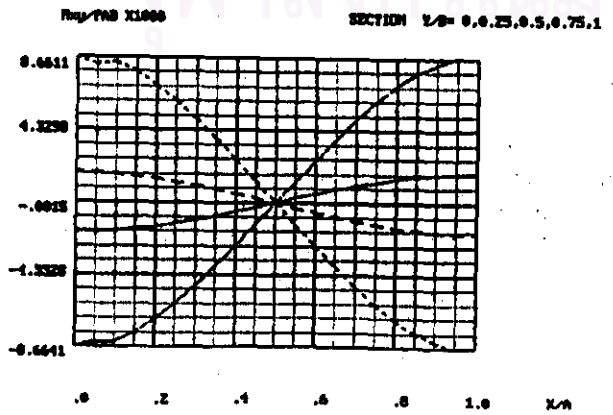
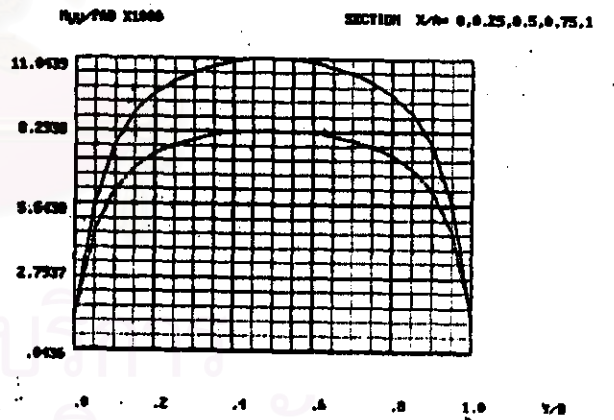
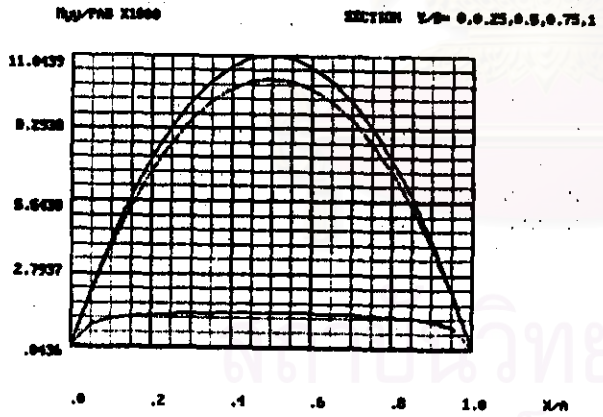
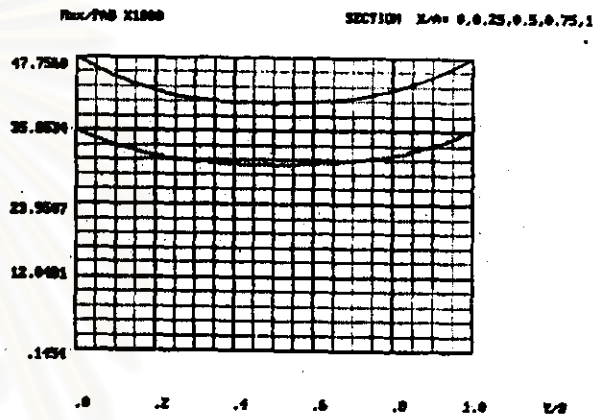
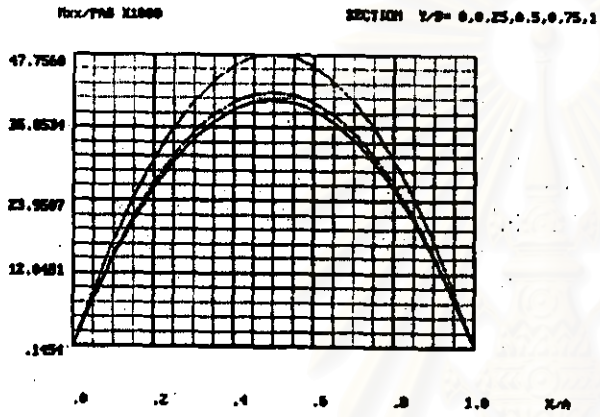
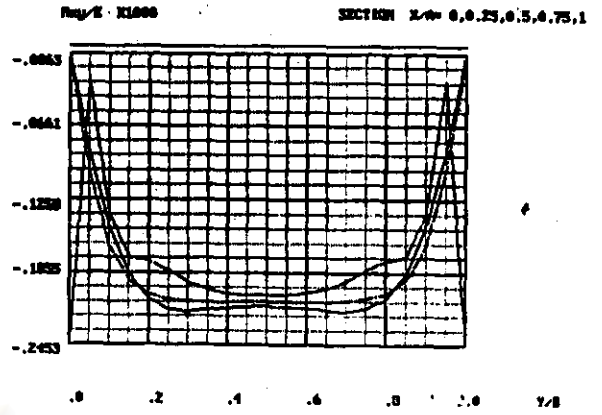
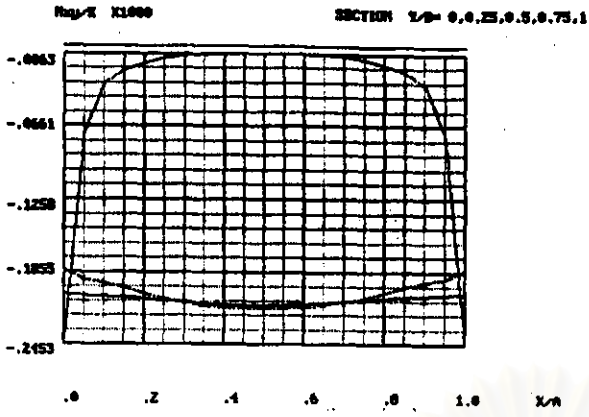




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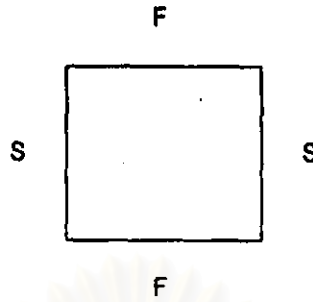
ผลของกรณีที่ 3 :

$$\frac{A}{B} = 0.5$$

$$\frac{f}{h} = 4.0$$

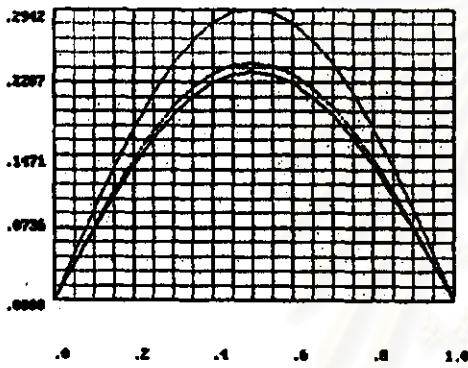
$$\frac{P_{3,AB}}{Eh^2} = 0.01$$

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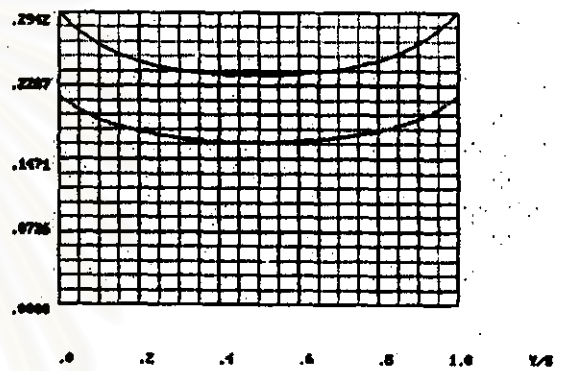
$v(h/AB) \times 1000$

SECTION $l/b = 0, 0.25, 0.5, 0.75, 1$



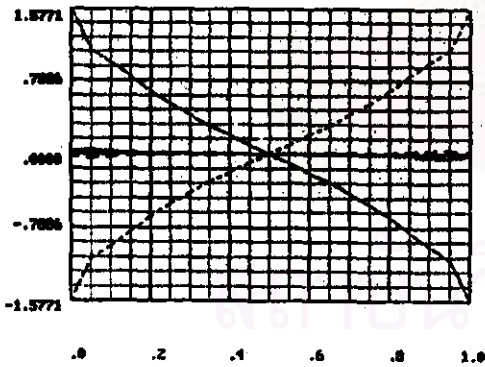
$w(h/AB) \times 1000$

SECTION $l/b = 0, 0.25, 0.5, 0.75, 1$



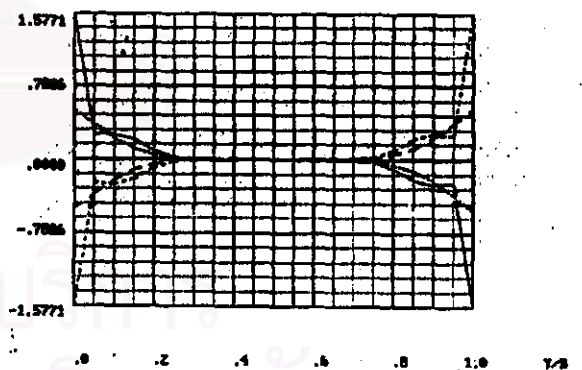
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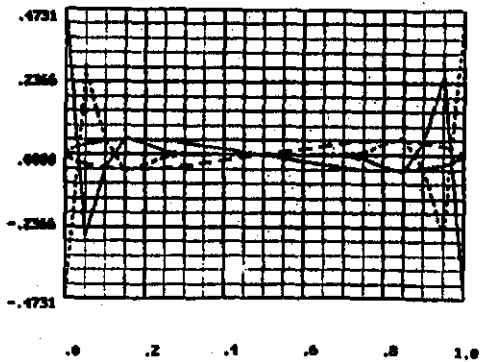
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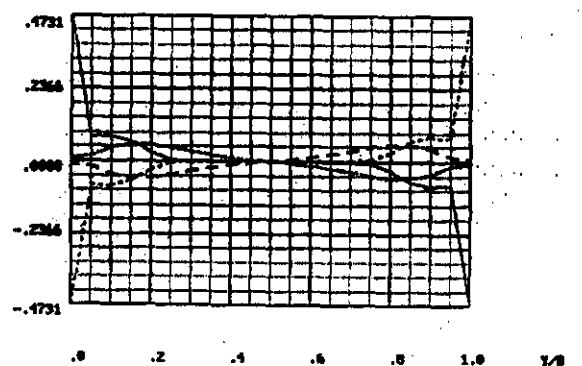
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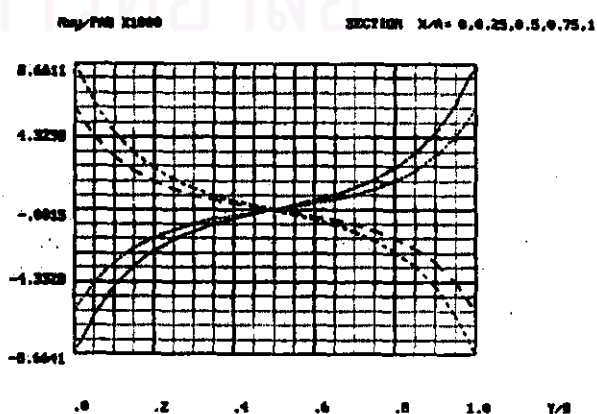
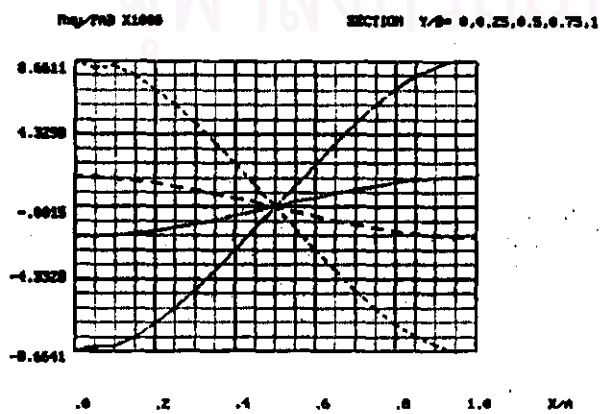
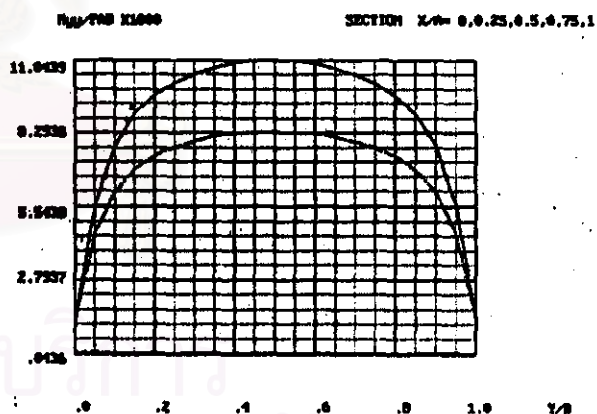
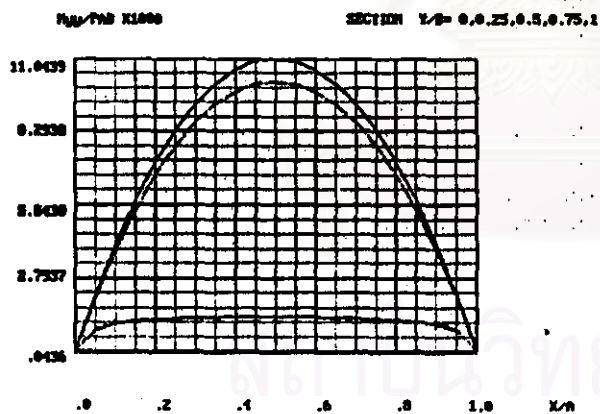
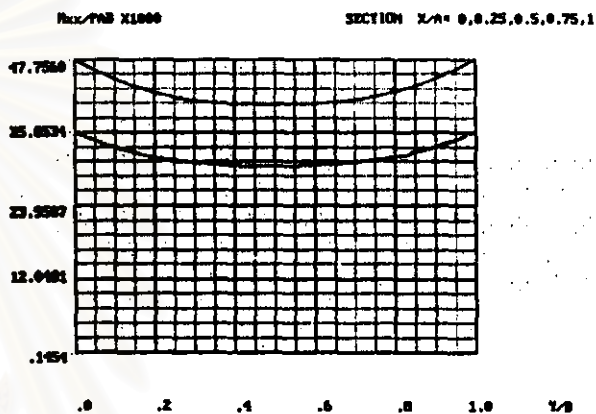
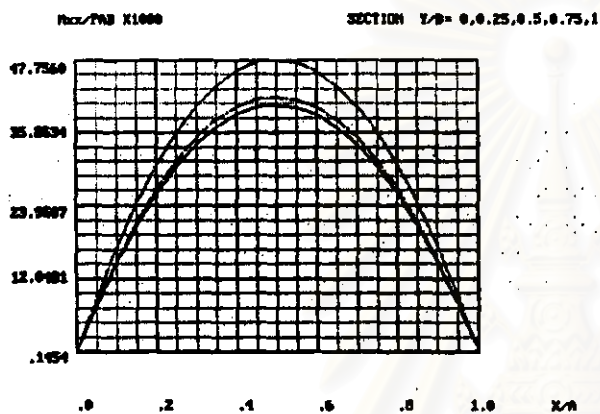
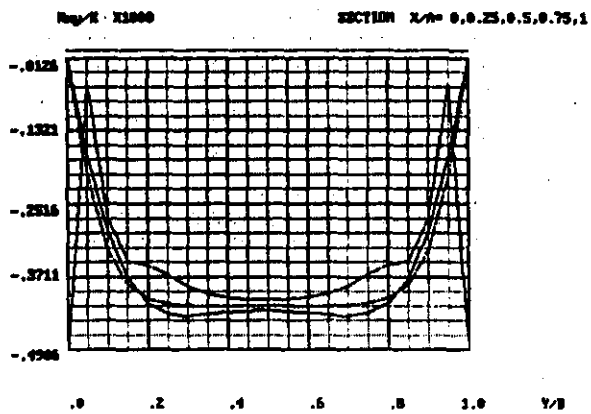
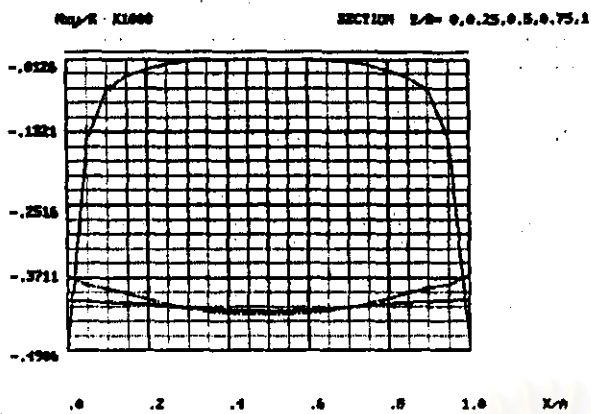
SECTION $l/b = 0, 0.25, 0.5, 0.75, 1$



$M_{zz}/K \times 1000$

SECTION $l/b = 0, 0.25, 0.5, 0.75, 1$





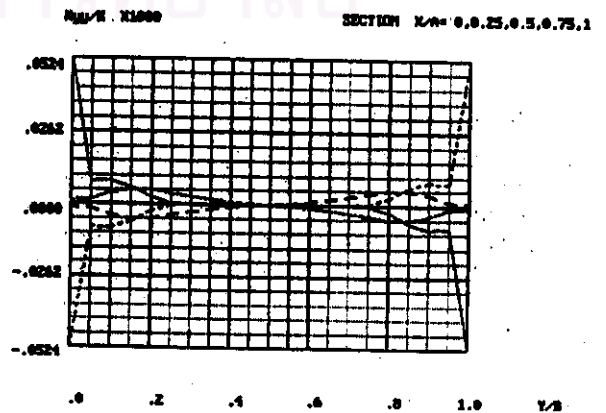
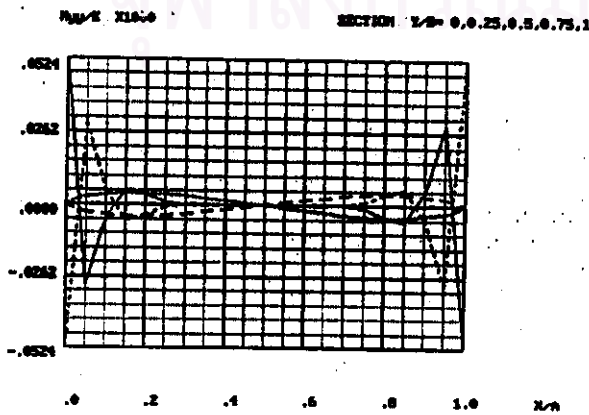
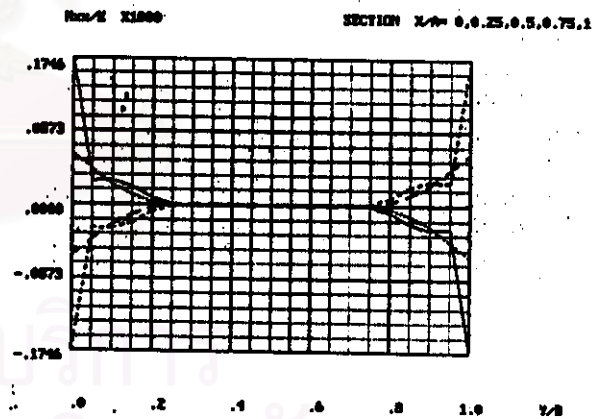
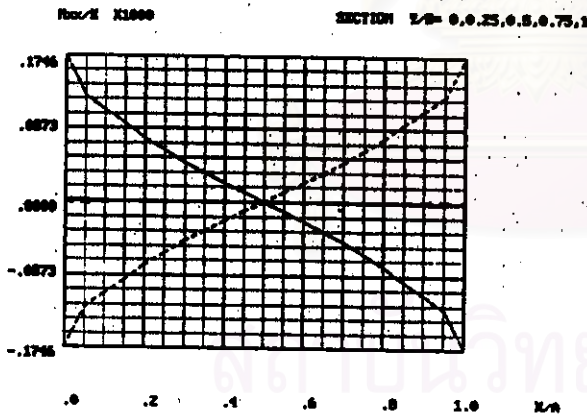
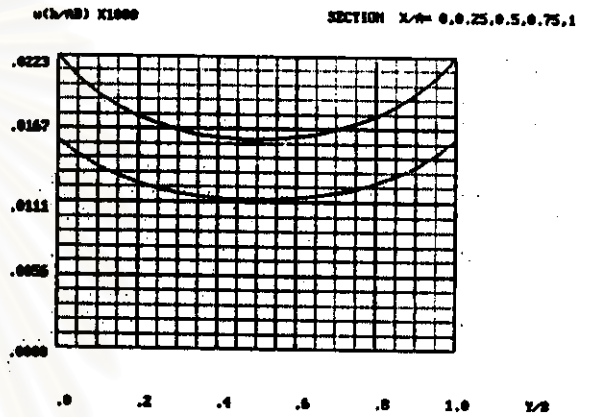
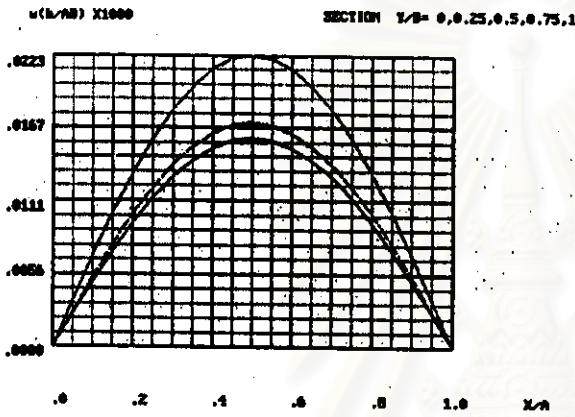
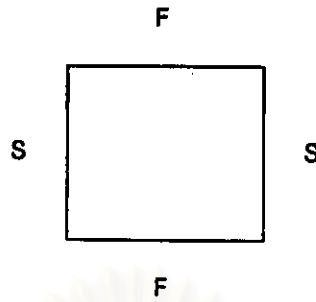
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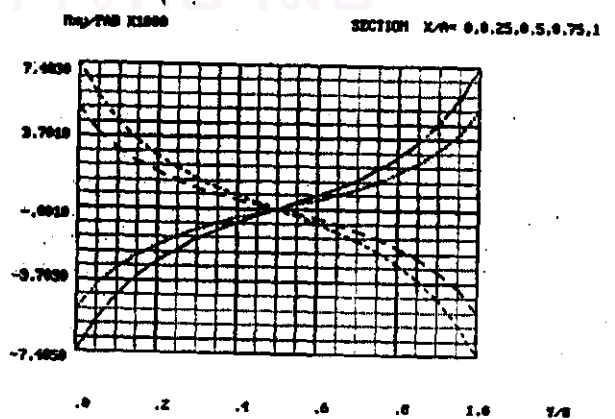
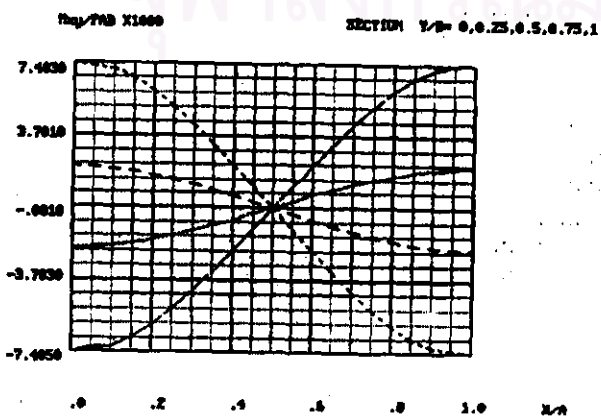
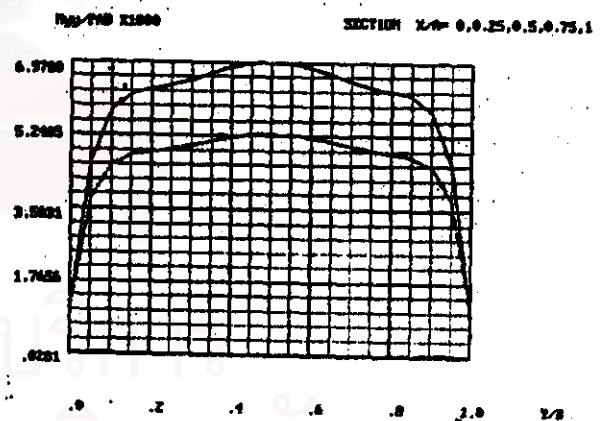
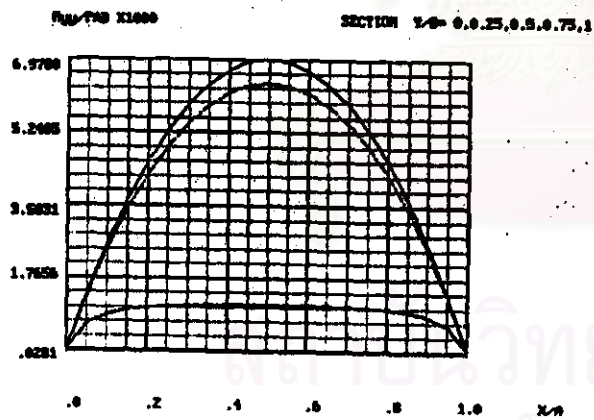
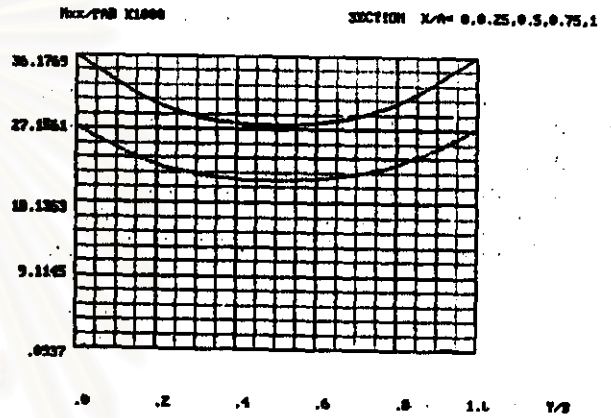
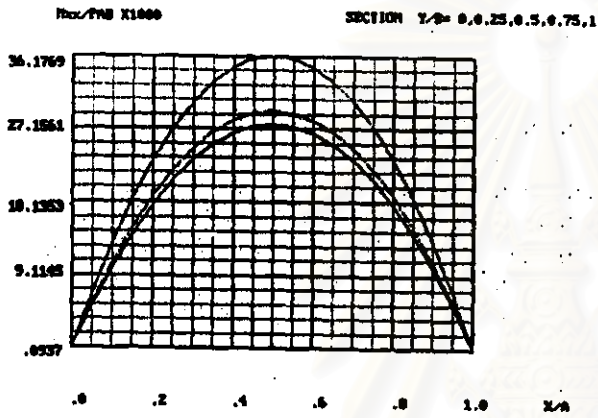
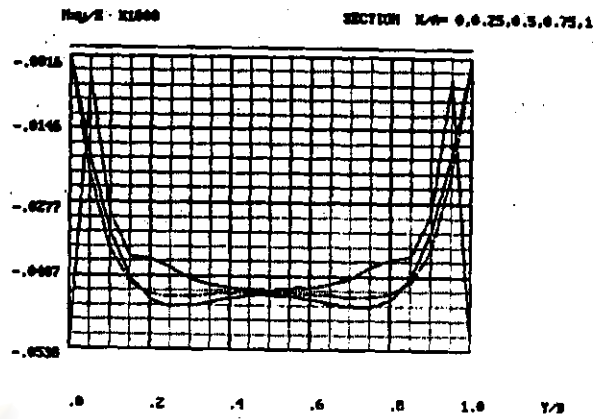
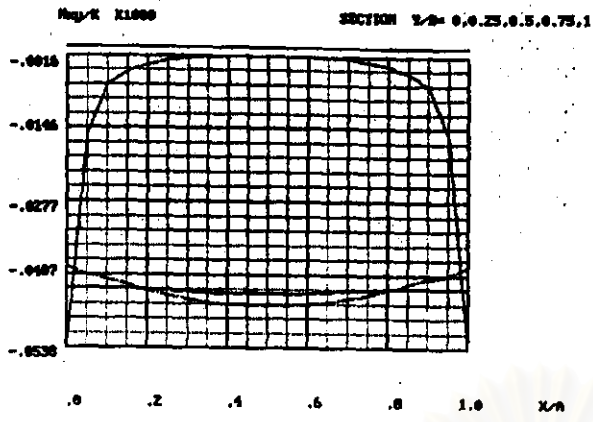
$$\frac{A}{B} = 0.5$$

$$\frac{f}{h} = 6.0$$

$$\frac{P_3 AB}{Eh^2} = 0.001$$

$$\nu = 0.3$$





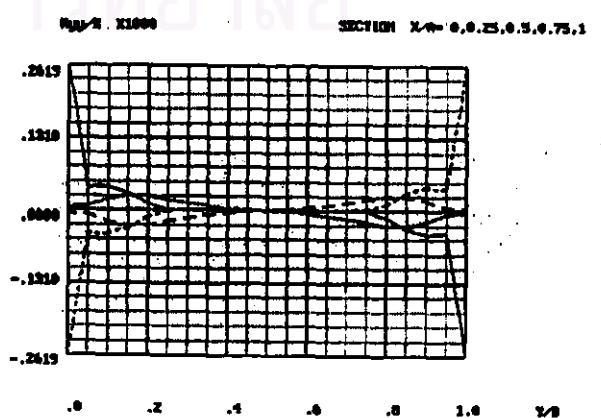
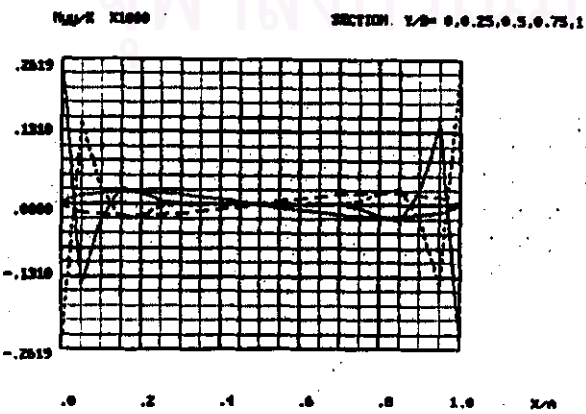
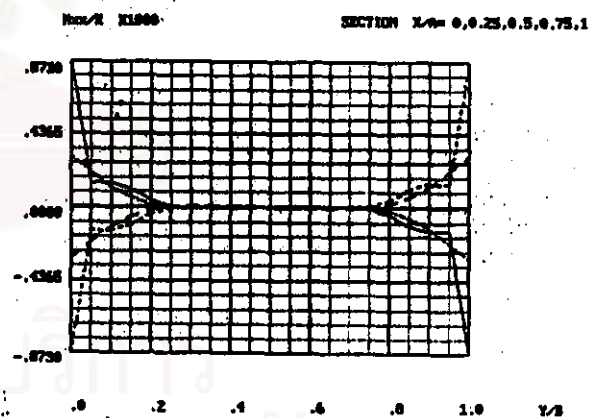
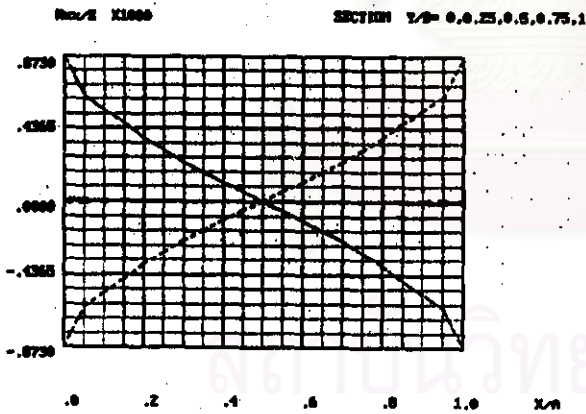
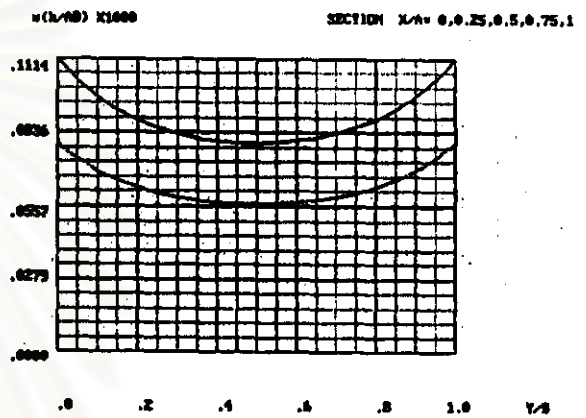
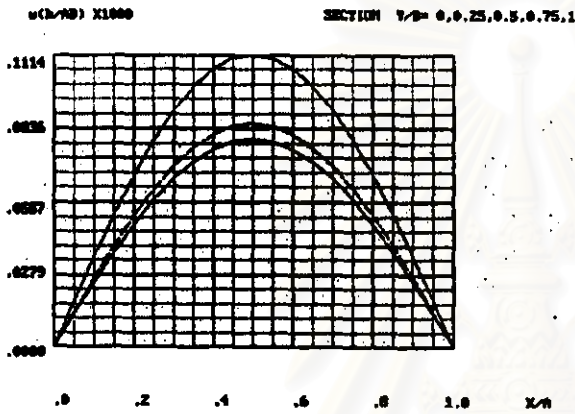
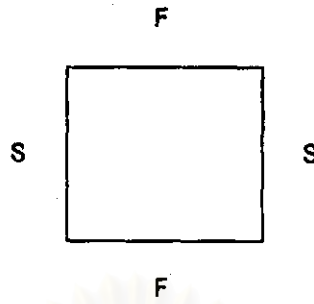
ผลของกรณีที่ 3 :

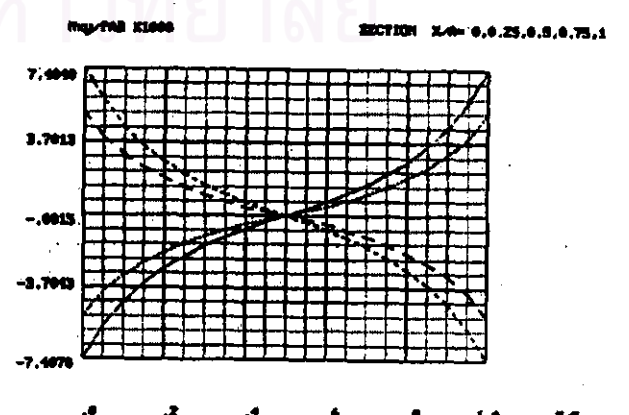
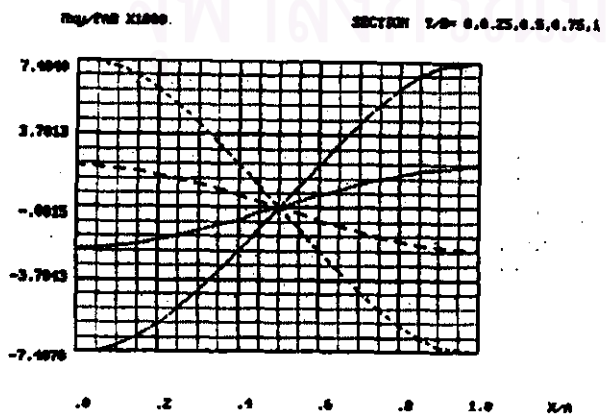
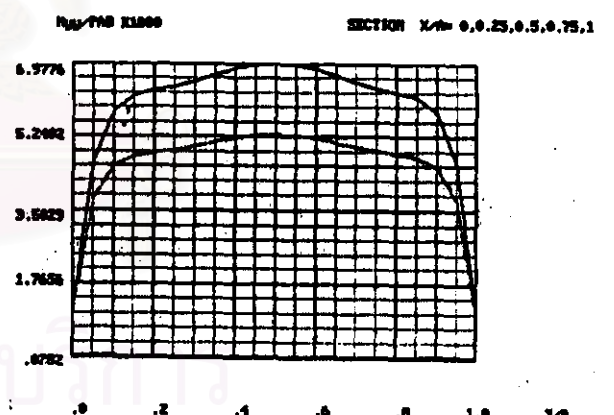
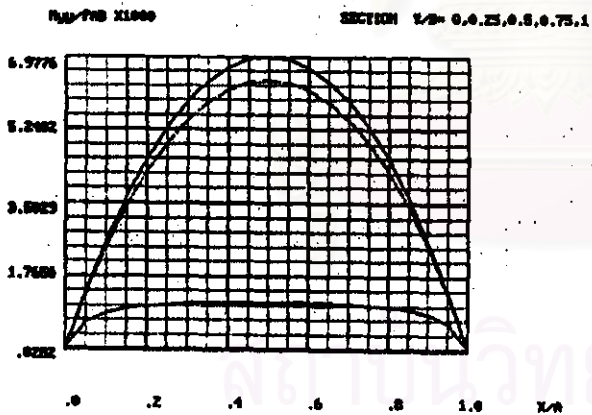
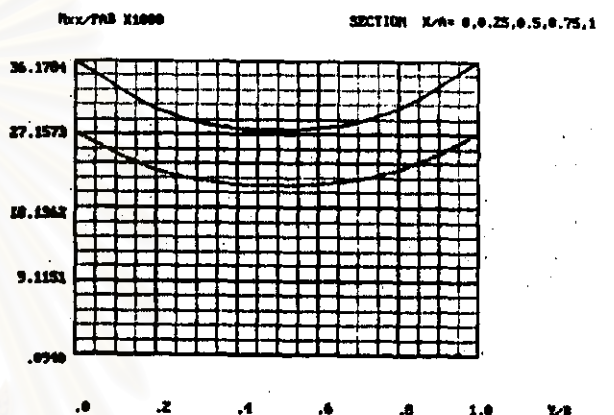
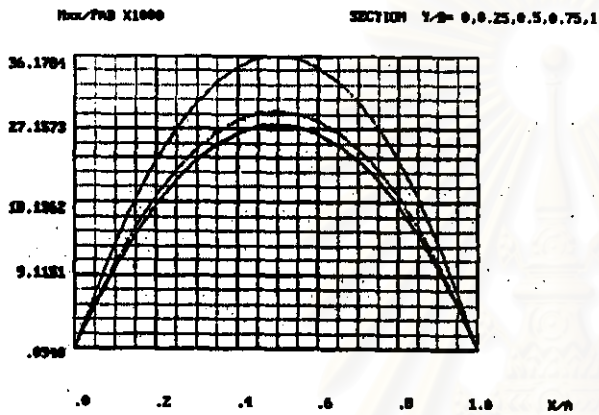
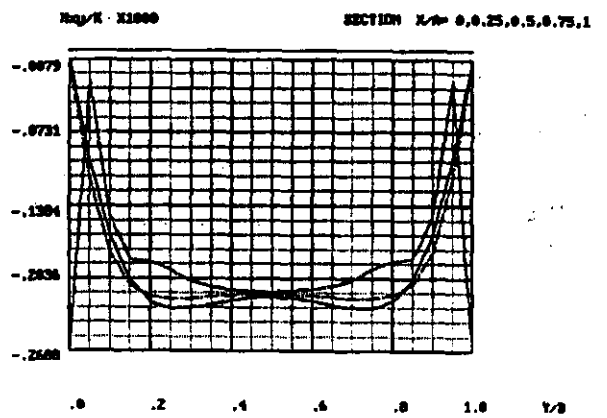
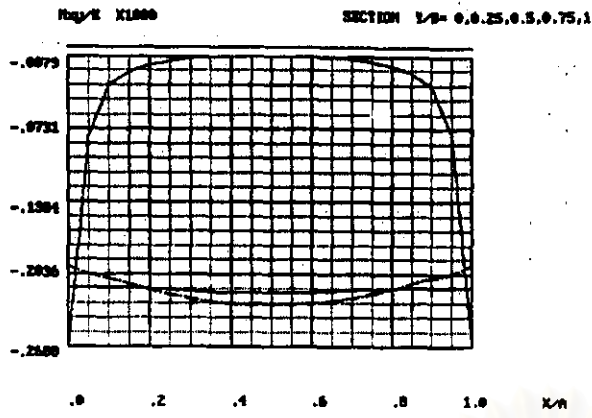
$$\frac{A}{B} = 0.5$$

$$\frac{f}{h} = 6.0$$

$$\frac{P_3 AB}{Eh^2} = 0.005$$

$$\nu = 0.3$$





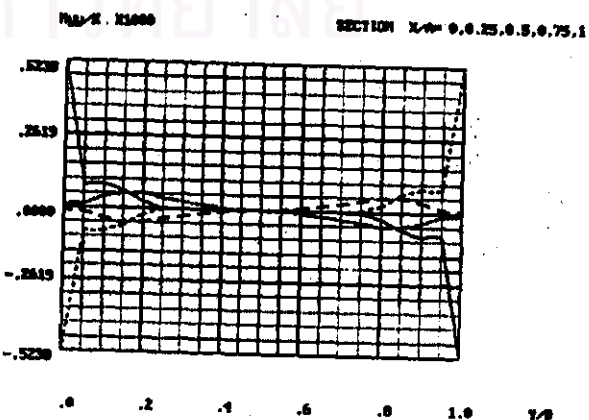
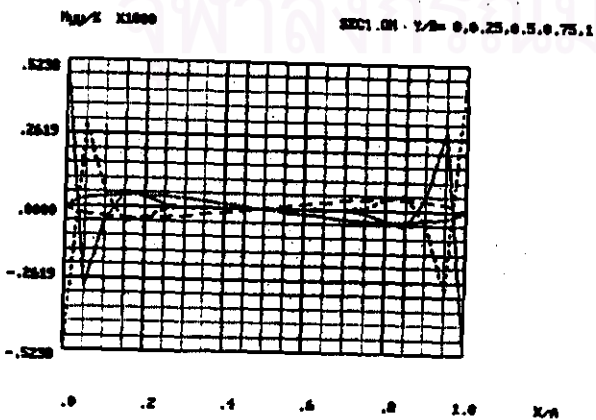
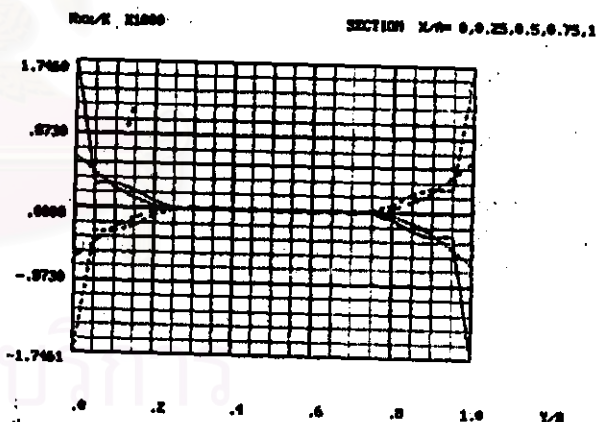
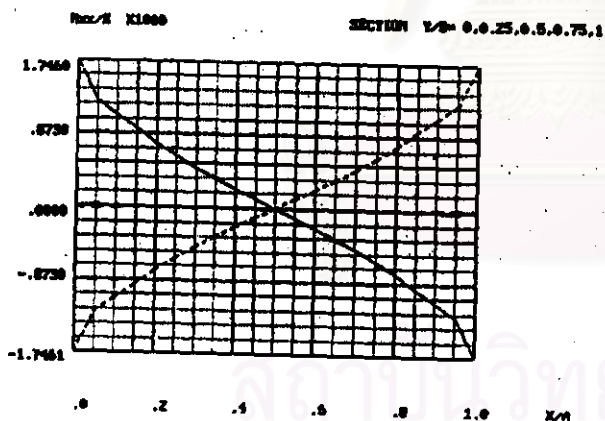
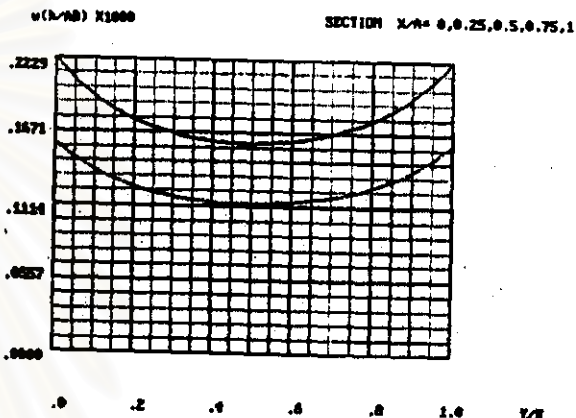
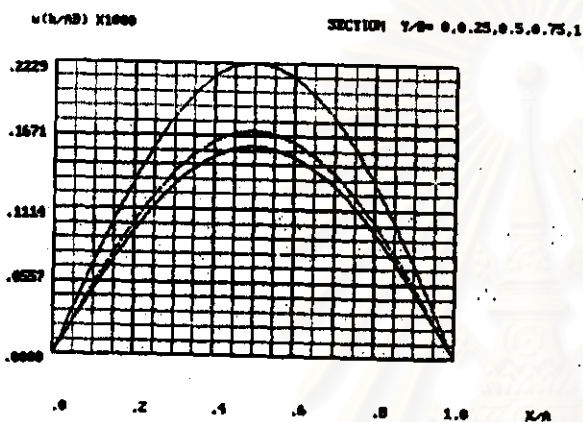
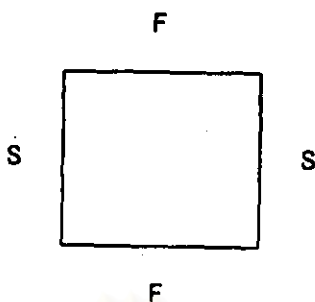
ผลของกรณีที่ 3 :

$$\frac{A}{B} = 0.5$$

$$\frac{f}{h} = 6.0$$

$$\frac{P_3 AB}{Eh^2} = 0.01$$

$$\nu = 0.3$$





ต้นฉบับไม่มีหน้า
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สถาบันวิทยบริการ
จุฬาลงกรณ์มหาวิทยาลัย

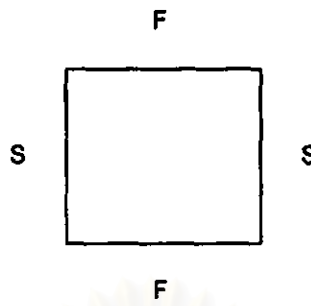
ผลของกรณีที่ 3 :

$$\frac{A}{B} = 1.0$$

$$\frac{f}{h} = 2.0$$

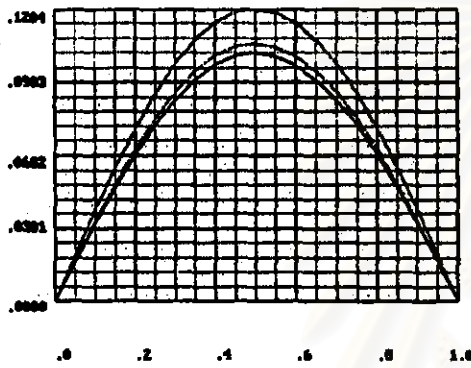
$$\frac{P_1 AB}{Eh^2} = 0.001$$

$$\nu = 0.3$$



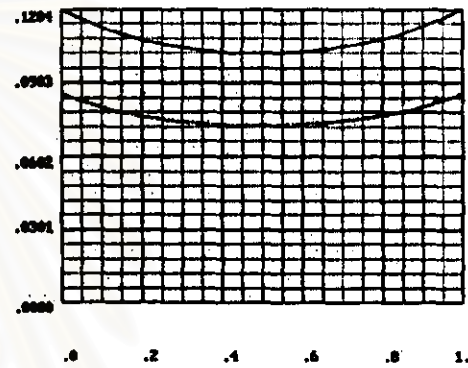
$w(h/AB) \times 1000$

SECTION $Y/B = 0, 0.25, 0.5, 0.75, 1$



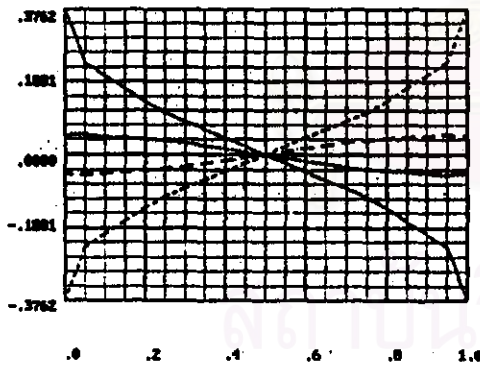
$w(h/AB) \times 1000$

SECTION $X/A = 0, 0.25, 0.5, 0.75, 1$



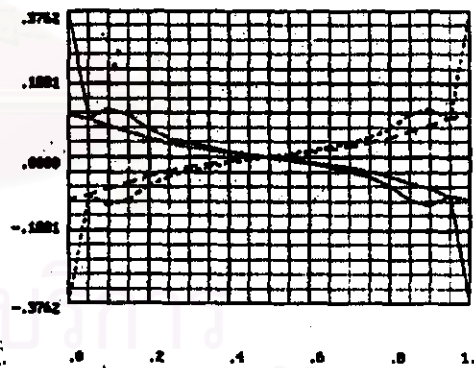
$M_{xx}/K \times 1000$

SECTION $Y/B = 0, 0.25, 0.5, 0.75, 1$



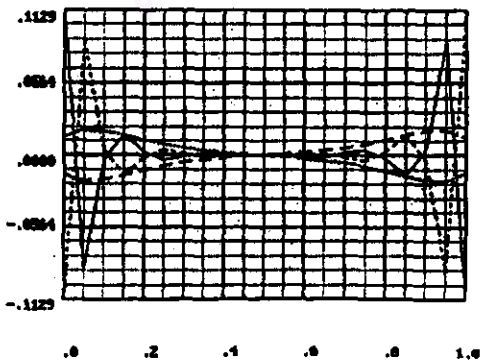
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SECTION $X/A = 0, 0.25, 0.5, 0.75, 1$



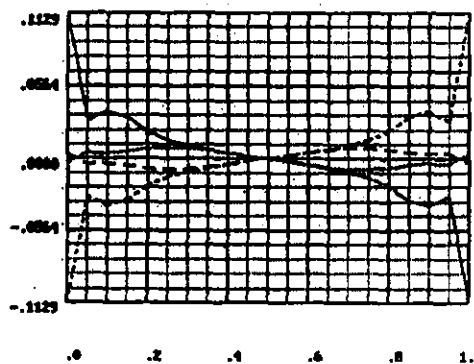
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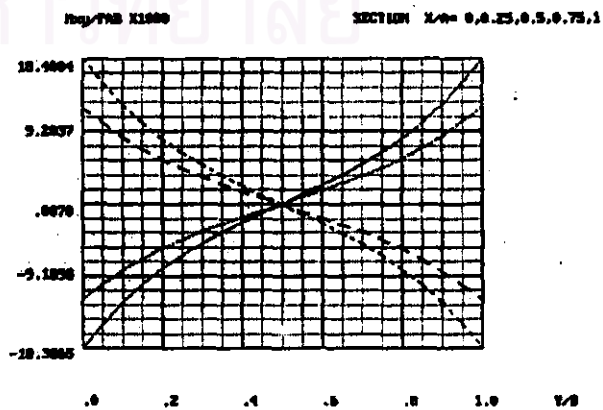
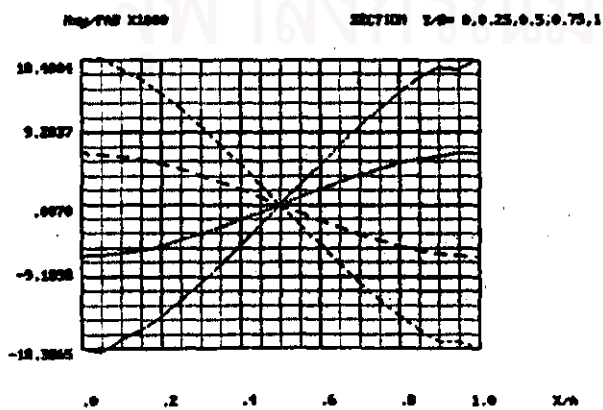
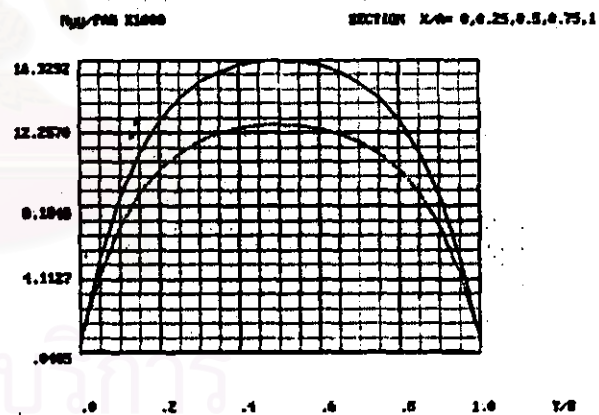
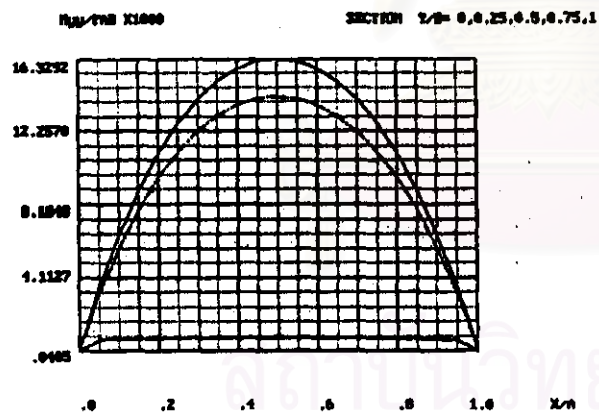
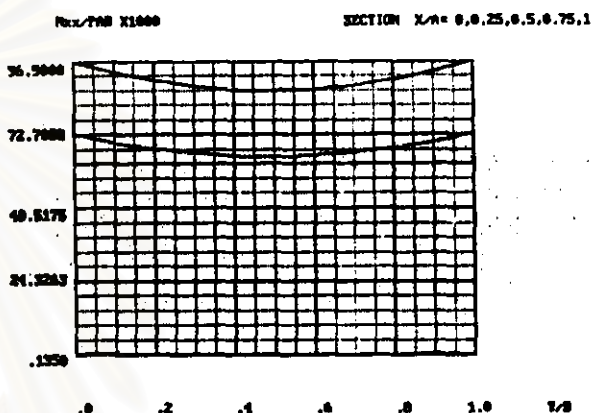
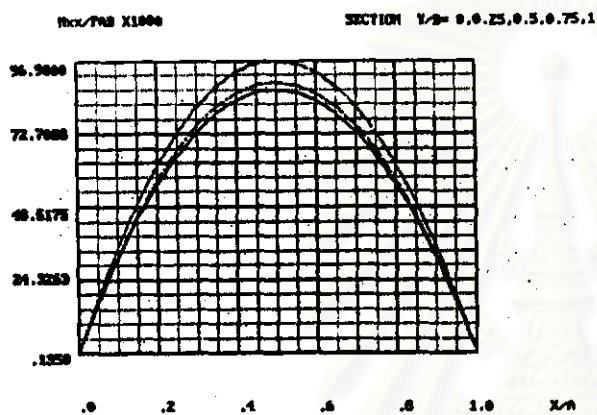
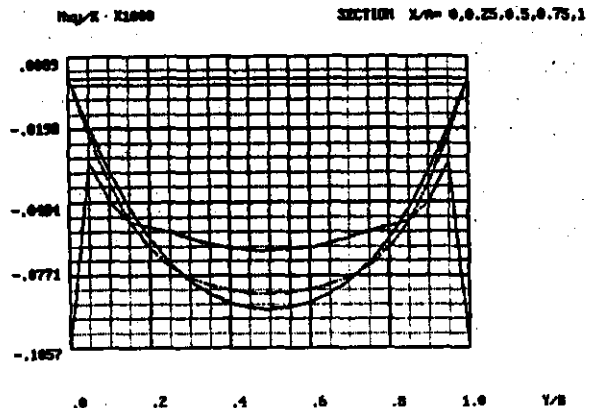
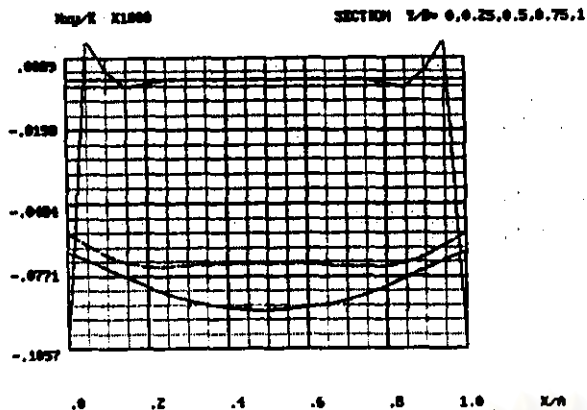
SECTION $Y/B = 0, 0.25, 0.5, 0.75, 1$



$M_{yy}/K \times 1000$

SECTION $X/A = 0, 0.25, 0.5, 0.75, 1$



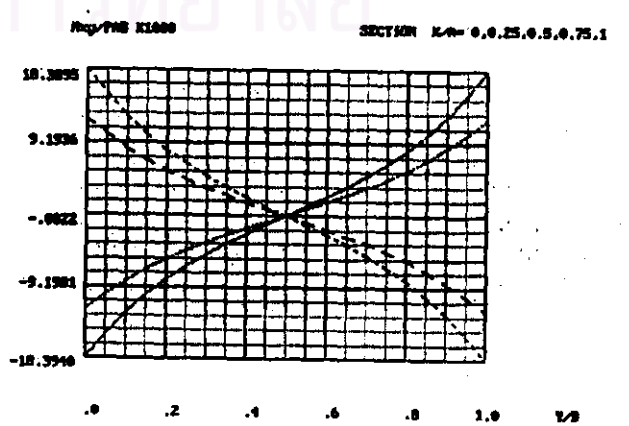
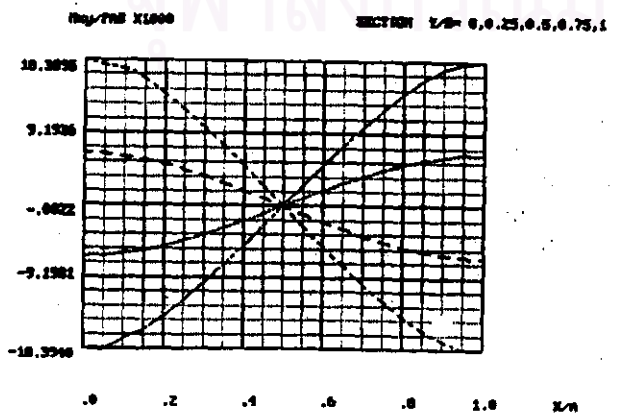
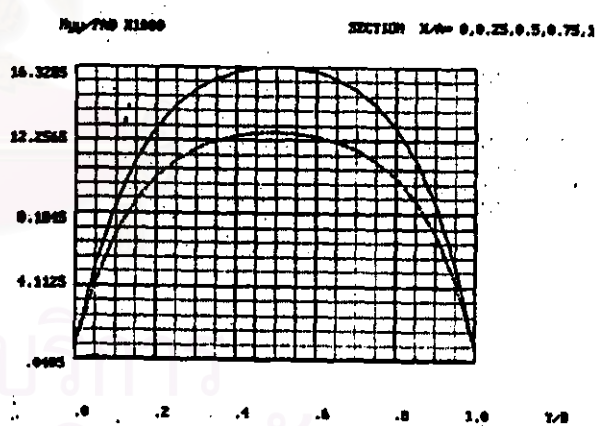
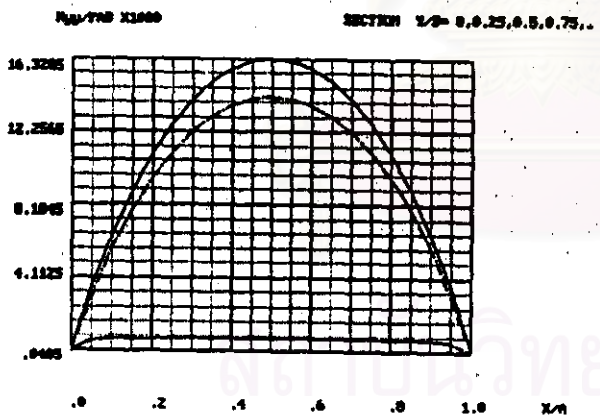
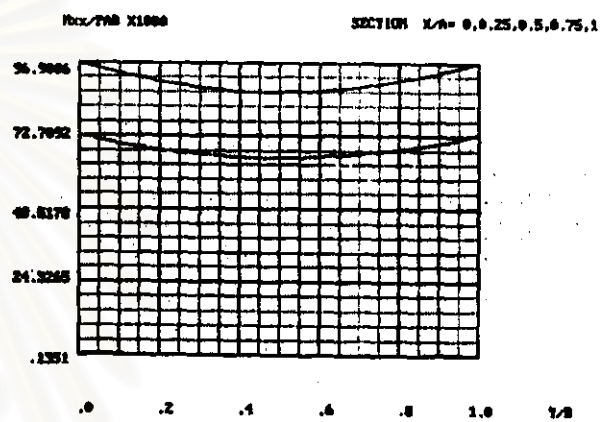
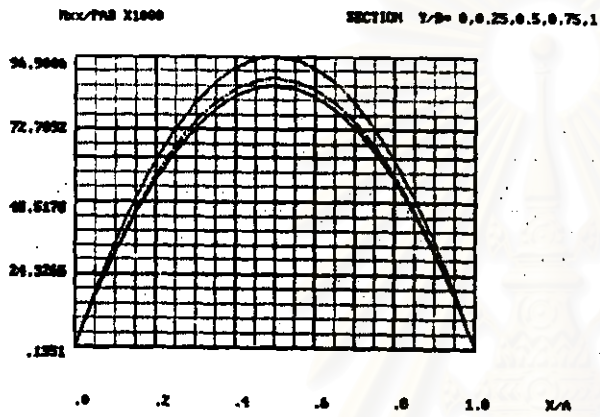
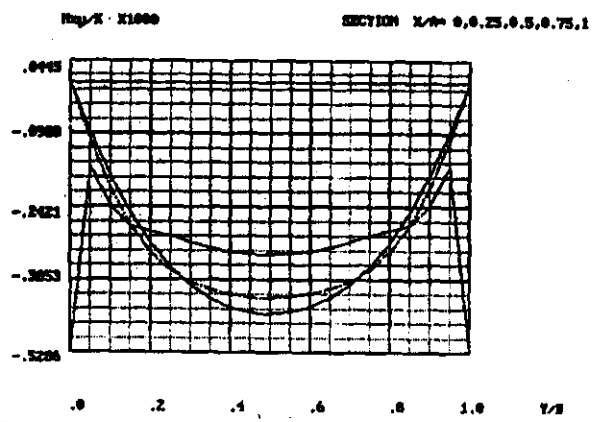
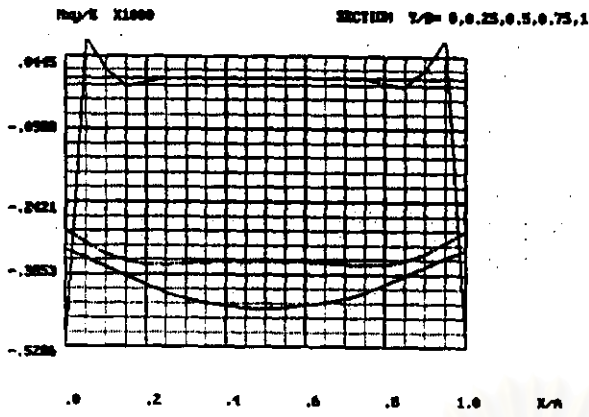




ต้นฉบับไม่มีหน้า

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สถาบันวิทยบริการ
จุฬาลงกรณ์มหาวิทยาลัย



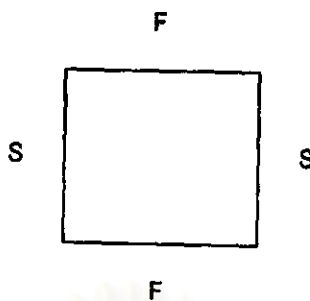
ผลของกรณีที่ 3 :

$$\frac{A}{B} = 1.0$$

$$\frac{f}{h} = 2.0$$

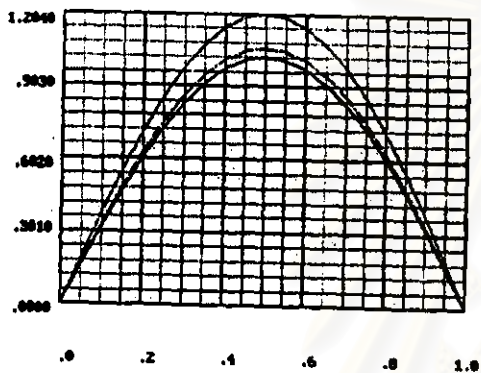
$$\frac{P_3 AB}{Eh^2} = 0.01$$

$$\nu = 0.3$$



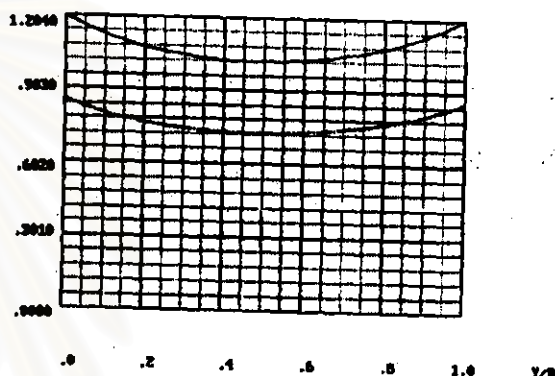
u(h/AB) X1000

SECTION X/h= 0.0,0.25,0.5,0.75,1



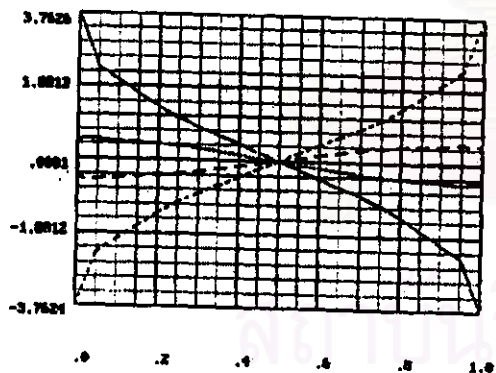
u(h/AB) X1000

SECTION X/h= 0.0,0.25,0.5,0.75,1



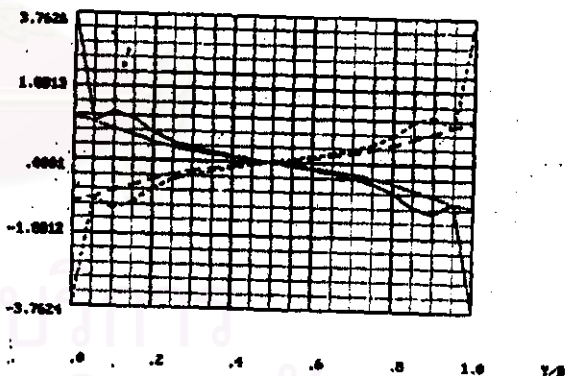
W(x)/K X1000

SECTION X/h= 0.0,0.25,0.5,0.75,1



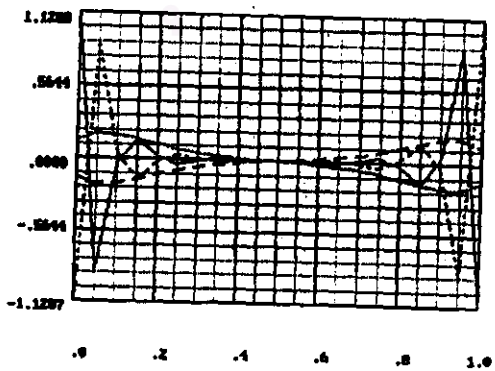
W(x)/K X1000

SECTION X/h= 0.0,0.25,0.5,0.75,1



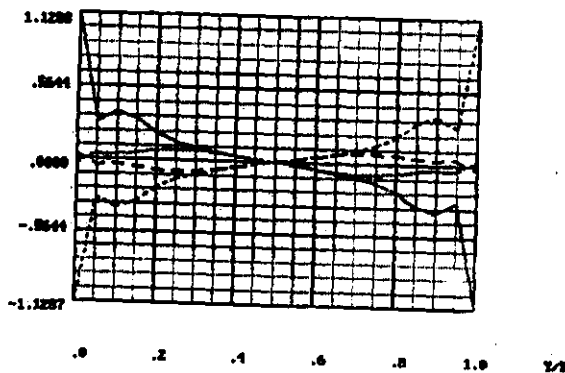
Phi(x)/K X1000

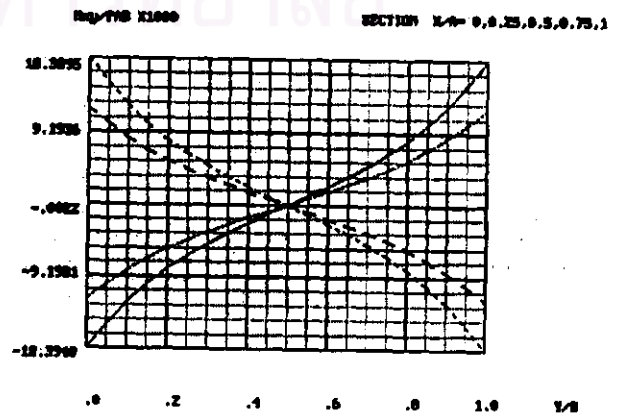
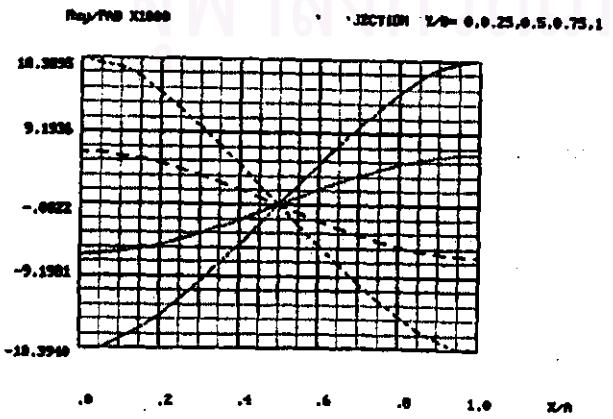
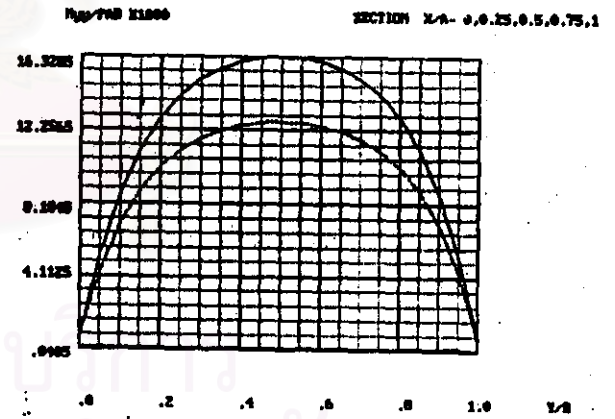
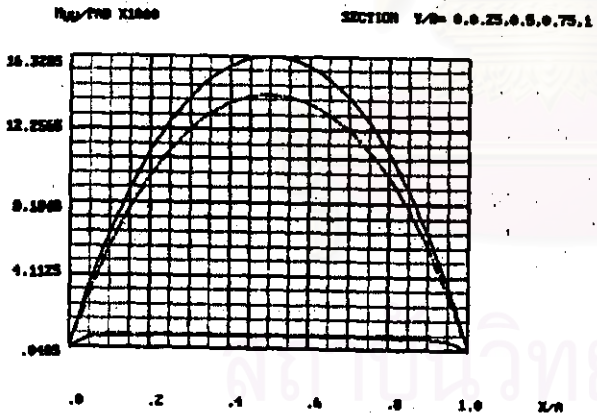
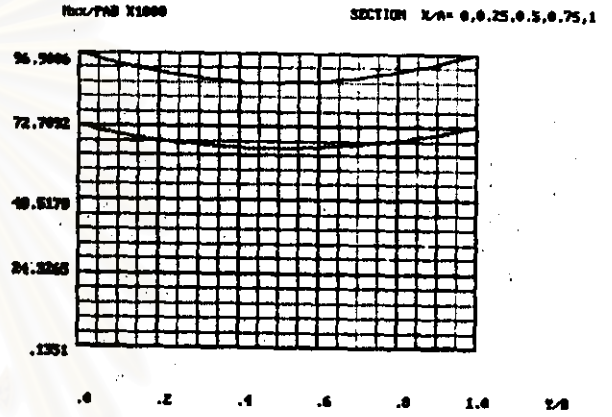
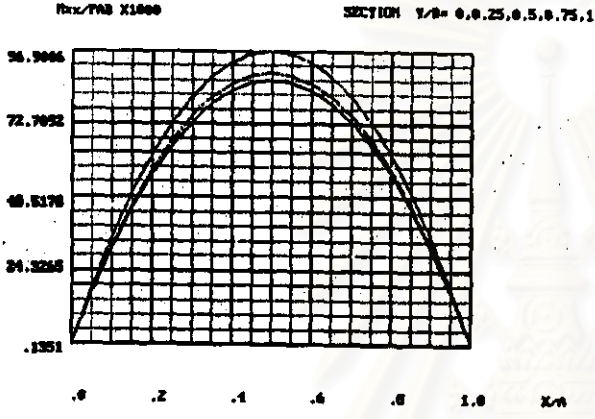
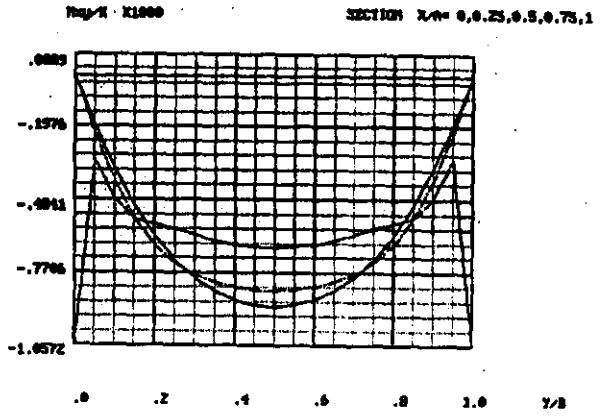
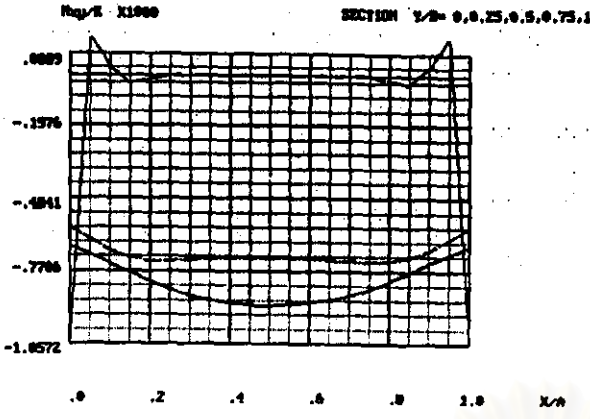
SECTION X/h= 0.0,0.25,0.5,0.75,1



Phi(x)/K X1000

SECTION X/h= 0.0,0.25,0.5,0.75,1





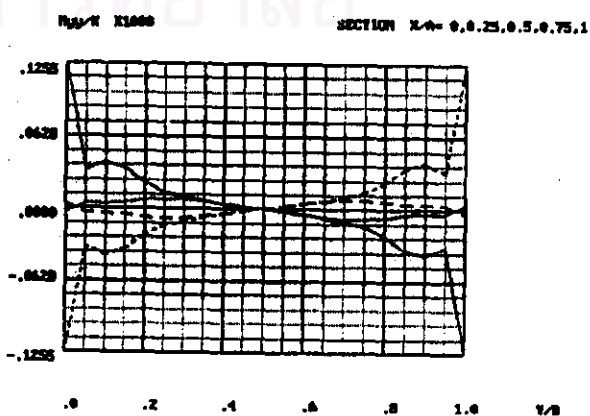
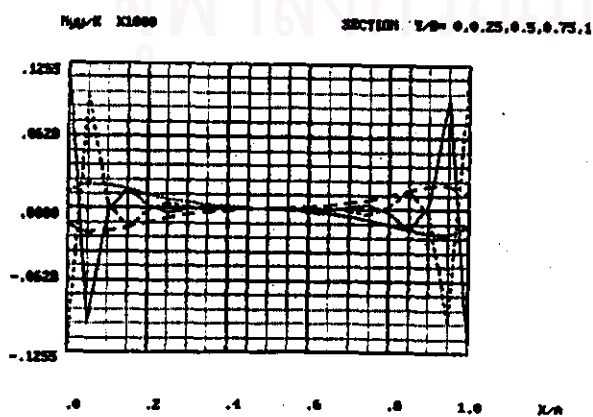
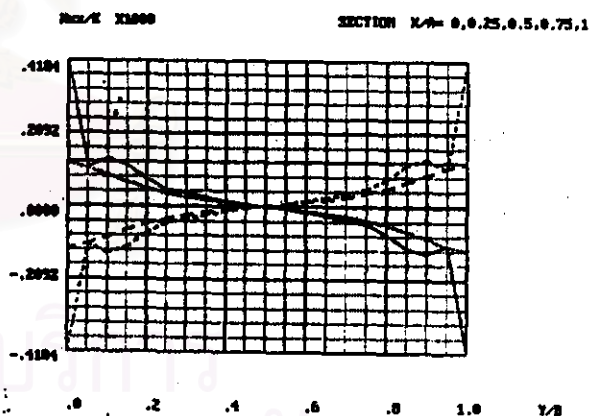
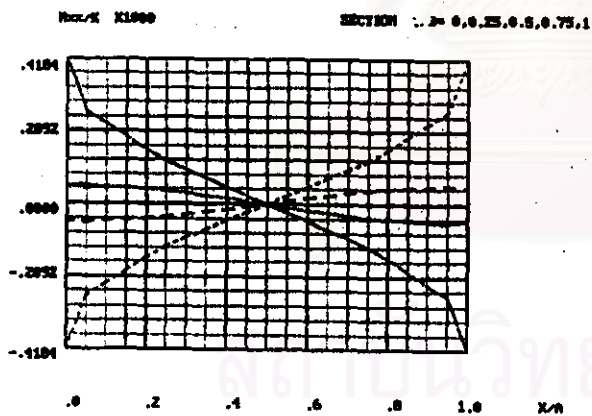
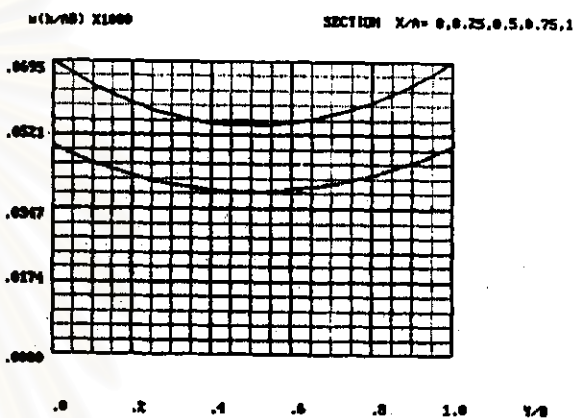
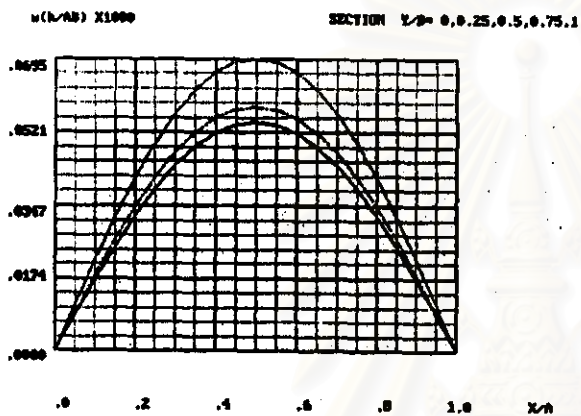
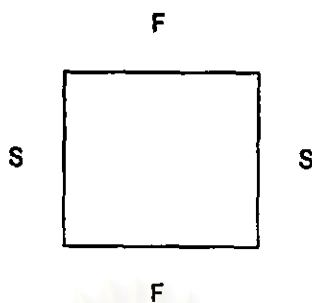
ผลของกรณีที่ 3 :

$$\frac{A}{B} = 1.0$$

$$\frac{f}{h} = 4.0$$

$$\frac{P_3 AB}{Eh^2} = 0.001$$

$$\nu = 0.3$$





ต้นฉบับไม่มีหน้านี้

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สถาบันวิทยบริการ
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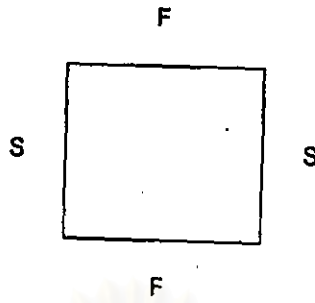
ผลของกรณีที่ 3 :

$$\frac{A}{B} = 1.0$$

$$\frac{f}{h} = 4.0$$

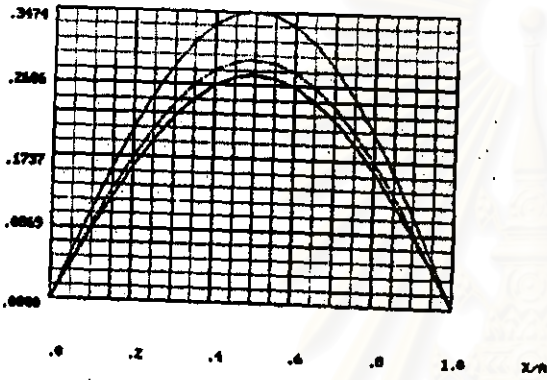
$$\frac{P_3 AB}{Eh^2} = 0.005$$

$$\nu = 0.3$$



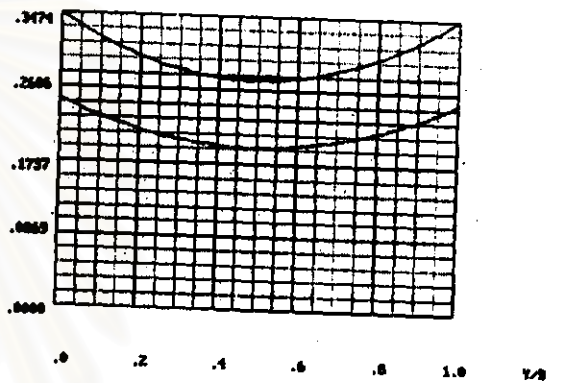
$u(L/AB) \times 1000$

SECTION $Y/B = 0, 0.25, 0.5, 0.75, 1$



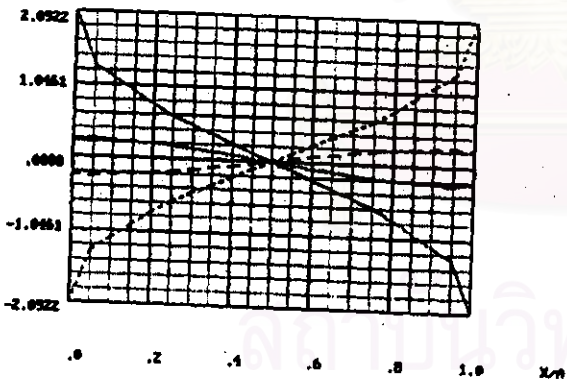
$u(L/AB) \times 1000$

SECTION $X/A = 0, 0.25, 0.5, 0.75, 1$



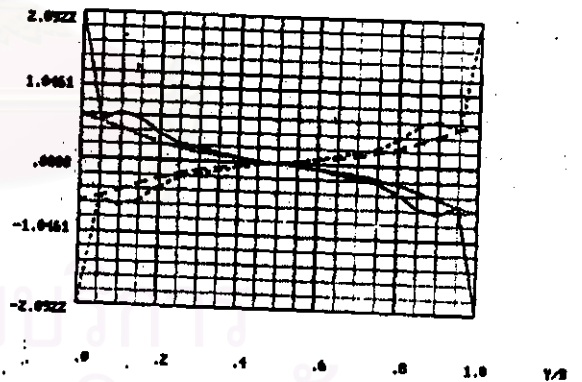
$\sigma_{xx}/E \times 1000$

SECTION $Y/B = 0, 0.25, 0.5, 0.75, 1$



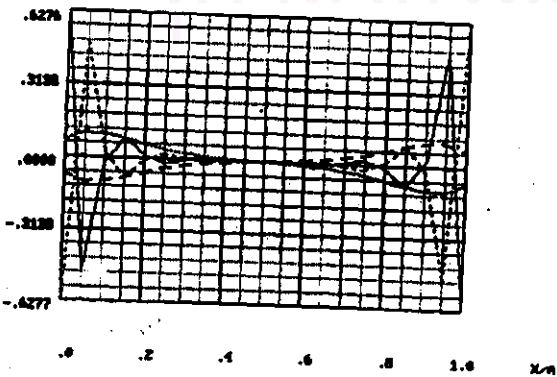
$\sigma_{xx}/E \times 1000$

SECTION $X/A = 0, 0.25, 0.5, 0.75, 1$



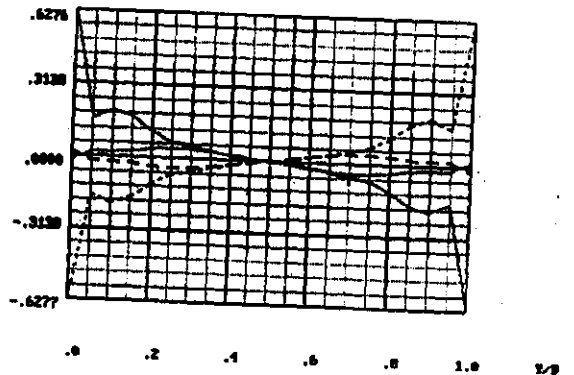
$\sigma_{yy}/E \times 1000$

SECTION $Y/B = 0, 0.25, 0.5, 0.75, 1$



$\sigma_{yy}/E \times 1000$

SECTION $X/A = 0, 0.25, 0.5, 0.75, 1$





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จุฬาลงกรณ์มหาวิทยาลัย

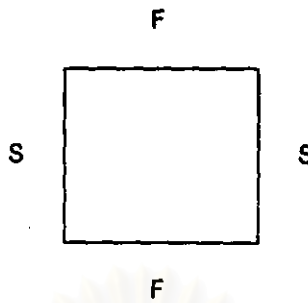
ผลของกรณีที่ 3 :

$$\frac{A}{B} = 1.0$$

$$\frac{f}{h} = 4.0$$

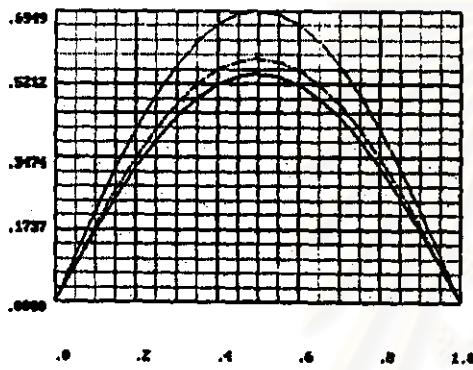
$$\frac{P_3 AB}{Eh^2} = 0.01$$

$$\nu = 0.3$$



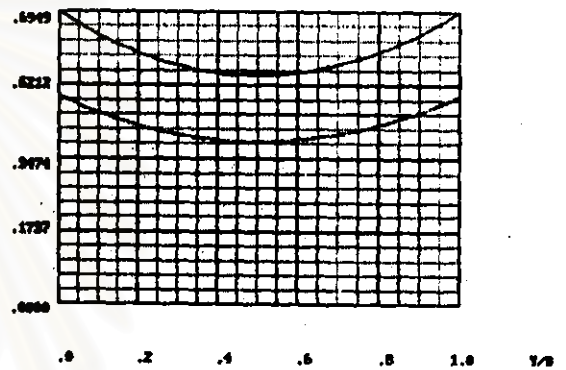
$w(x/h)$ X1000

SECTION $Y/B = 0, 0.25, 0.5, 0.75, 1$



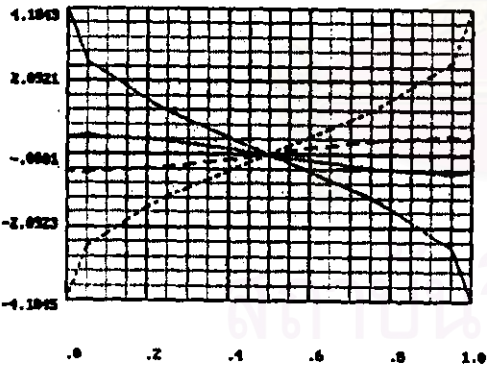
$w(x/h)$ X1000

SECTION $X/A = 0, 0.25, 0.5, 0.75, 1$



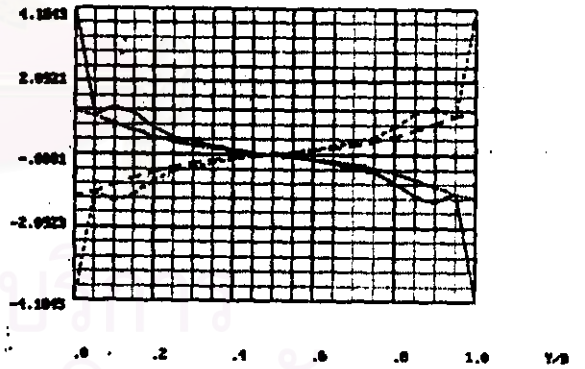
M_{xx}/K X1000

SECTION $Y/B = 0, 0.25, 0.5, 0.75, 1$



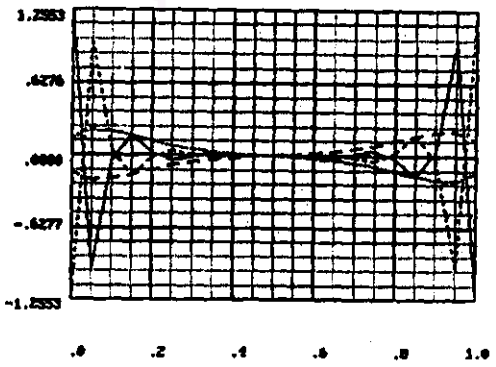
M_{xx}/K X1000

SECTION $X/A = 0, 0.25, 0.5, 0.75, 1$



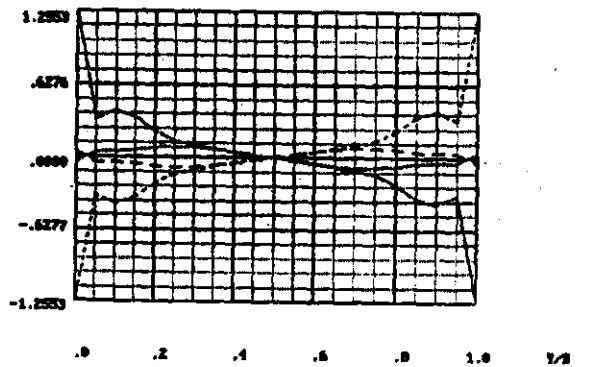
M_{yy}/K X1000

SECTION $Y/B = 0, 0.25, 0.5, 0.75, 1$



M_{yy}/K X1000

SECTION $X/A = 0, 0.25, 0.5, 0.75, 1$





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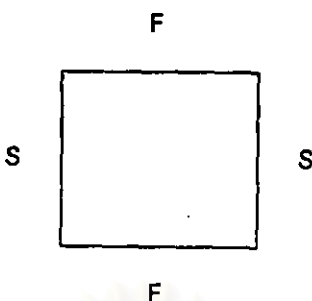
ผลของกรณีที่ 3 :

$$\frac{A}{B} = 1.0$$

$$\frac{f}{h} = 6.0$$

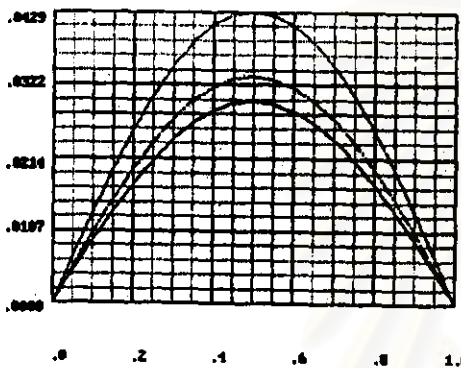
$$\frac{P_3AB}{Eh^2} = 0.001$$

$$\nu = 0.3$$



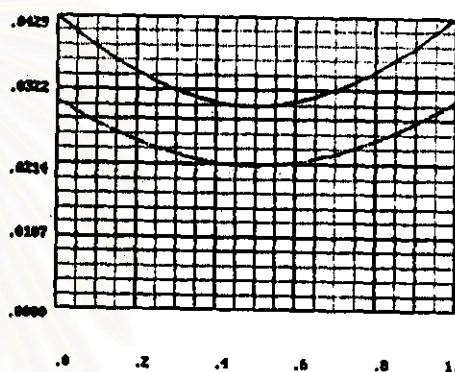
$u(h/8) \times 1000$

SECTION $Y/h = 0, 0.25, 0.5, 0.75, 1$



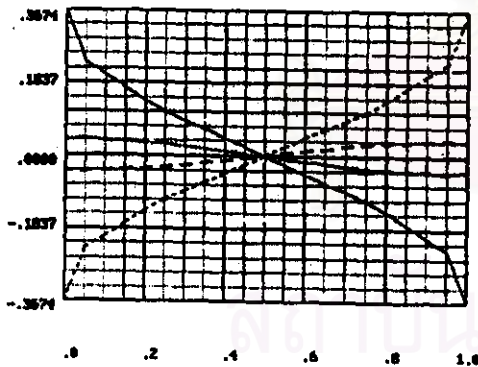
$u(h/8) \times 1000$

SECTION $X/h = 0, 0.25, 0.5, 0.75, 1$



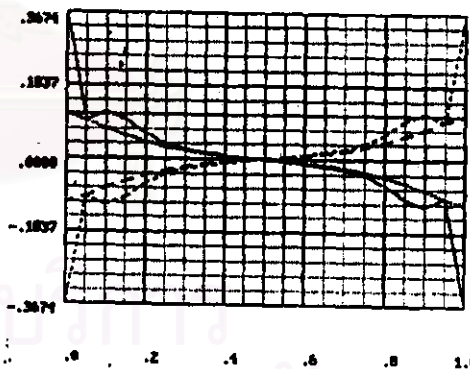
$W_x/E \times 1000$

SECTION $Y/h = 0, 0.25, 0.5, 0.75, 1$



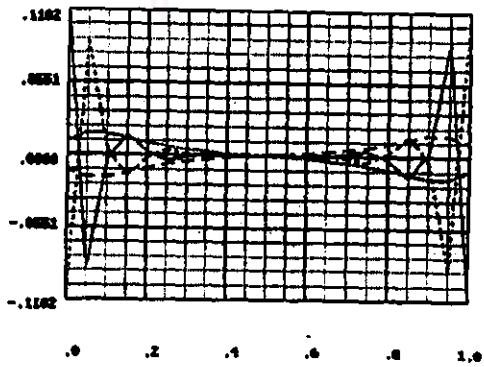
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SECTION $X/h = 0, 0.25, 0.5, 0.75, 1$



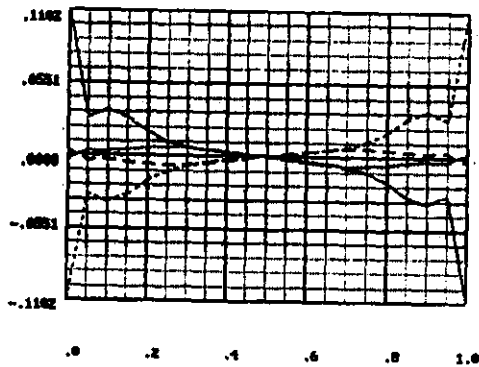
$W_y/E \times 1000$

SECTION $Y/h = 0, 0.25, 0.5, 0.75, 1$



$W_y/E \times 1000$

SECTION $X/h = 0, 0.25, 0.5, 0.75, 1$





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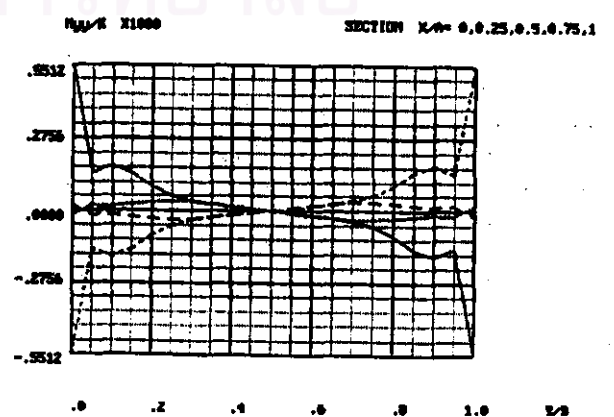
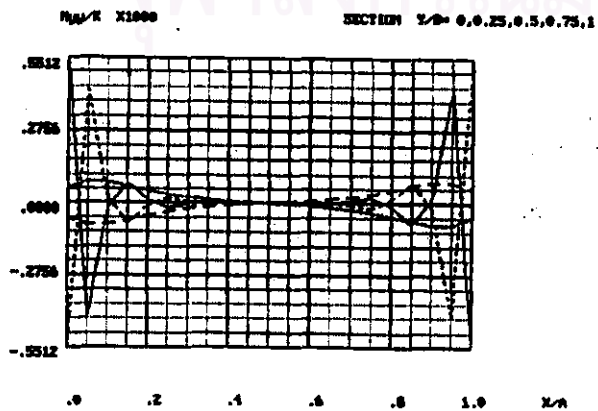
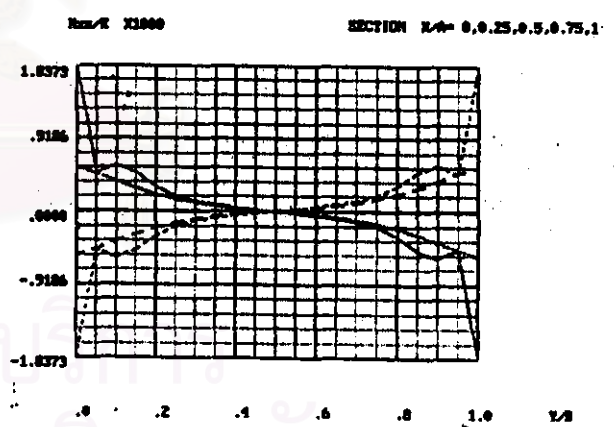
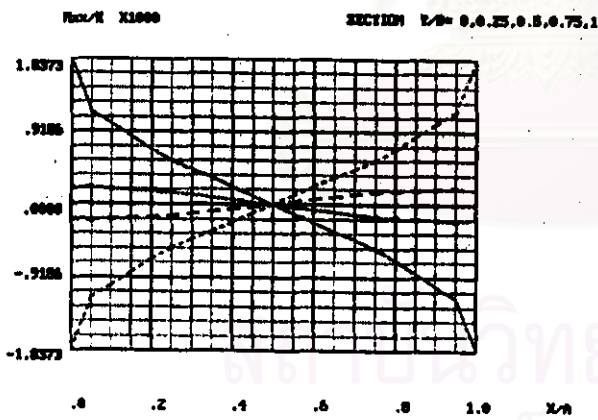
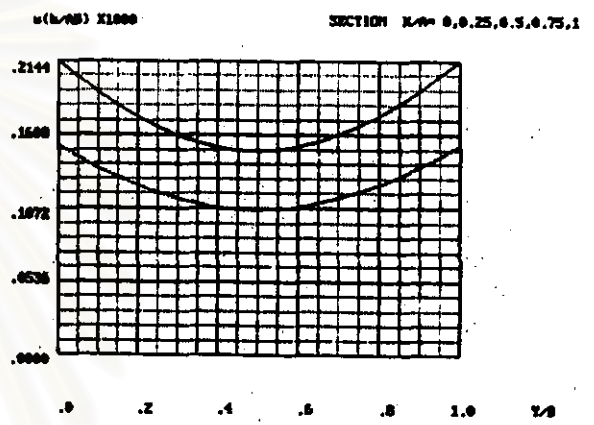
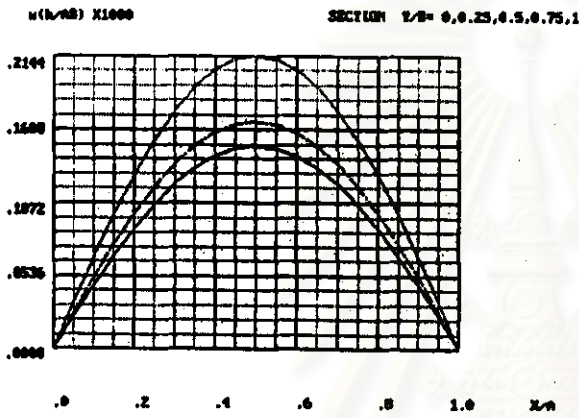
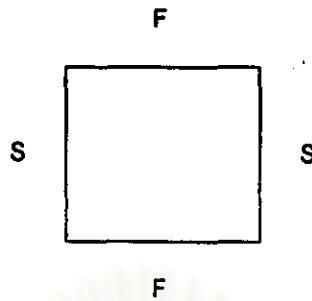
ผลของกรณีที่ 3 :

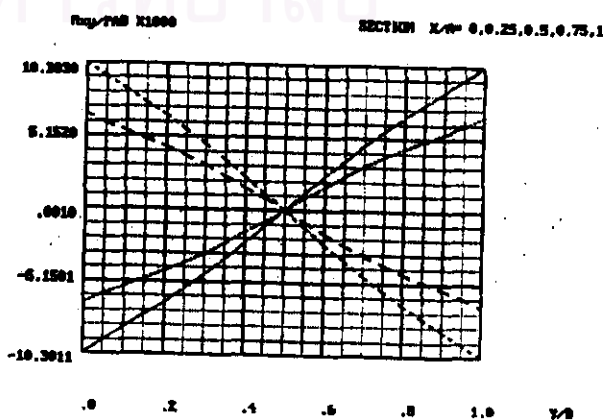
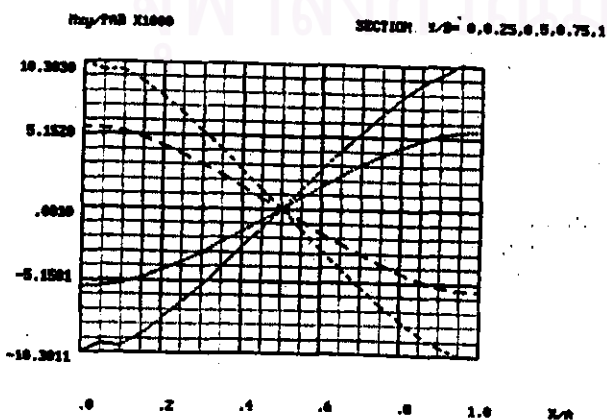
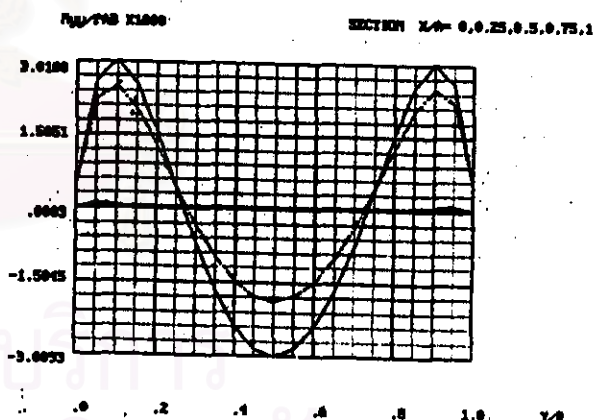
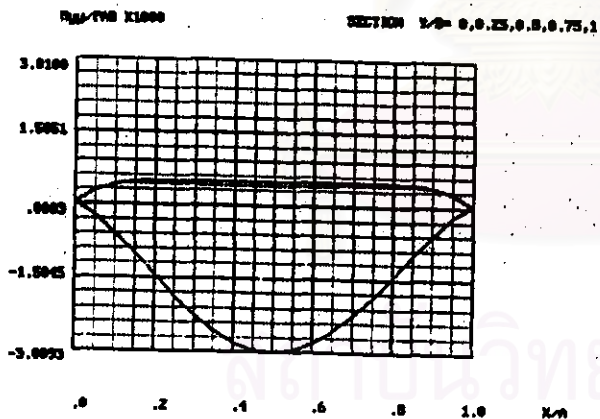
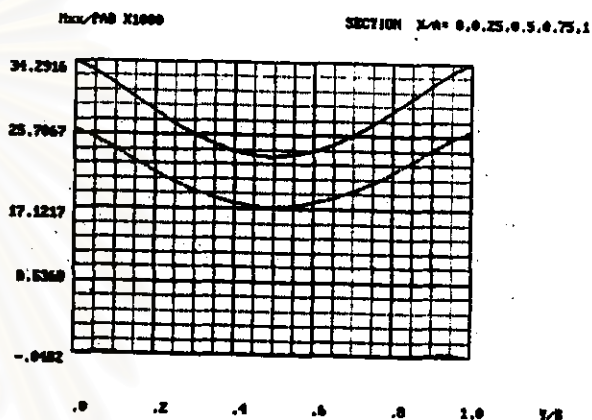
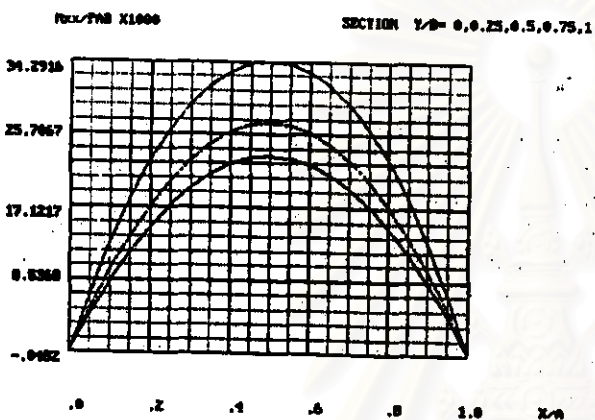
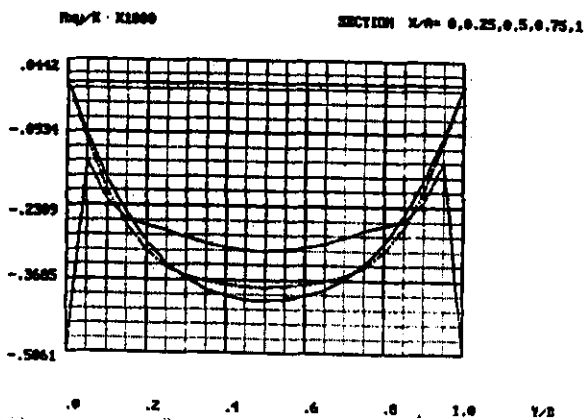
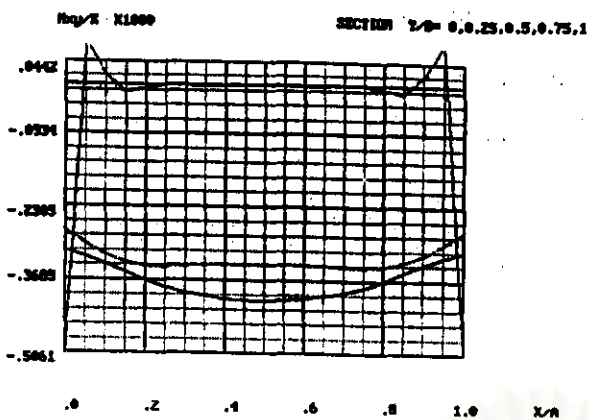
$$\frac{A}{B} = 1.0$$

$$\frac{f}{h} = 6.0$$

$$\frac{P_3 AB}{Eh^2} = 0.005$$

$$\nu = 0.3$$





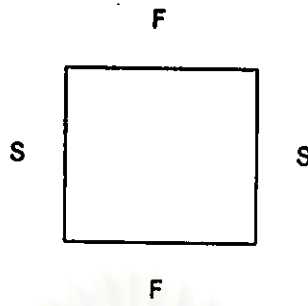
ผลของกรณีที่ 3 :

$$\frac{A}{B} = 1.0$$

$$\frac{f}{h} = 6.0$$

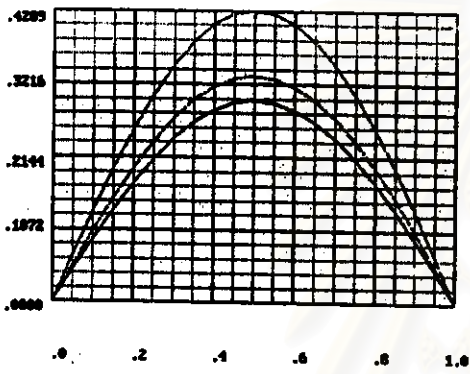
$$\frac{P_3 AB}{Eh^2} = 0.01$$

$$\nu = 0.3$$



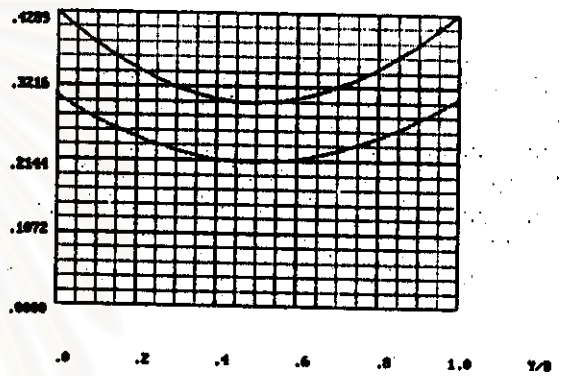
$u(h/\nu B) \times 1000$

SECTION $Y/B = 0, 0.25, 0.5, 0.75, 1$



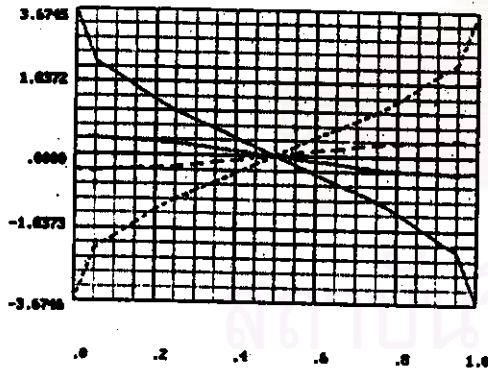
$u(h/\nu B) \times 1000$

SECTION $X/h = 0, 0.25, 0.5, 0.75, 1$



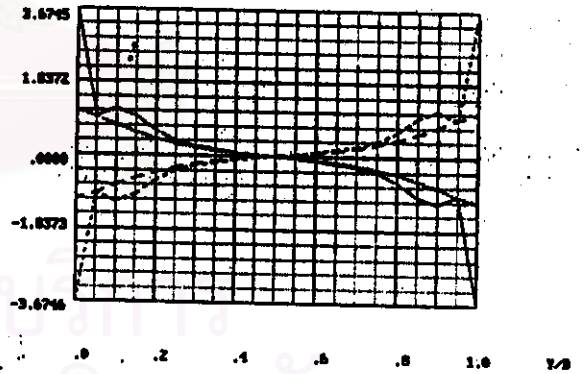
$\nu u_x/K \times 1000$

SECTION $Y/B = 0, 0.25, 0.5, 0.75, 1$



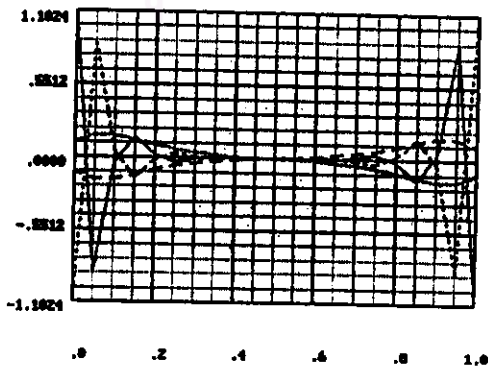
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SECTION $X/h = 0, 0.25, 0.5, 0.75, 1$



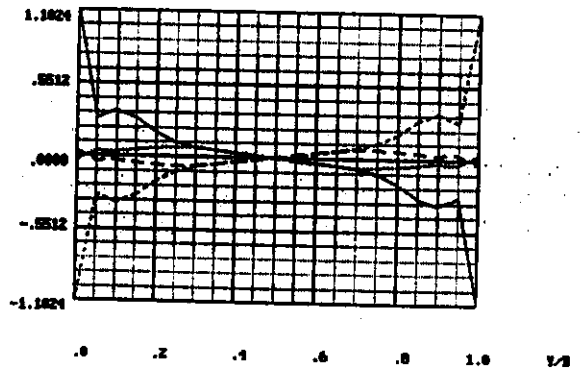
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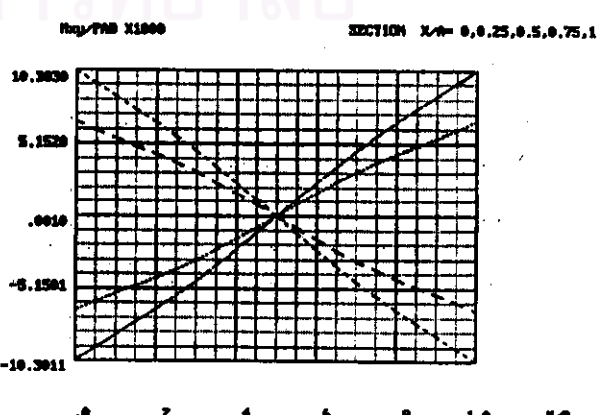
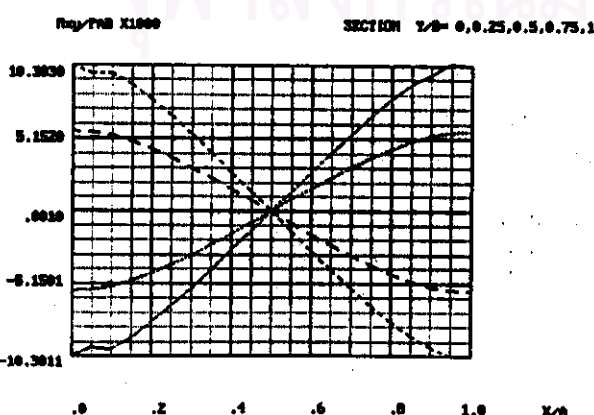
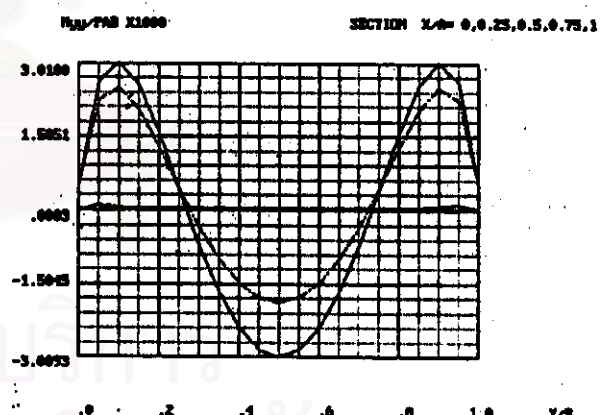
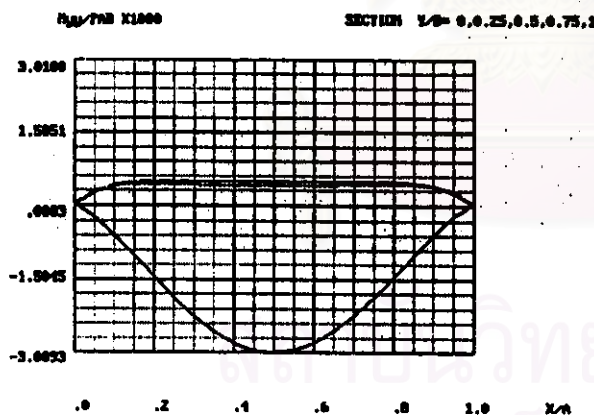
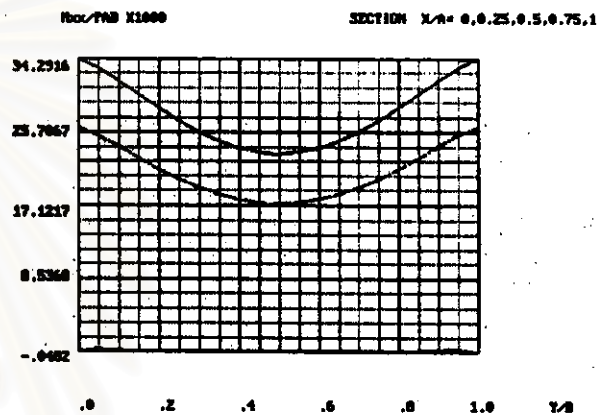
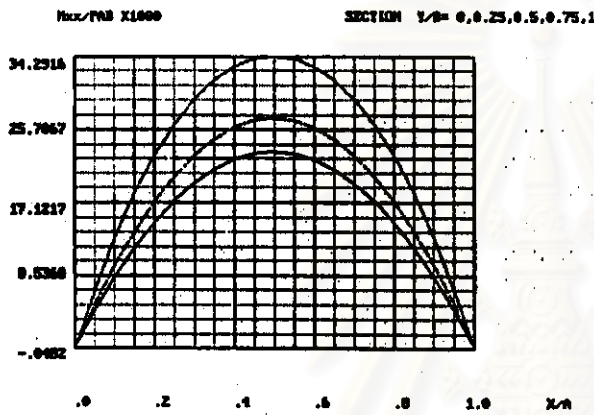
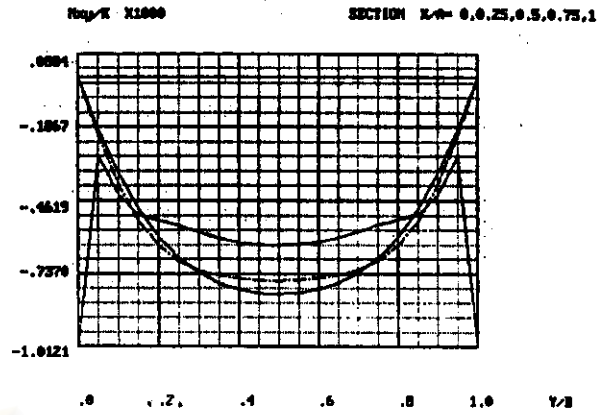
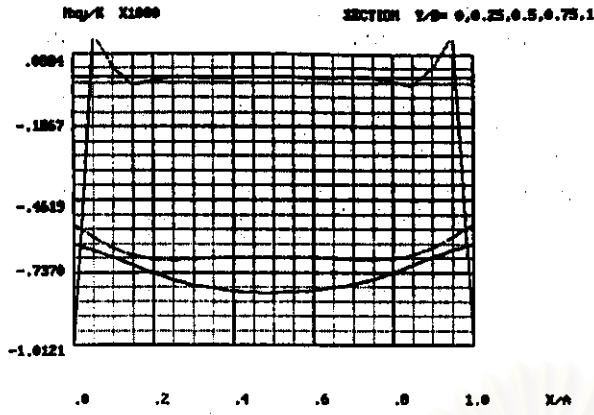
SECTION $Y/B = 0, 0.25, 0.5, 0.75, 1$



$\nu u_y/K \times 1000$

SECTION $X/h = 0, 0.25, 0.5, 0.75, 1$





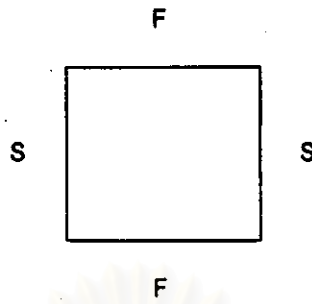
ผลของกรณีที่ 3 :

$$\frac{A}{B} = 2.0$$

$$\frac{f}{h} = 2.0$$

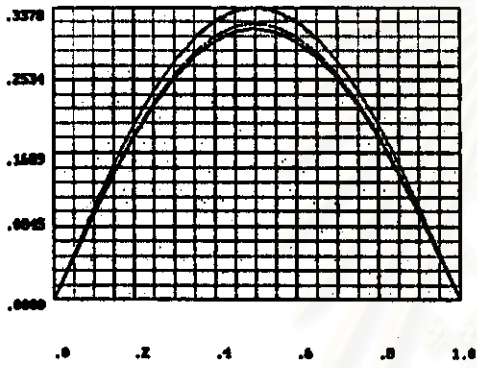
$$\frac{P_3 AB}{Eh^2} = 0.001$$

$$\nu = 0.3$$



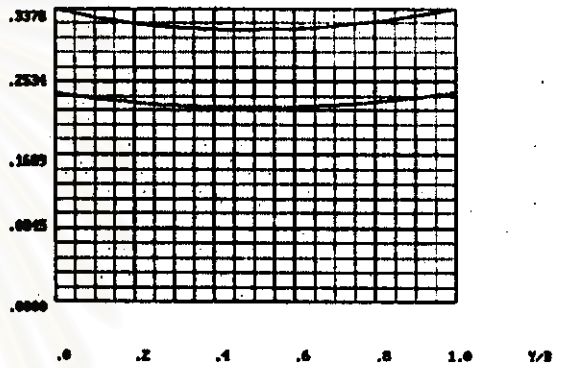
$u(h/8) \times 1000$

SECTION $Y/B = 0, 0.25, 0.5, 0.75, 1$



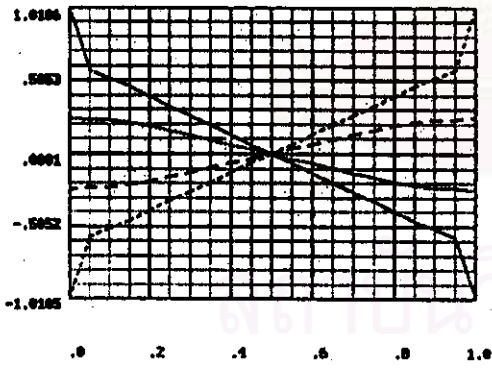
$u(h/8) \times 1000$

SECTION $X/B = 0, 0.25, 0.5, 0.75, 1$



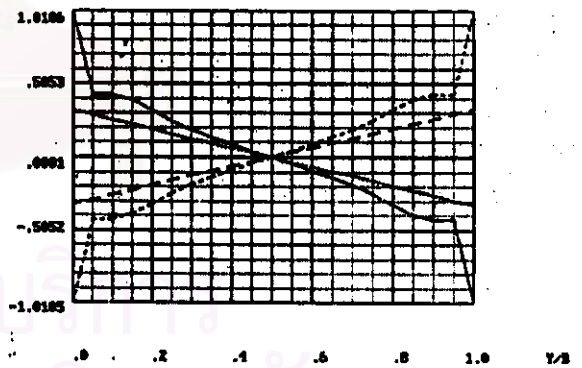
$\sigma_{xx}/E \times 1000$

SECTION $Y/B = 0, 0.25, 0.5, 0.75, 1$



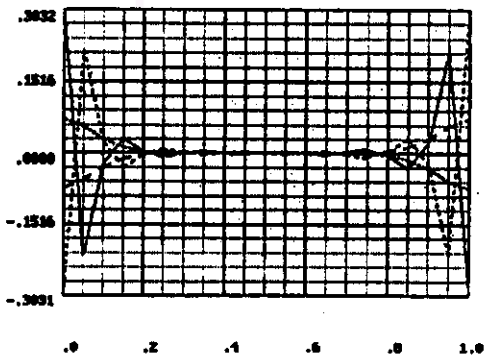
$\sigma_{xx}/E \times 1000$

SECTION $X/B = 0, 0.25, 0.5, 0.75, 1$



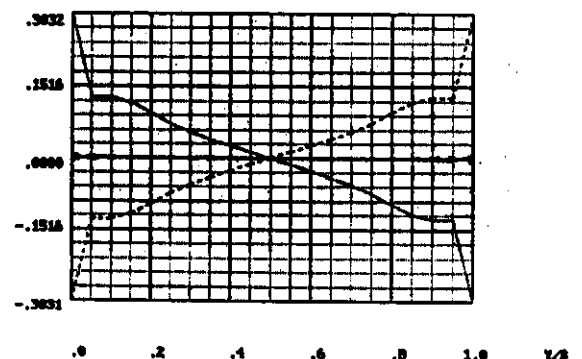
$\sigma_{yy}/E \times 1000$

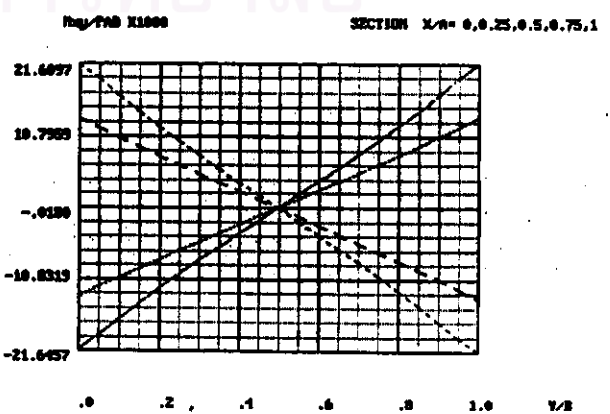
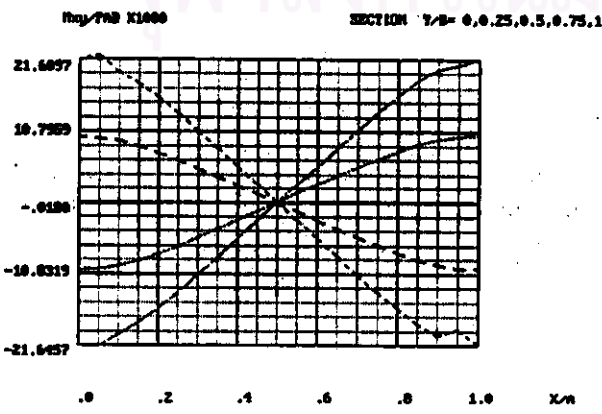
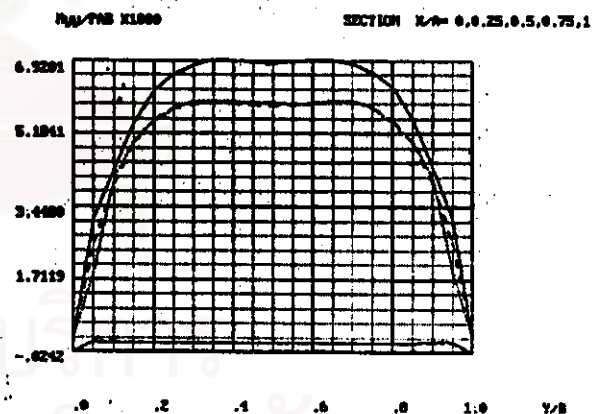
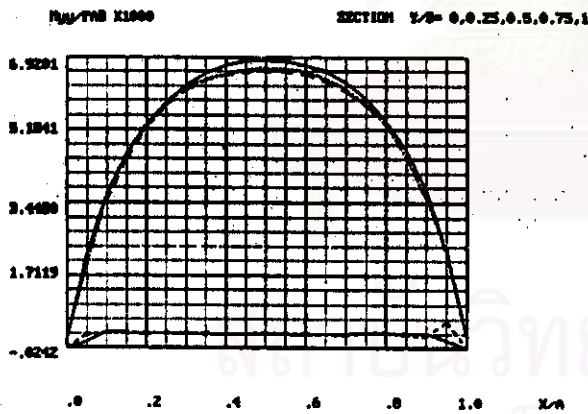
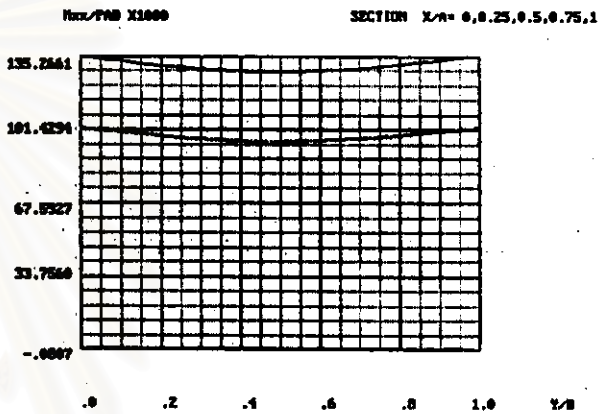
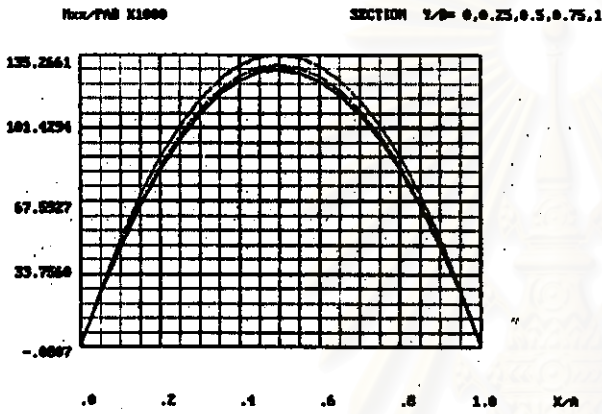
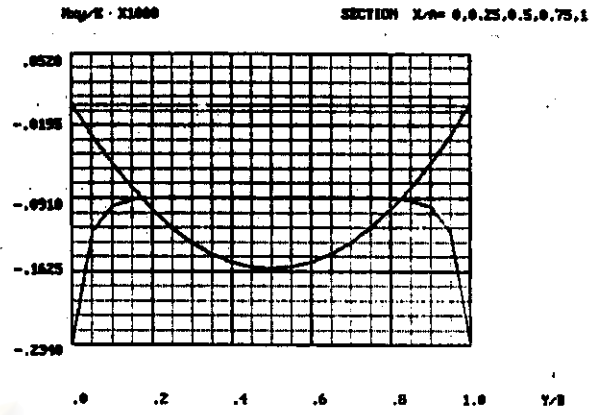
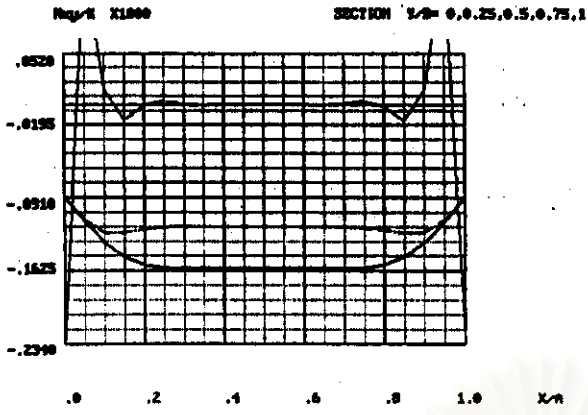
SECTION $Y/B = 0, 0.25, 0.5, 0.75, 1$



$\sigma_{yy}/E \times 1000$

SECTION $X/B = 0, 0.25, 0.5, 0.75, 1$





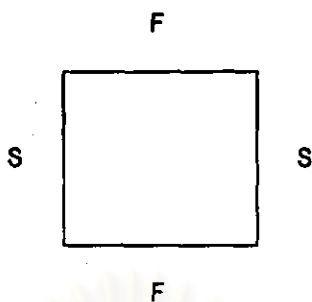
ผลของกรณีที่ 3 :

$$\frac{A}{B} = 2.0$$

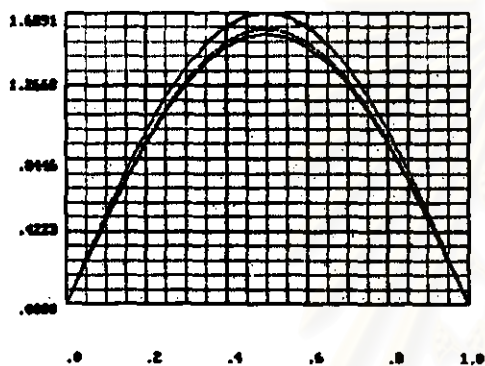
$$\frac{f}{h} = 2.0$$

$$\frac{P_3 AB}{Eh^2} = 0.005$$

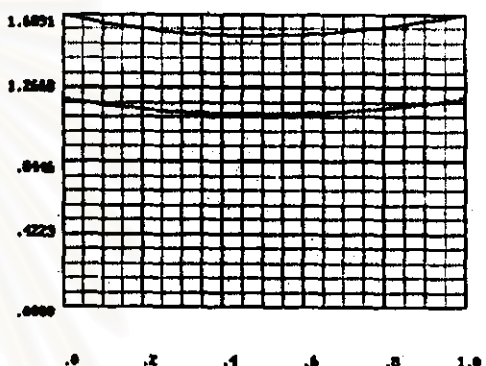
$$\nu = 0.3$$



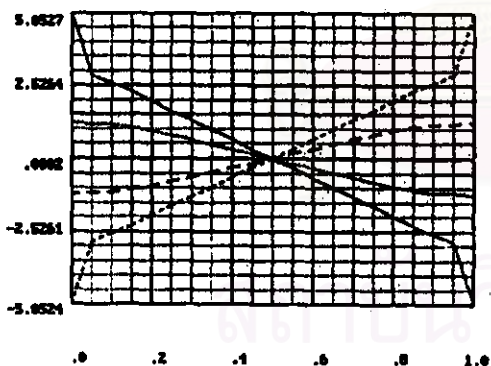
$u(h/AB) \times 1000$ SECTION $Y/B = 0.0, 0.25, 0.5, 0.75, 1$



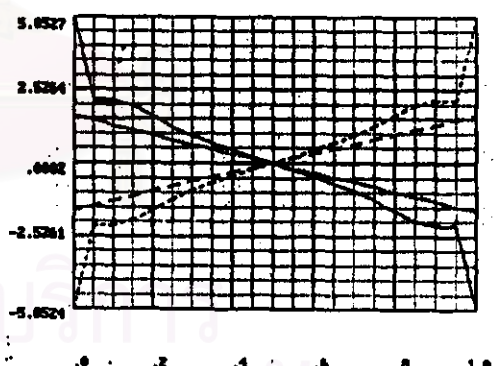
$u(h/AB) \times 1000$ SECTION $X/A = 0.0, 0.25, 0.5, 0.75, 1$



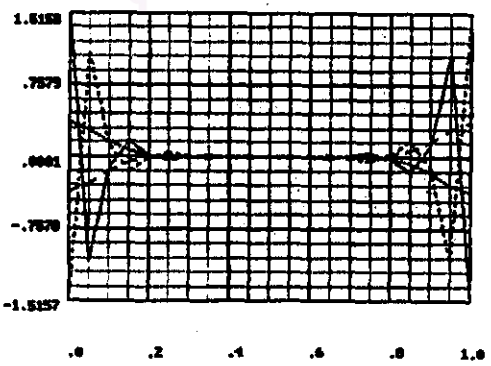
$\sigma_{xx}/E \times 1000$ SECTION $Y/B = 0.0, 0.25, 0.5, 0.75, 1$



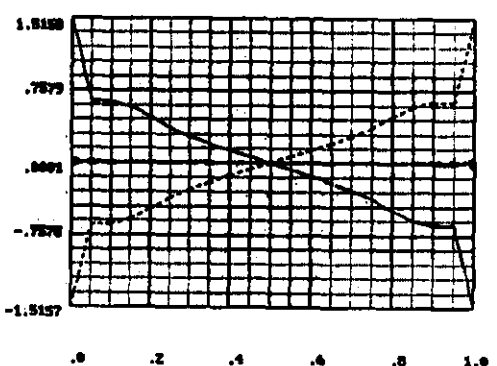
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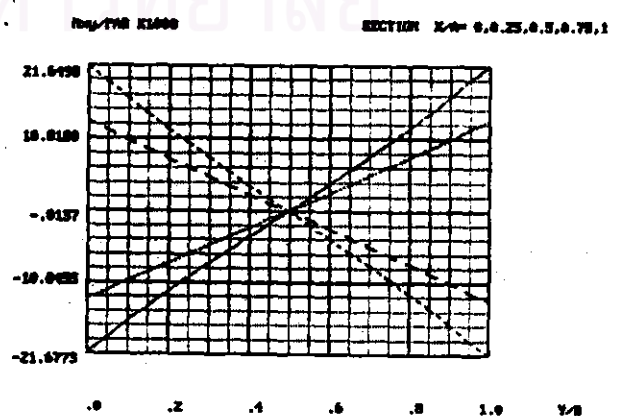
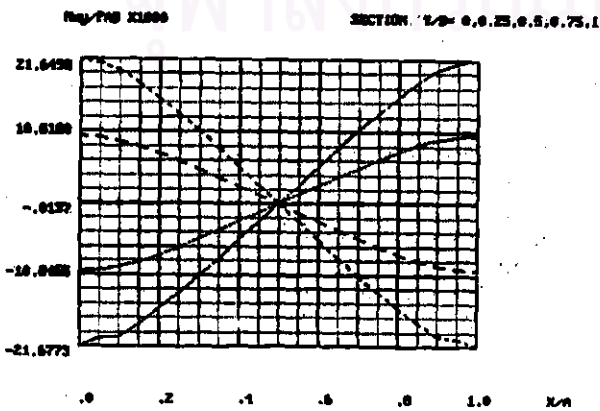
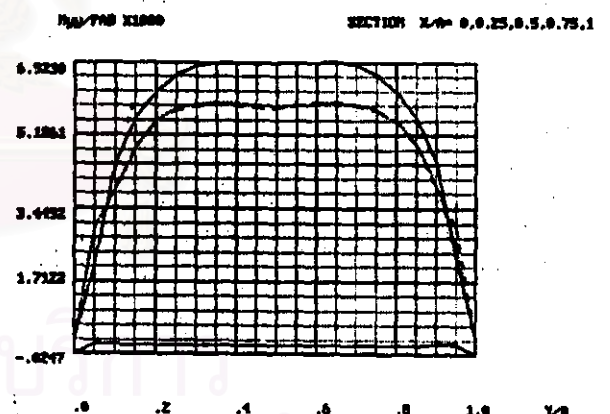
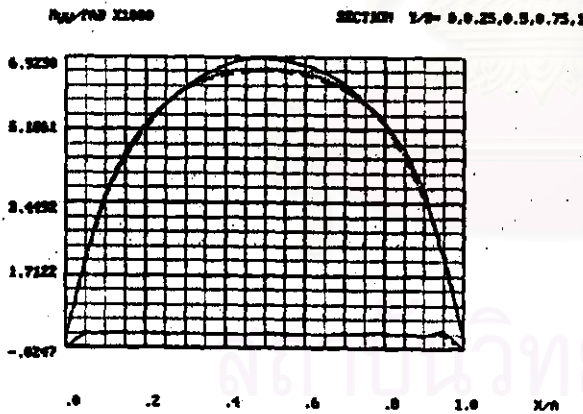
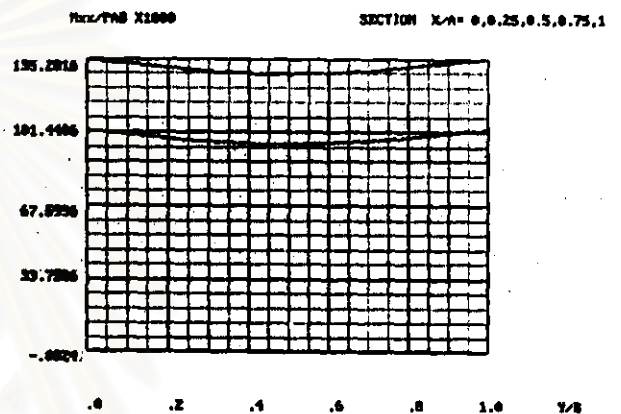
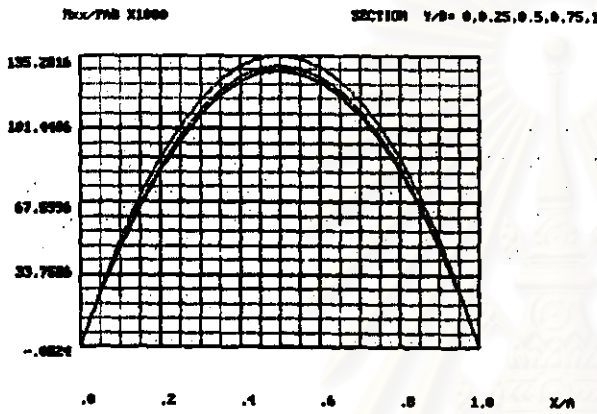
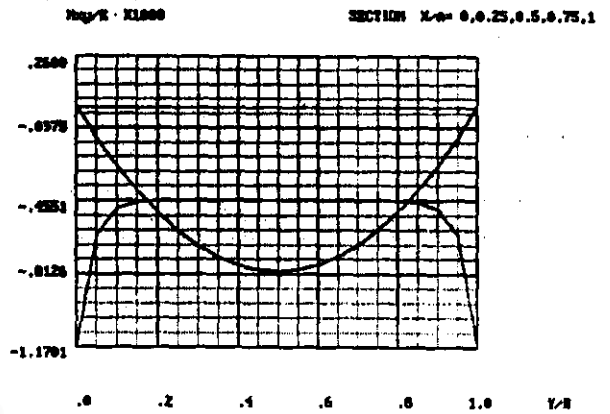
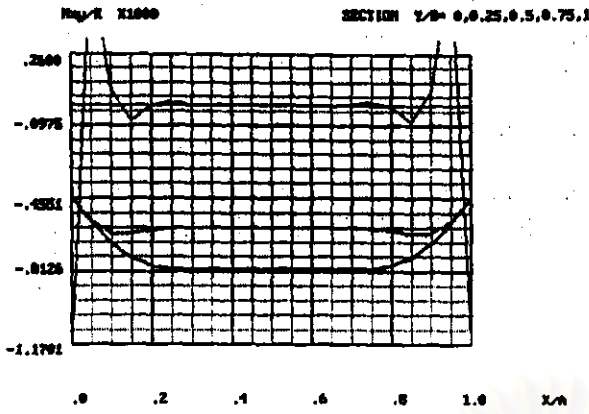


$\sigma_{yy}/E \times 1000$ SECTION $Y/B = 0.0, 0.25, 0.5, 0.75, 1$



$\sigma_{yy}/E \times 1000$ SECTION $X/A = 0.0, 0.25, 0.5, 0.75, 1$

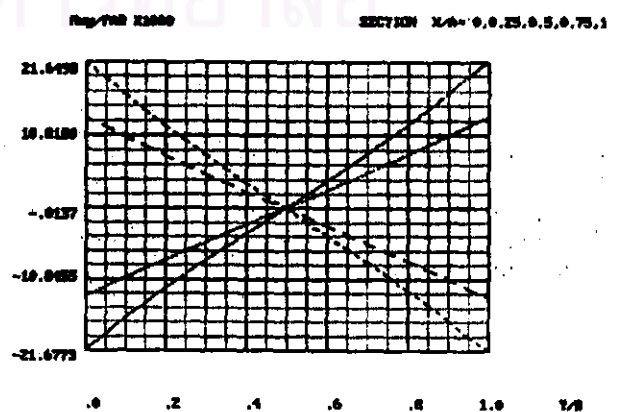
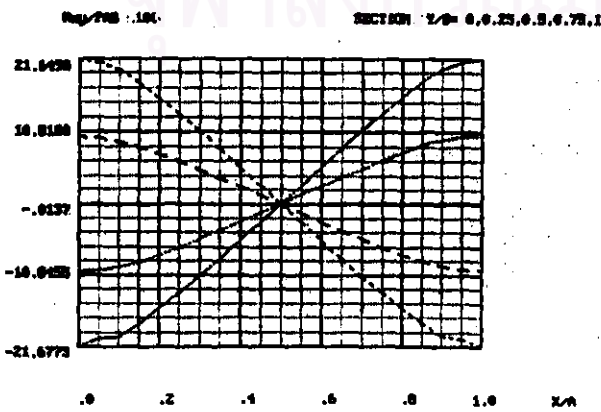
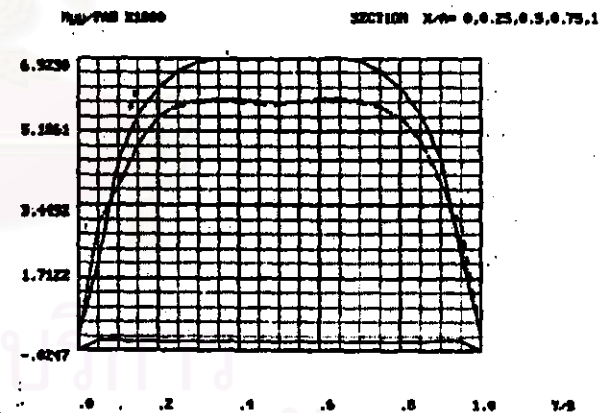
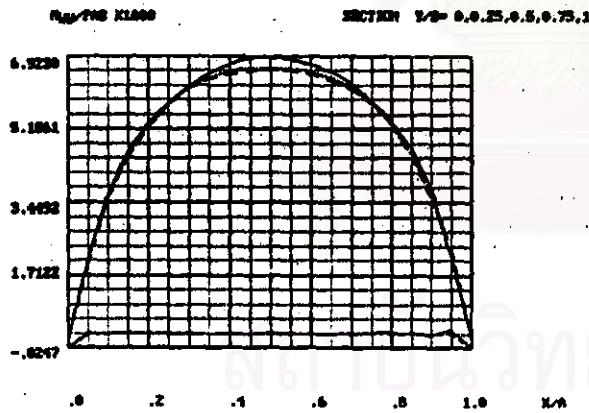
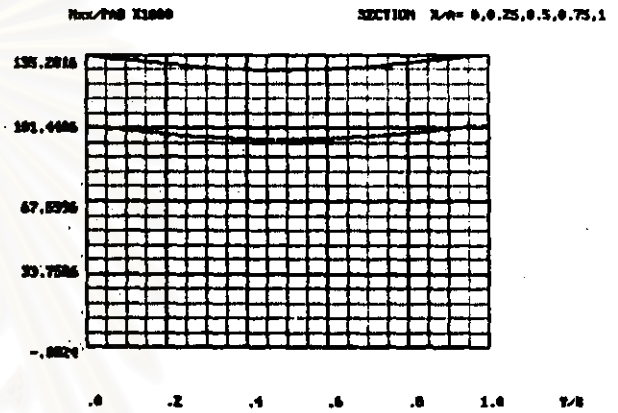
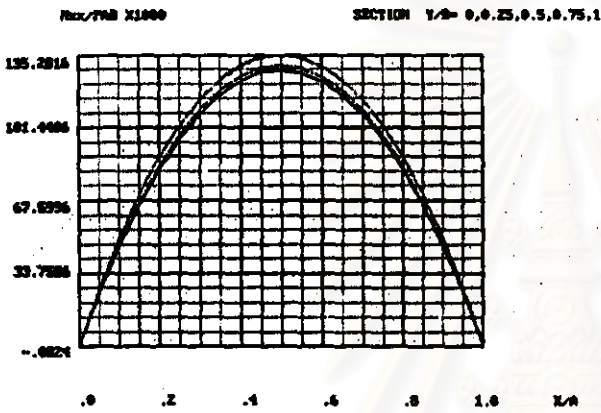
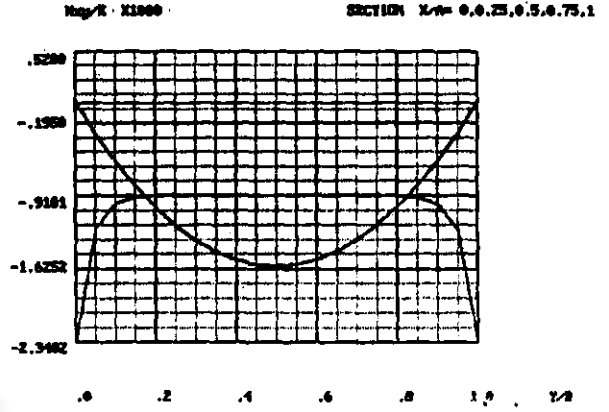
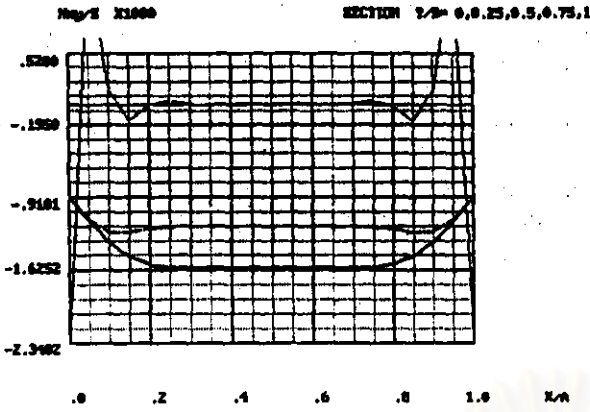


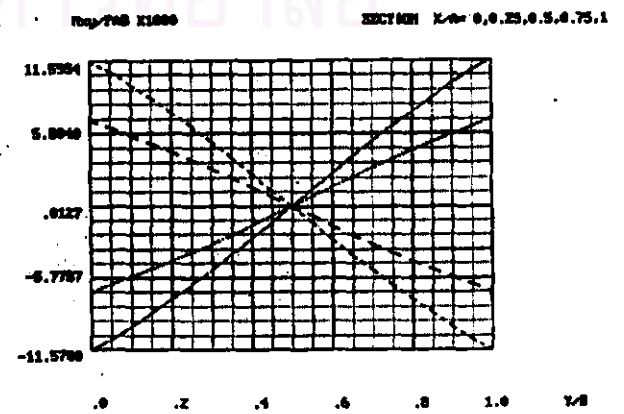
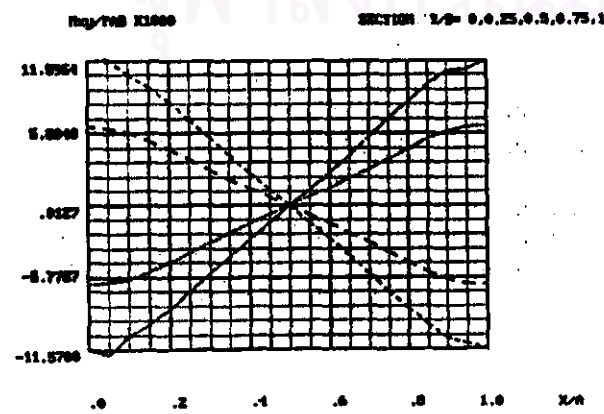
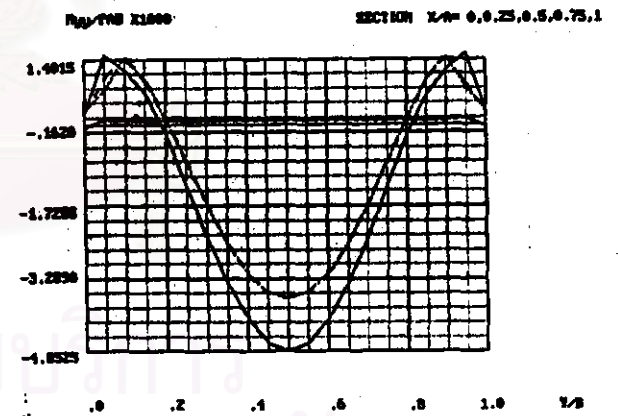
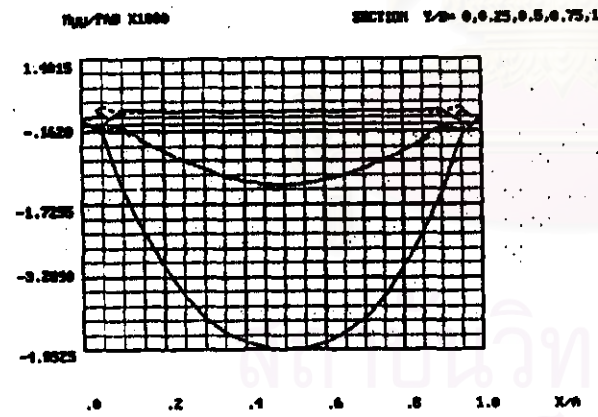
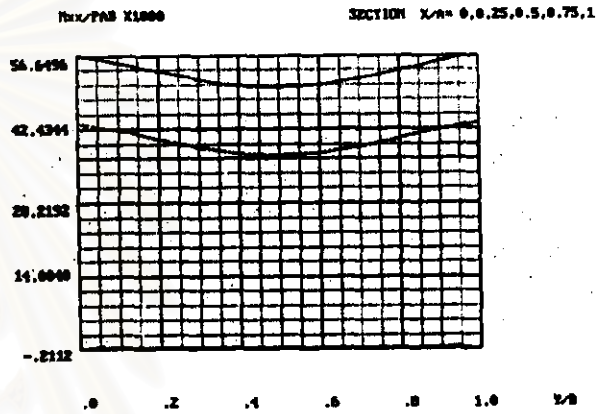
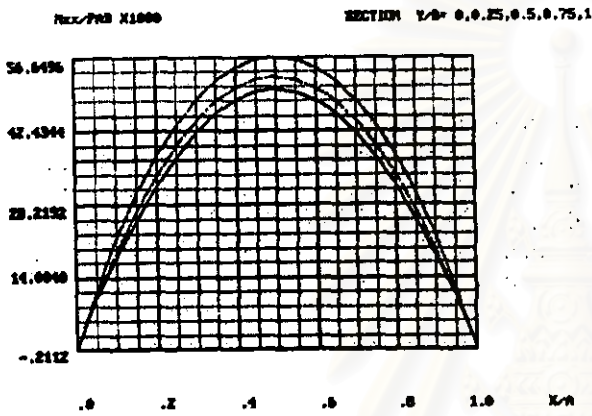
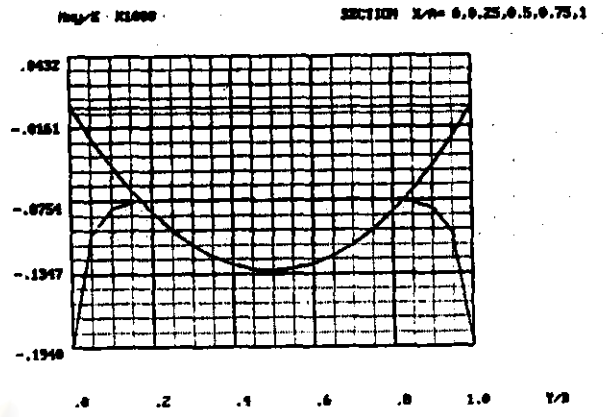
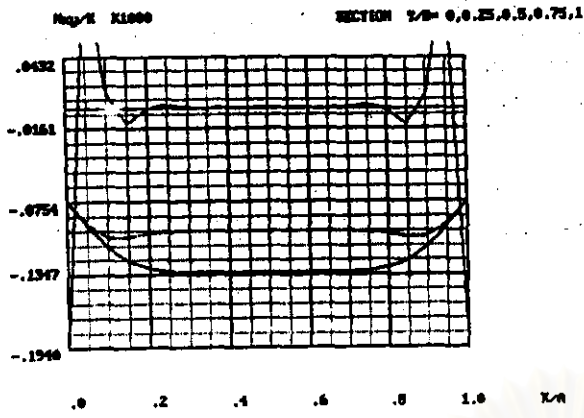




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สถาบันวิทยบริการ
จุฬาลงกรณ์มหาวิทยาลัย





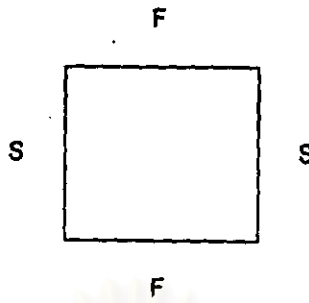
ผลของกรณีที่ 3 :

$$\frac{A}{B} = 2.0$$

$$\frac{f}{h} = 4.0$$

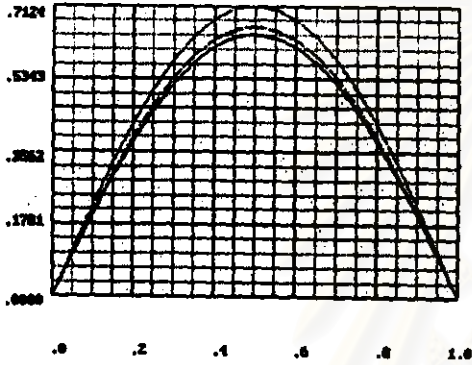
$$\frac{P_3 AB}{Eh^2} = 0.005$$

$$\nu = 0.3$$



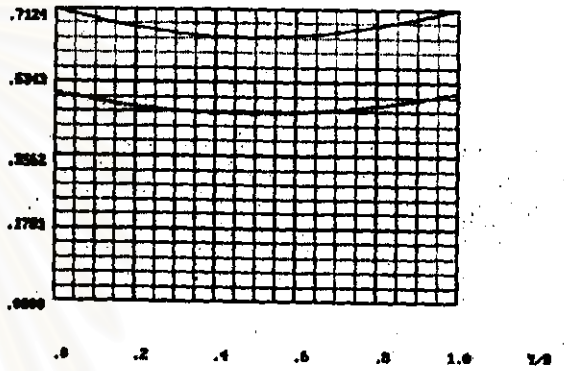
$w(l/AB) \times 1000$

SECTION $l/b = 0, 0.25, 0.5, 0.75, 1$



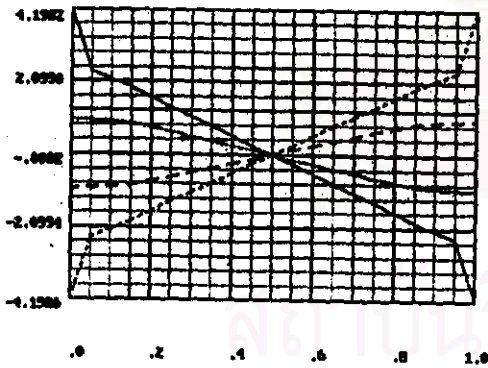
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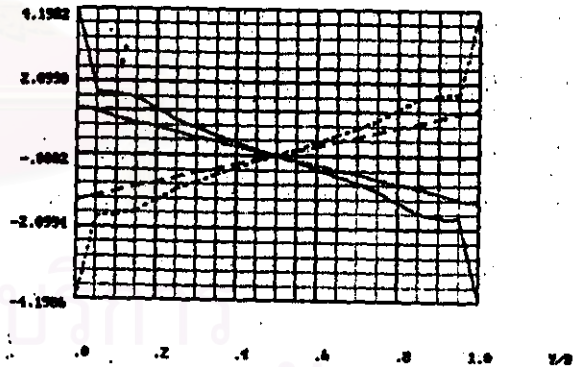
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SECTION $l/b = 0, 0.25, 0.5, 0.75, 1$



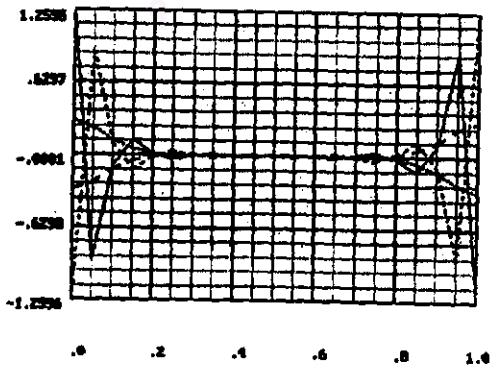
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SECTION $l/b = 0, 0.25, 0.5, 0.75, 1$



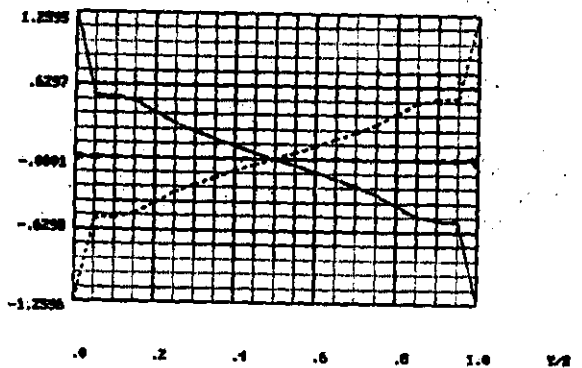
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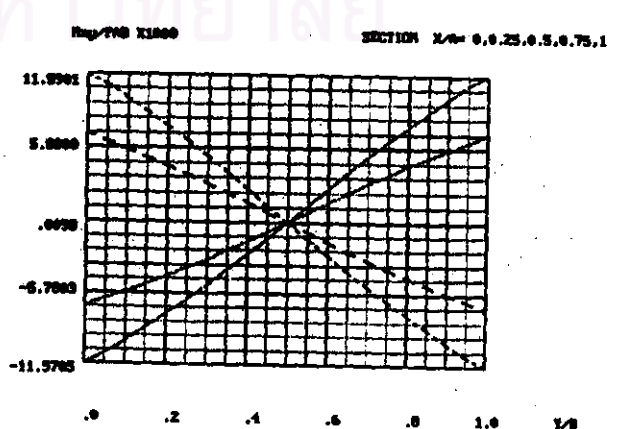
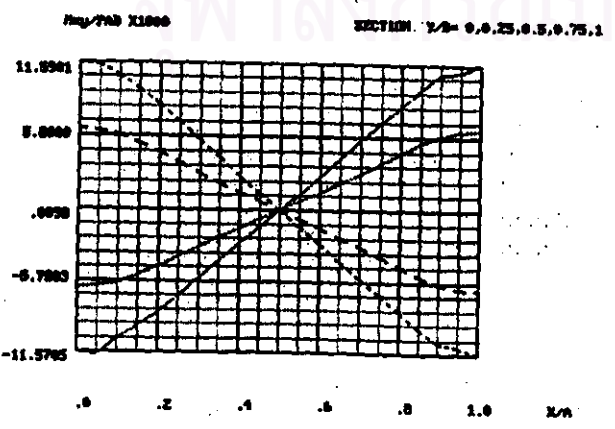
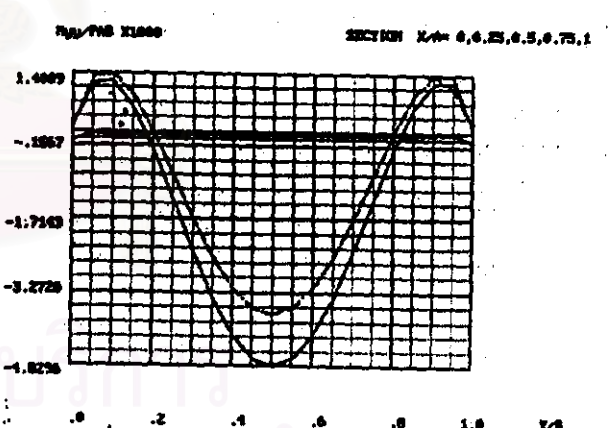
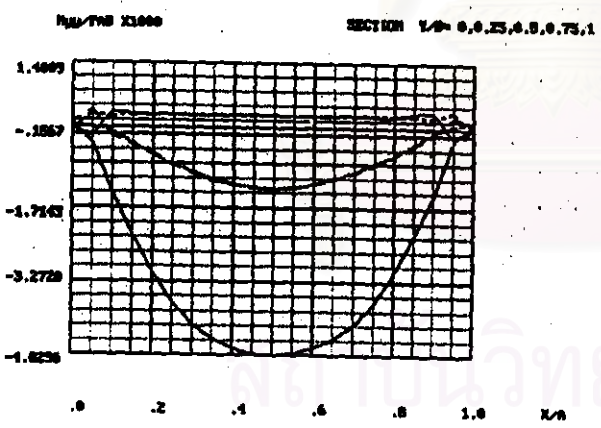
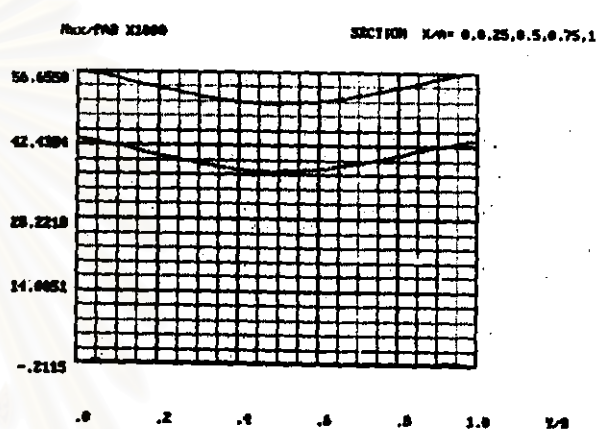
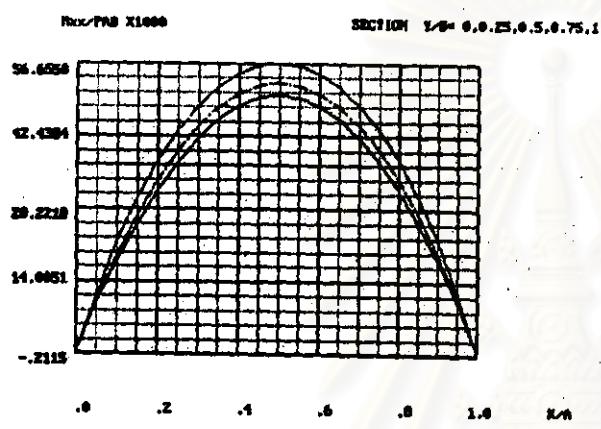
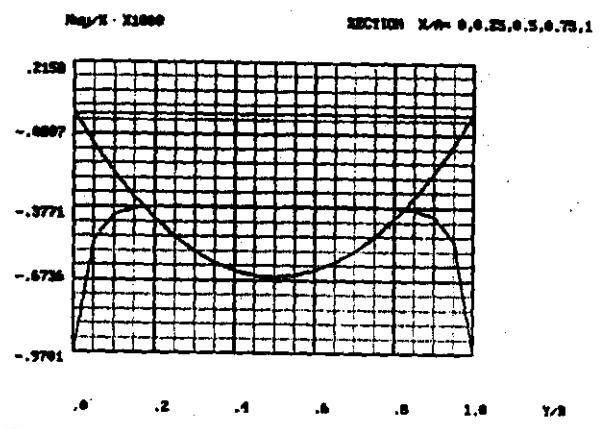
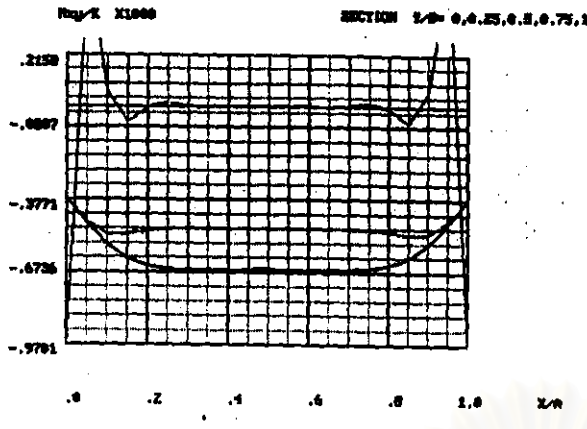
SECTION $l/b = 0, 0.25, 0.5, 0.75, 1$



$M_{yy}/K \times 1000$

SECTION $l/b = 0, 0.25, 0.5, 0.75, 1$





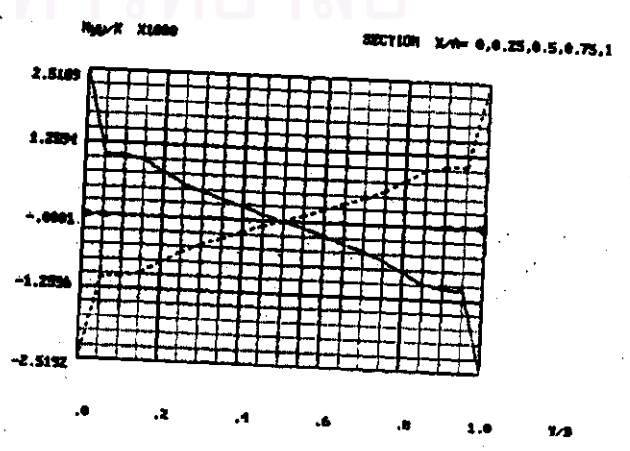
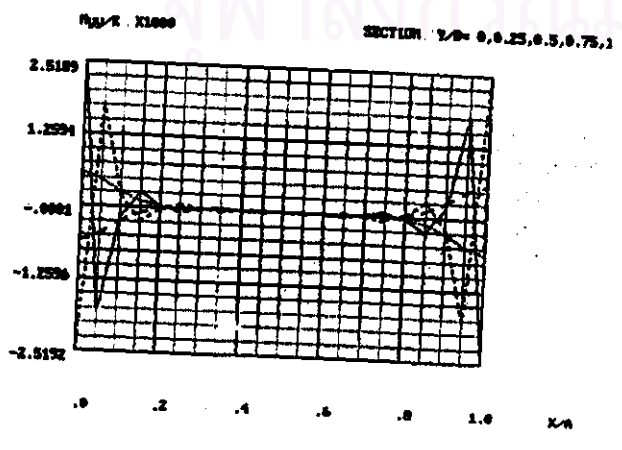
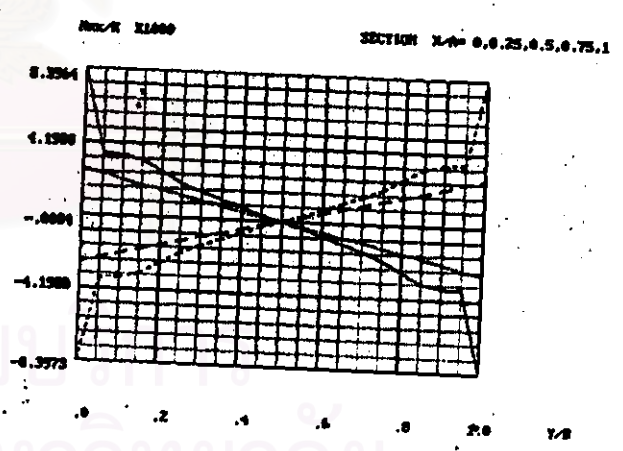
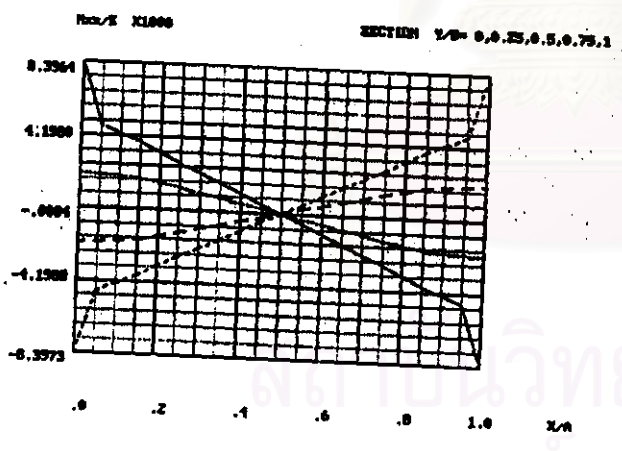
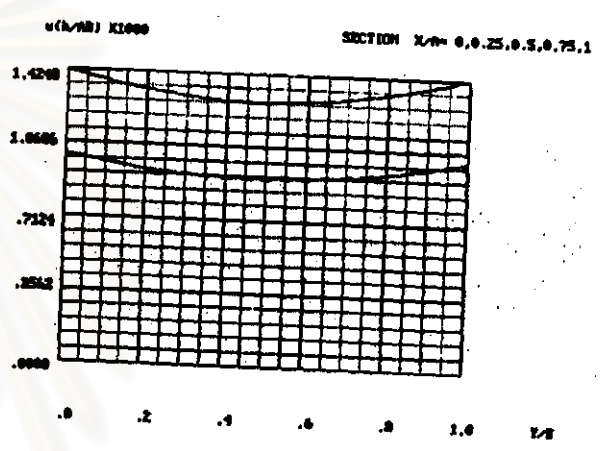
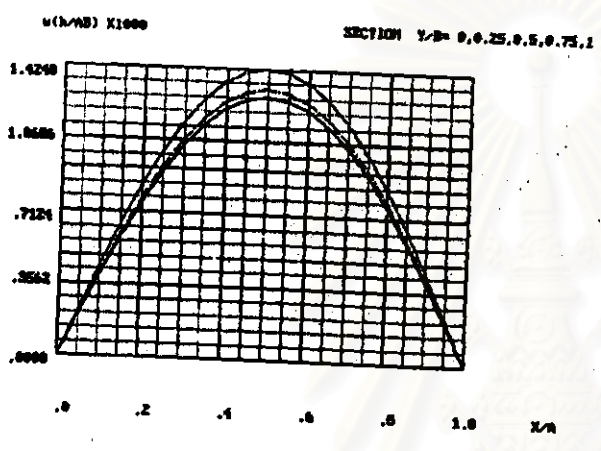
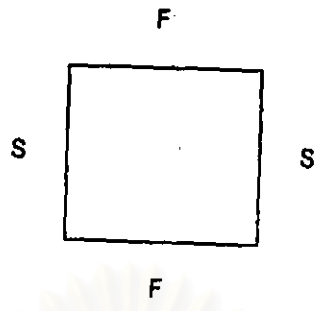
ผลของกรณีที่ 3 :

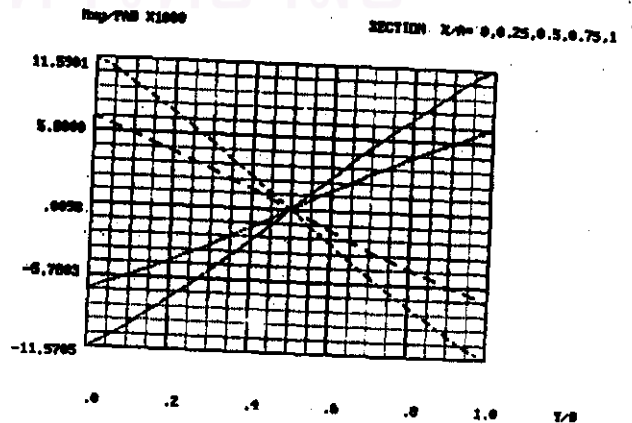
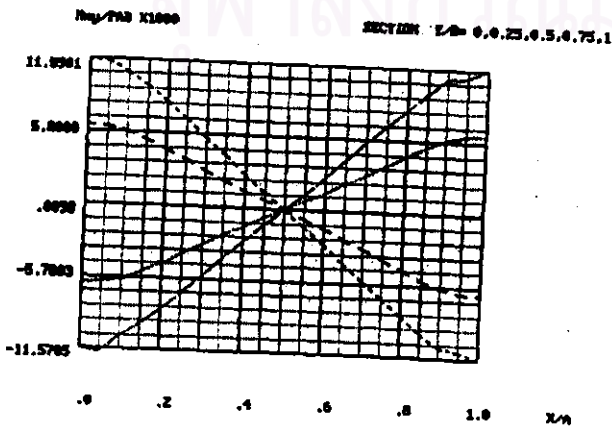
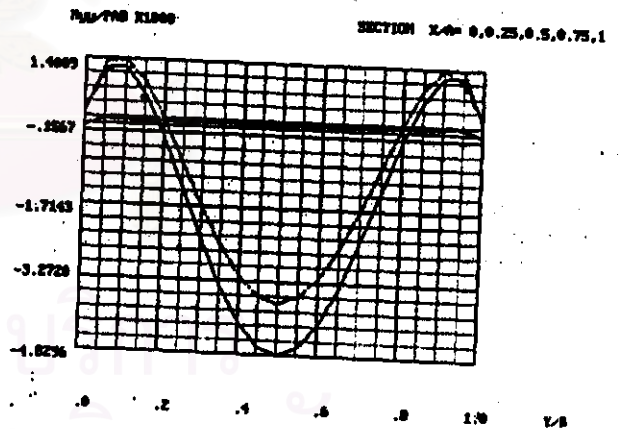
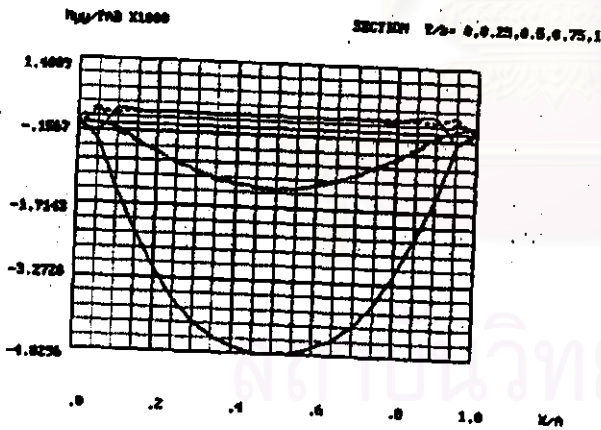
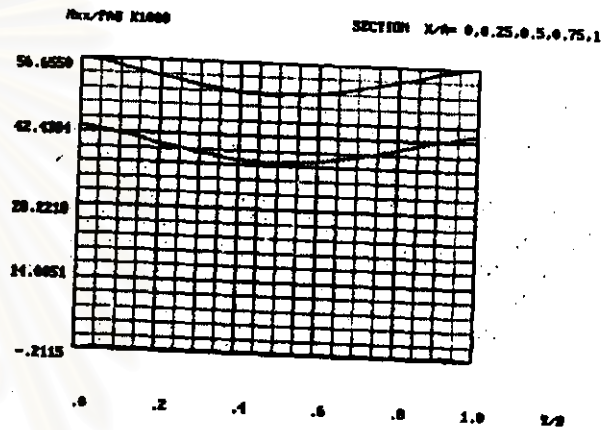
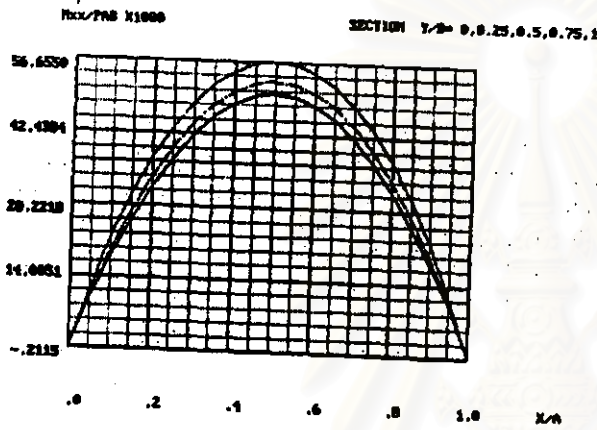
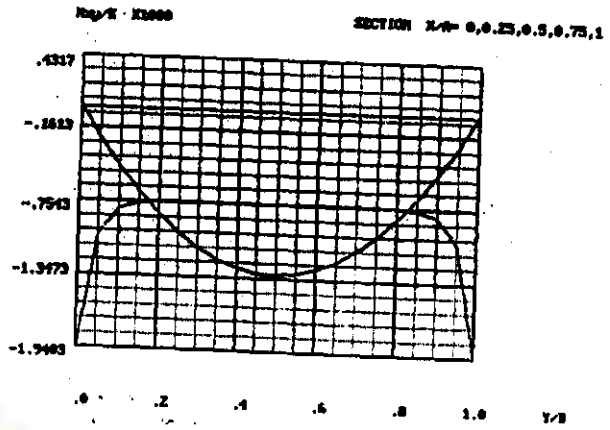
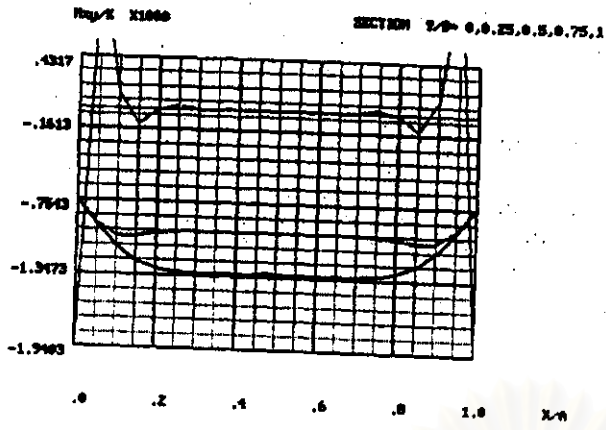
$$\frac{A}{B} = 2.0$$

$$\frac{f}{h} = 4.0$$

$$\frac{P_3 AB}{Eh^2} = 0.01$$

$$\nu = 0.3$$





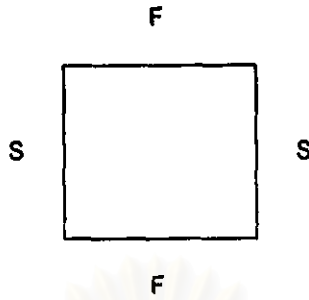
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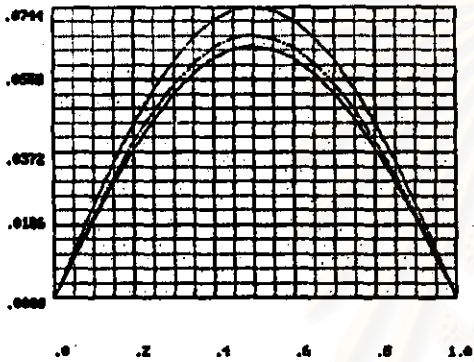
$$\frac{P_3 AB}{Eh^2} = 0.001$$

$$\nu = 0.3$$



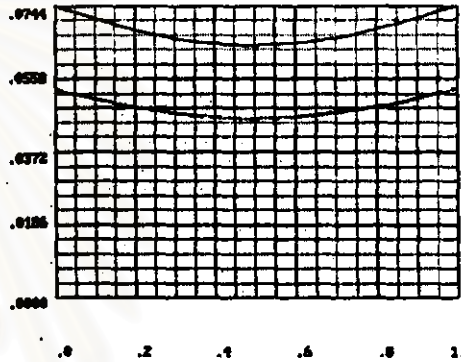
$u(h/8) \times 1000$

SECTION $Y/a = 0, 0.25, 0.5, 0.75, 1$



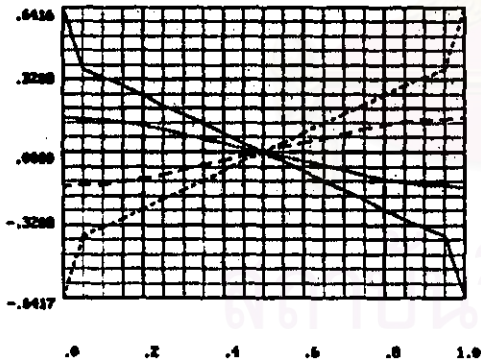
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SECTION $X/a = 0, 0.25, 0.5, 0.75, 1$



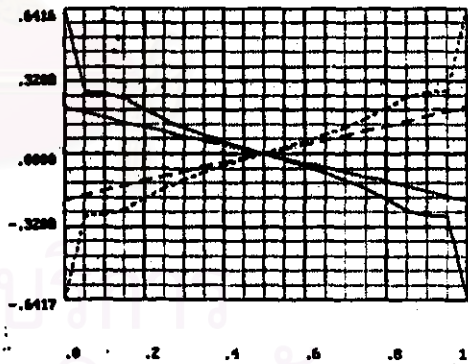
$\sigma_{xx}/E \times 10000$

SECTION $Y/a = 0, 0.25, 0.5, 0.75, 1$



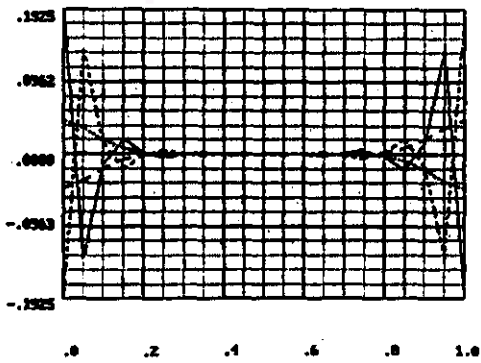
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SECTION $X/a = 0, 0.25, 0.5, 0.75, 1$



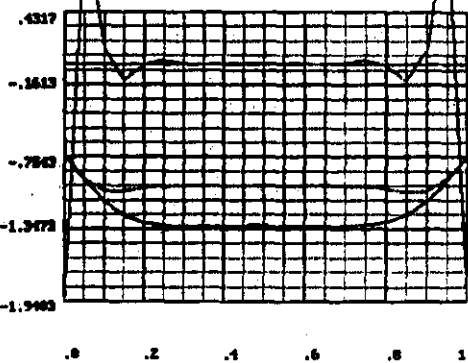
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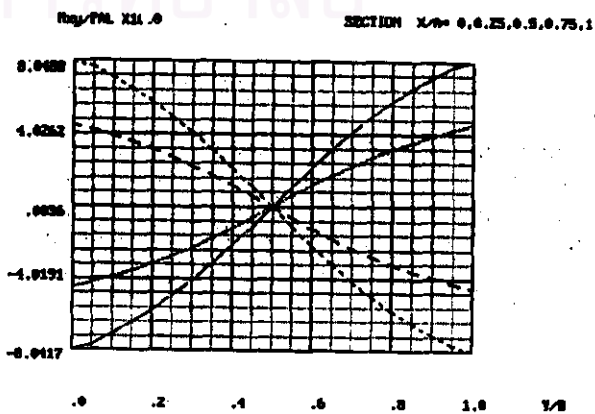
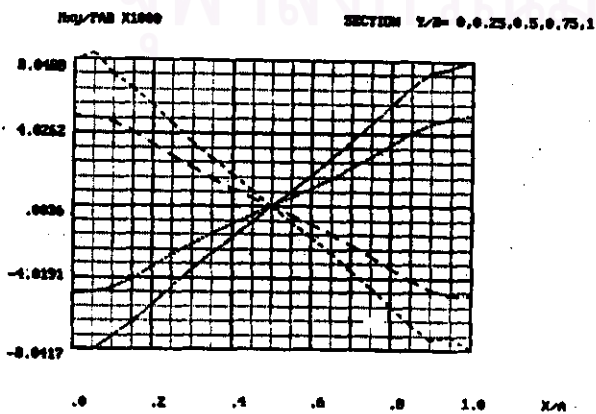
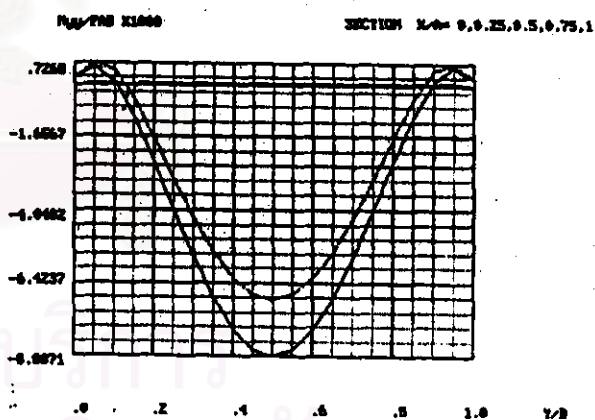
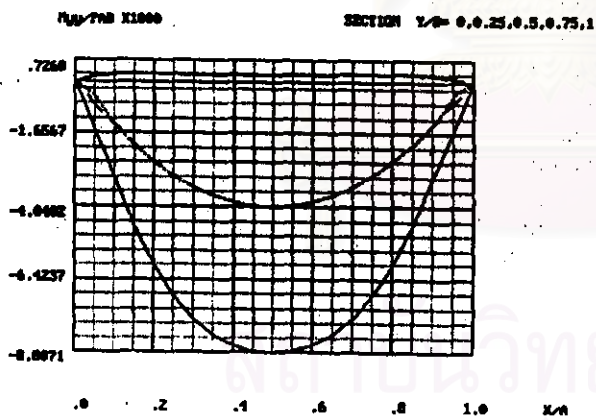
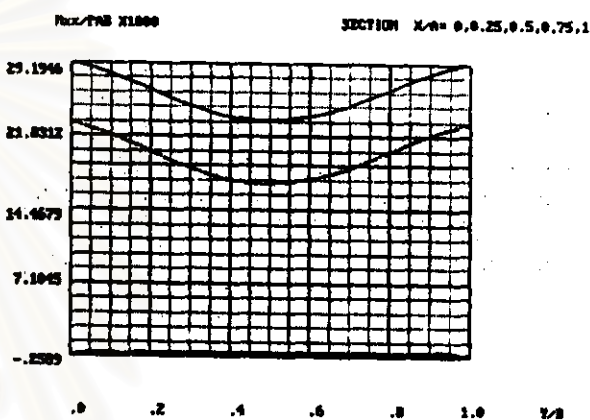
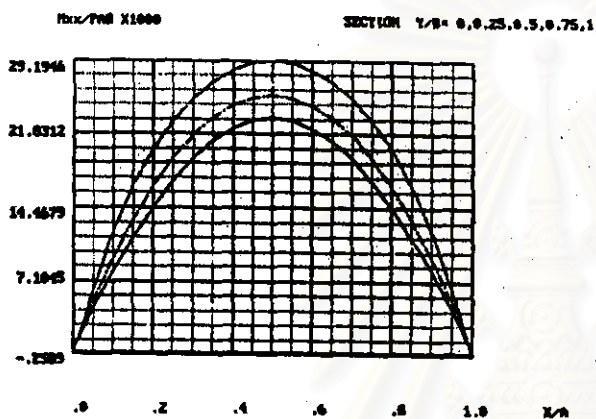
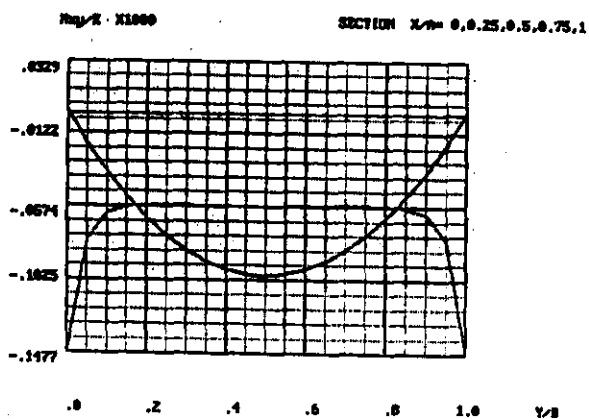
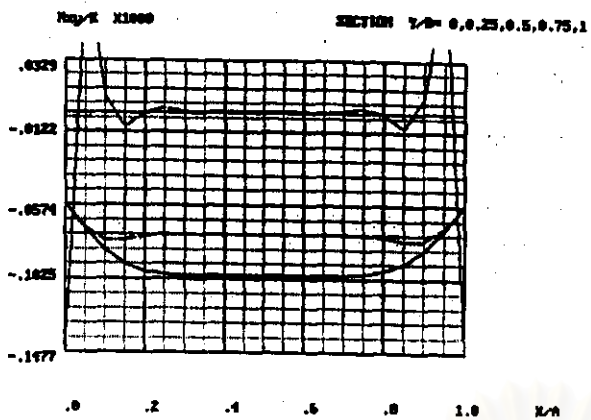
SECTION $Y/a = 0, 0.25, 0.5, 0.75, 1$



$\sigma_{yy}/E \times 10000$

SECTION $Y/a = 0, 0.25, 0.5, 0.75, 1$





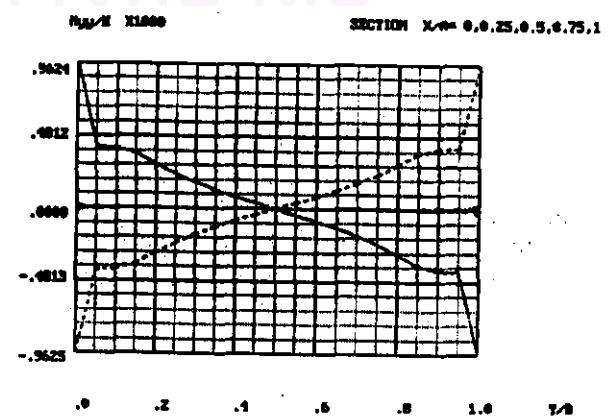
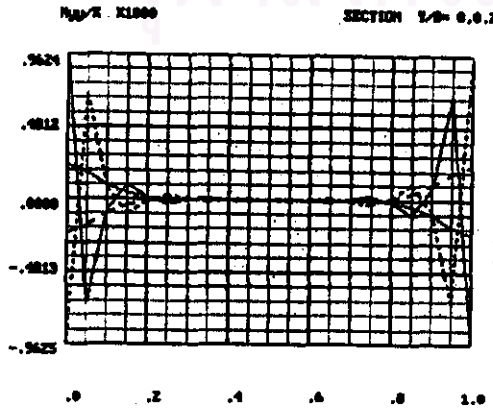
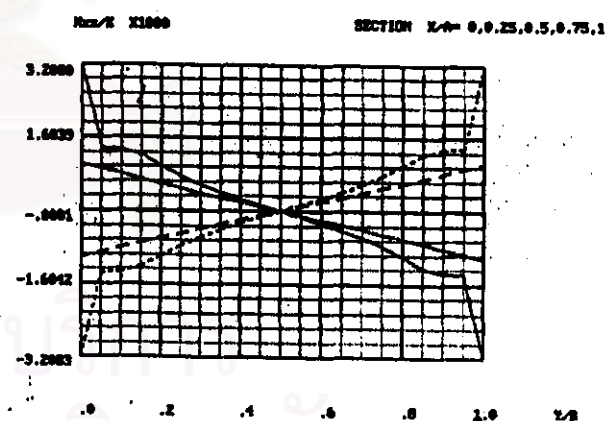
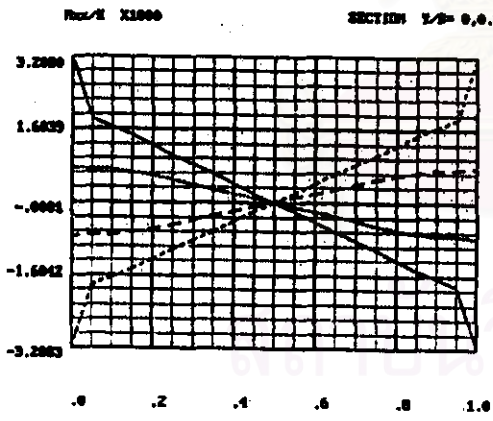
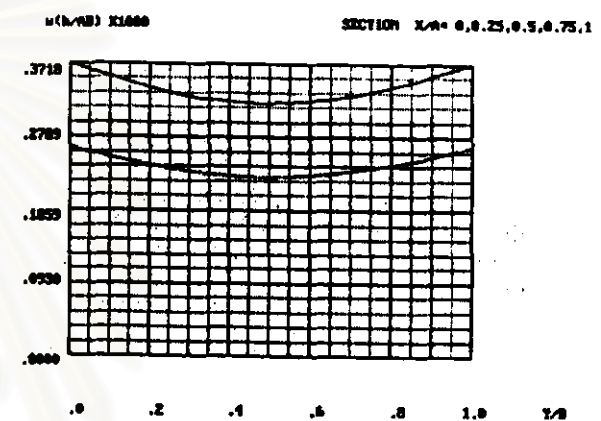
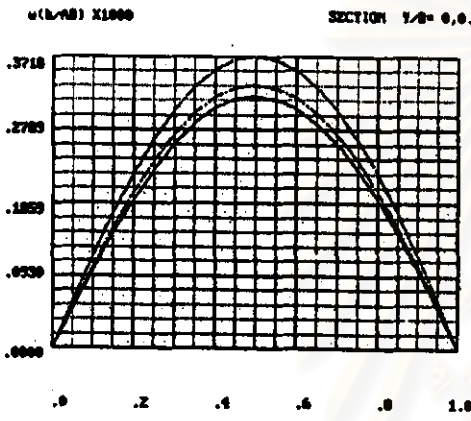
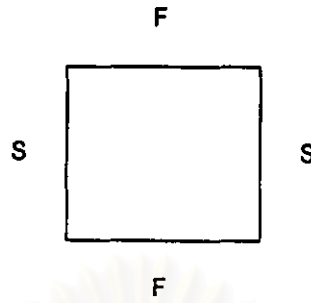
ผลของกรณีที่ 3 :

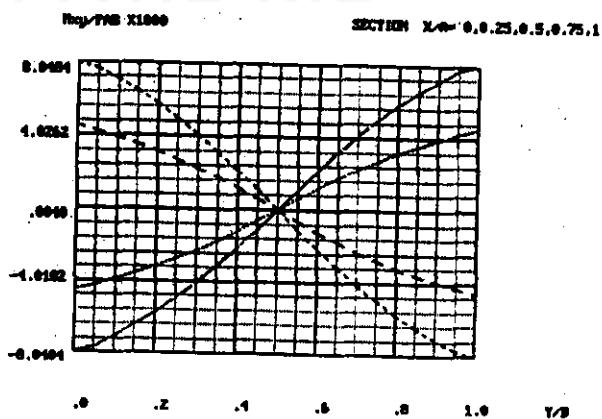
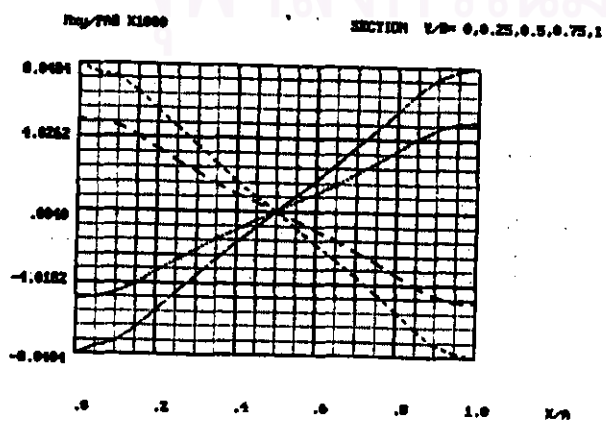
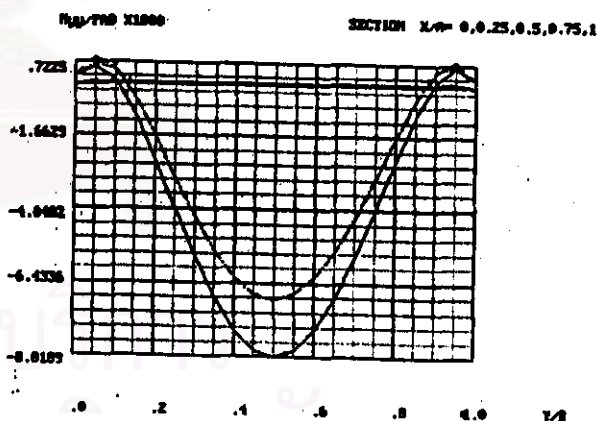
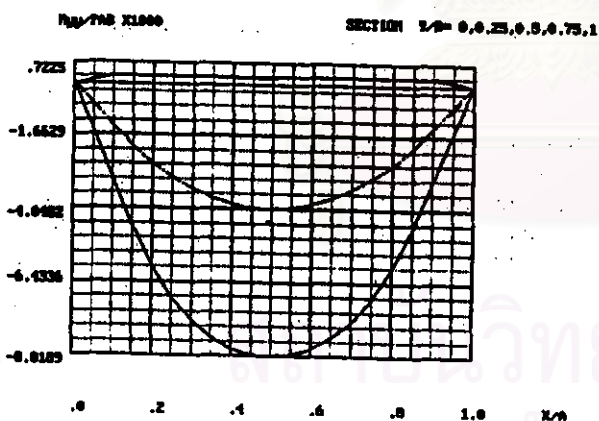
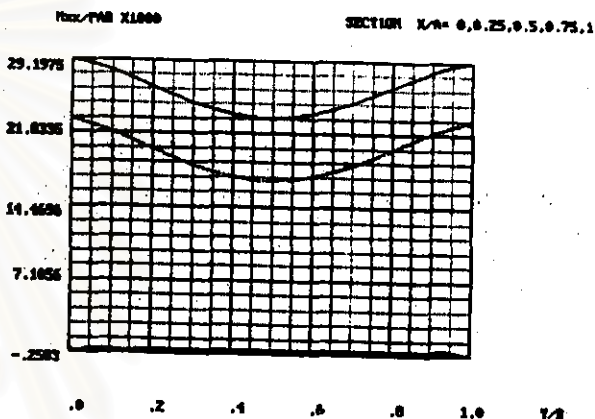
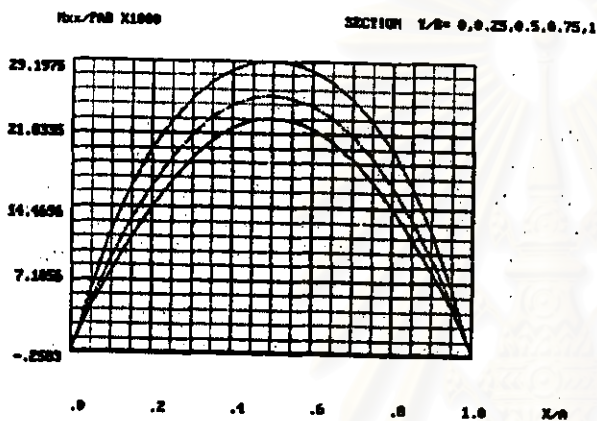
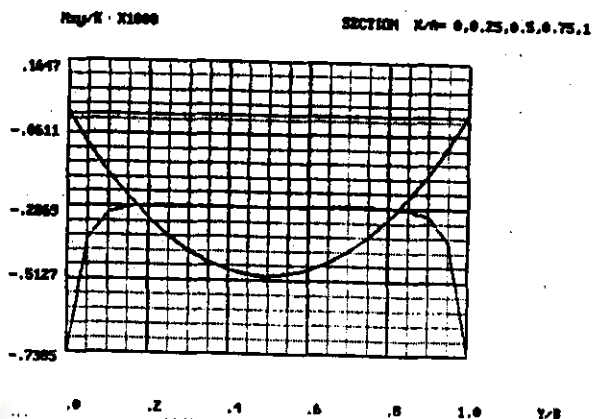
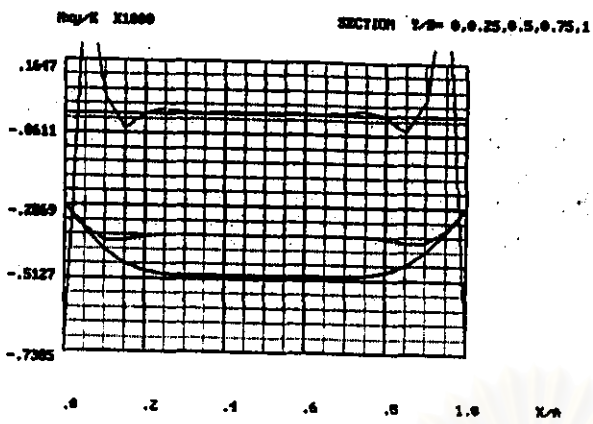
$$\frac{A}{B} = 2.0$$

$$\frac{f}{h} = 6.0$$

$$\frac{P_{y,AB}}{Eh^2} = 0.005$$

$$\nu = 0.3$$





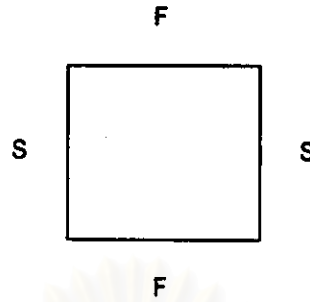
ผลของกรณีที่ 3 :

$$\frac{A}{B} = 2.0$$

$$\frac{f}{h} = 6.0$$

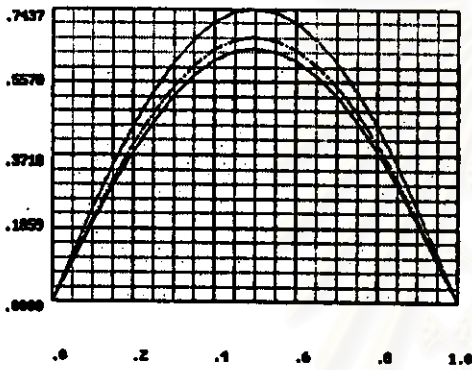
$$\frac{P_3 AB}{Eh^2} = 0.01$$

$$\nu = 0.3$$



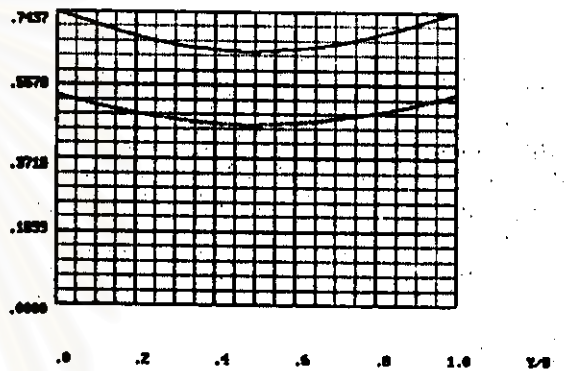
$u(h/AB) \times 1000$

SECTION $Y/B = 0.0, 0.25, 0.5, 0.75, 1$



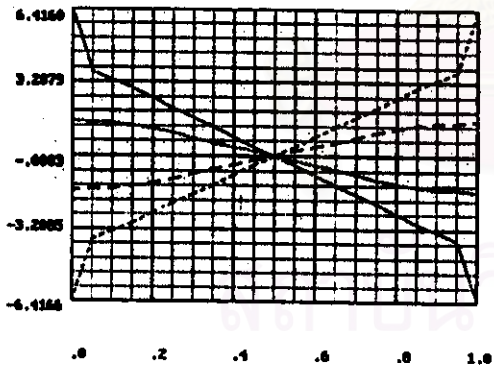
$u(h/AB) \times 1000$

SECTION $X/h = 0.0, 0.25, 0.5, 0.75, 1$



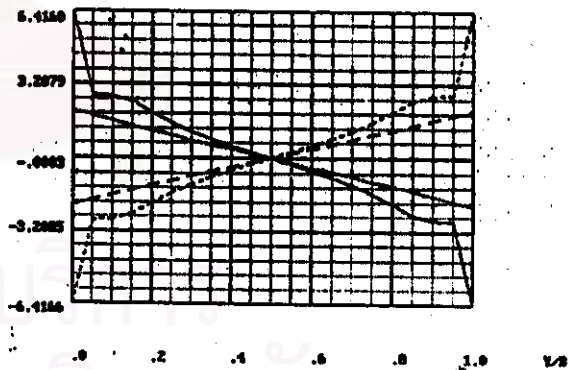
$w_h/K \times 1000$

SECTION $Y/B = 0.0, 0.25, 0.5, 0.75, 1$



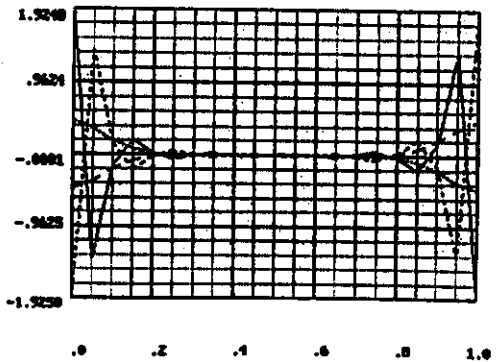
$w_h/K \times 1000$

SECTION $X/h = 0.0, 0.25, 0.5, 0.75, 1$



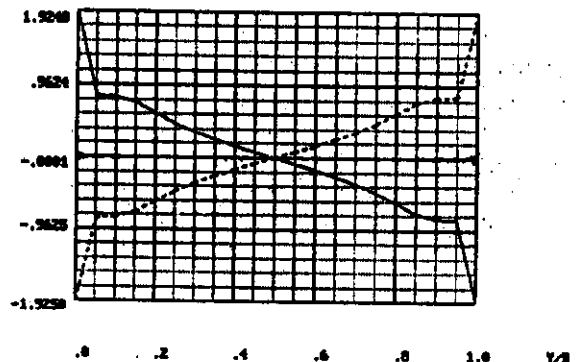
$w_{yy}/K \times 1000$

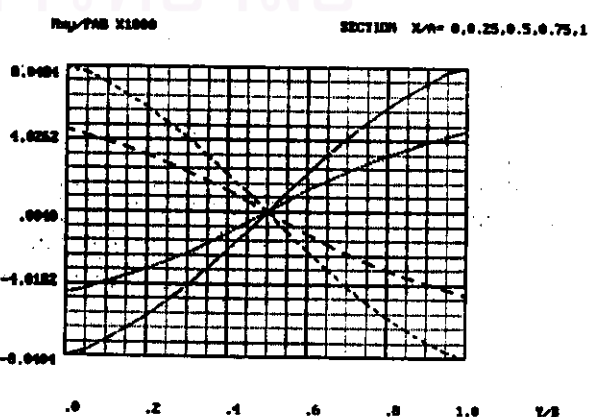
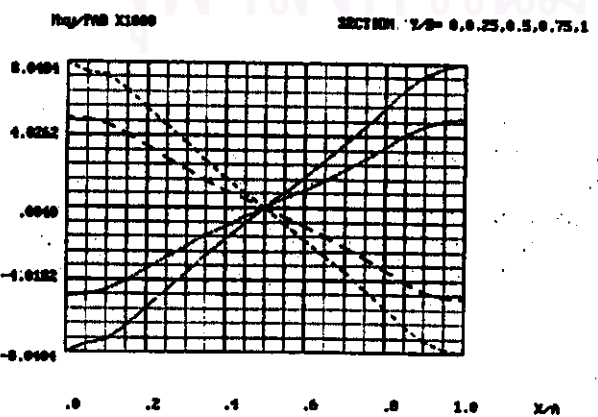
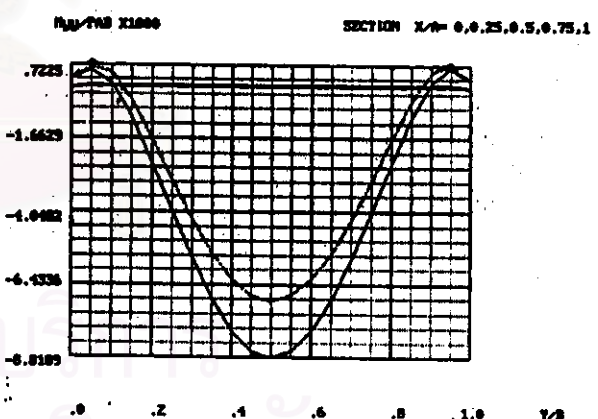
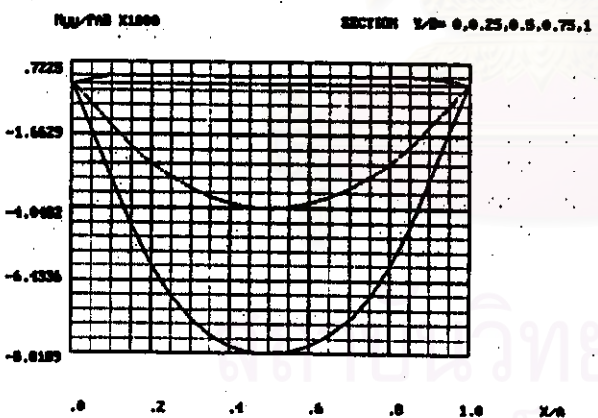
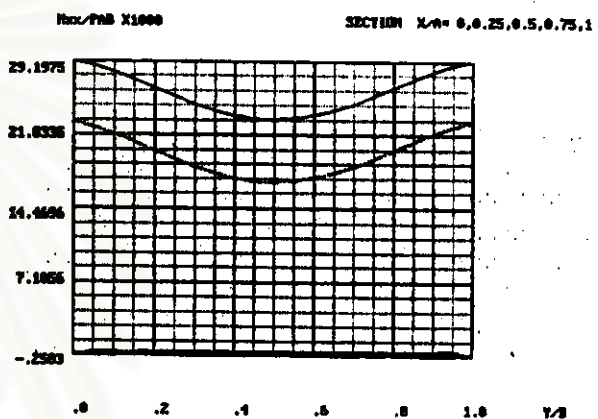
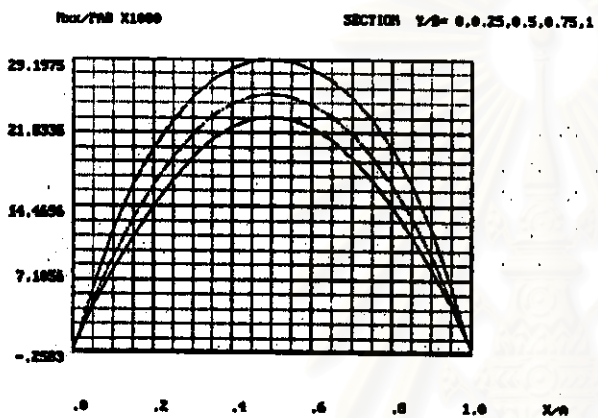
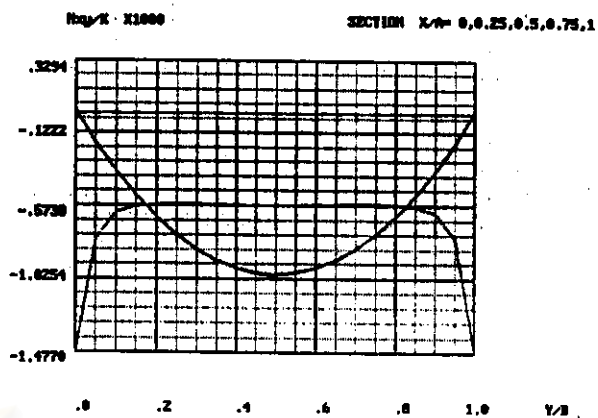
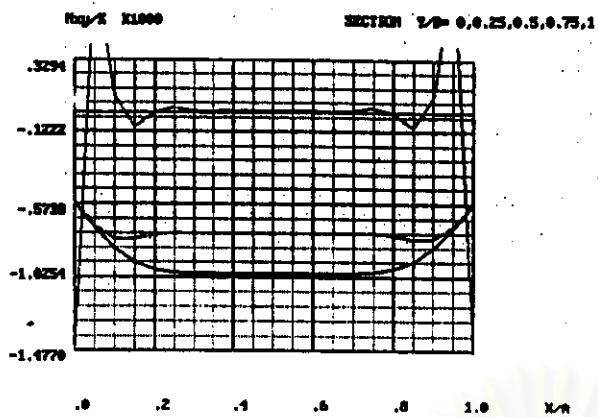
SECTION $Y/B = 0.0, 0.25, 0.5, 0.75, 1$



$w_{yy}/K \times 1000$

SECTION $X/h = 0.0, 0.25, 0.5, 0.75, 1$





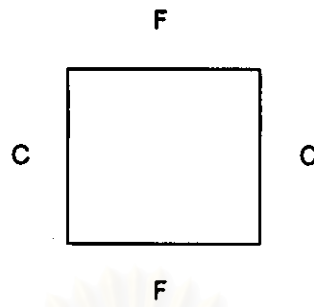
ผลของกรณีที่ 4 :

$$\frac{A}{B} = 0.5$$

$$\frac{f}{h} = 2.0$$

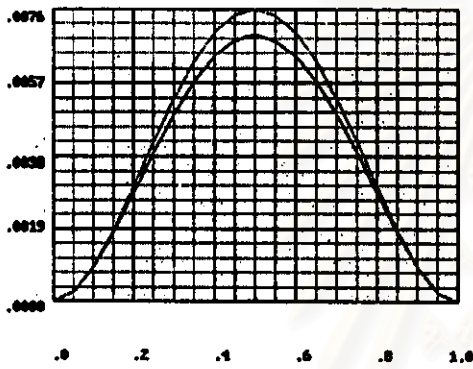
$$\frac{P_3 AB}{Eh^2} = 0.001$$

$$\nu = 0.3$$



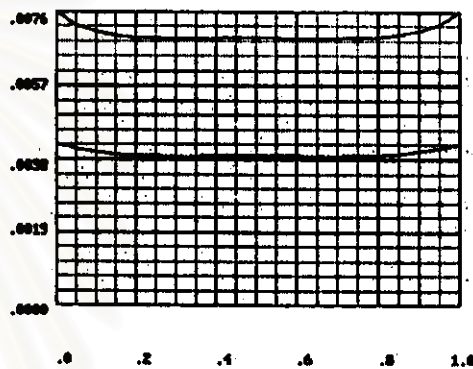
$w(h/AB) \times 1000$

SECTION $Y/B = 0.0, 0.25, 0.5, 0.75, 1$



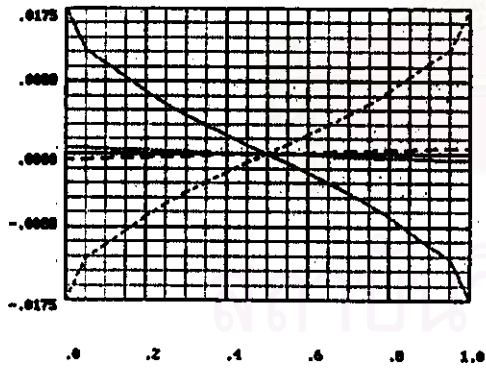
$w(h/AB) \times 1000$

SECTION $X/h = 0.0, 0.25, 0.5, 0.75, 1$



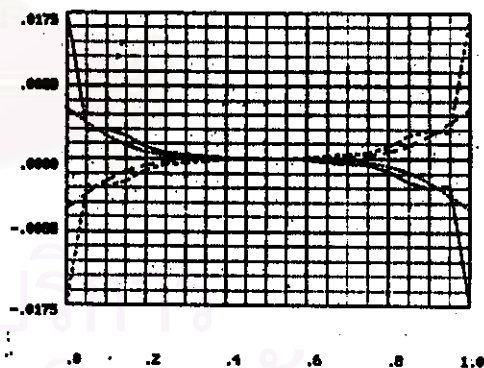
$\theta_{xz}/\epsilon \times 1000$

SECTION $Y/B = 0.0, 0.25, 0.5, 0.75, 1$



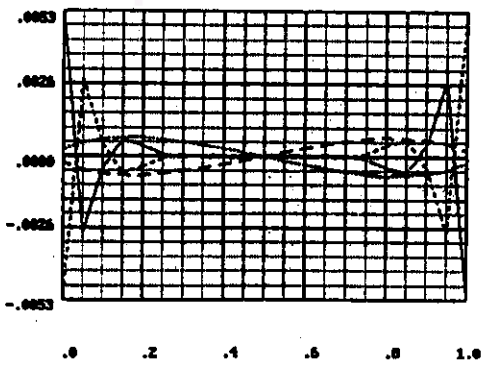
$\theta_{xz}/\epsilon \times 1000$

SECTION $X/h = 0.0, 0.25, 0.5, 0.75, 1$



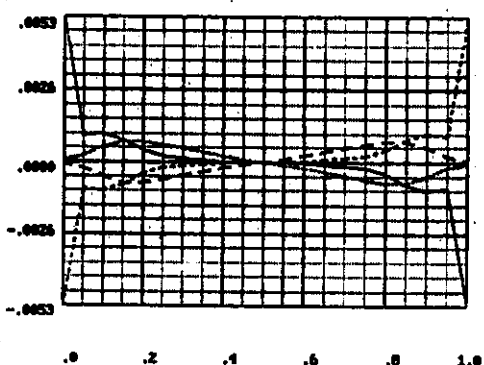
$\theta_{yz}/\epsilon \times 1000$

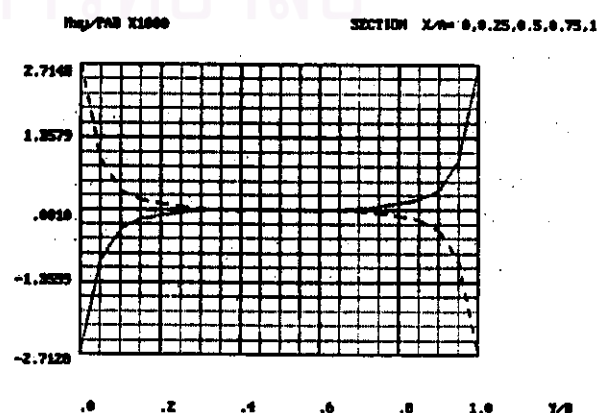
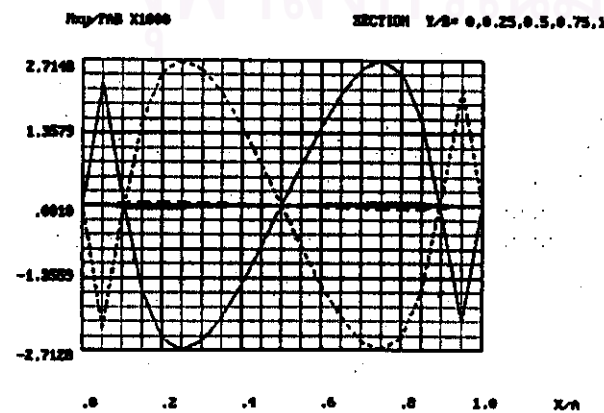
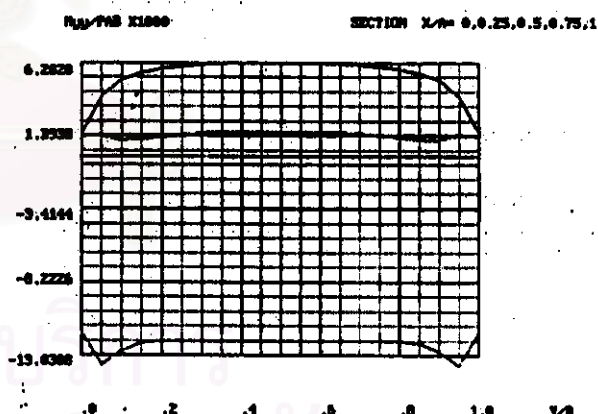
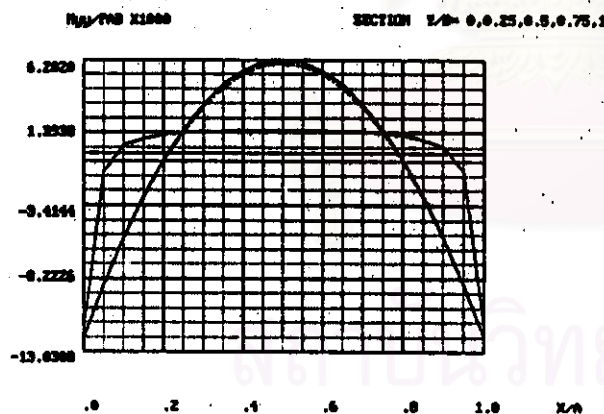
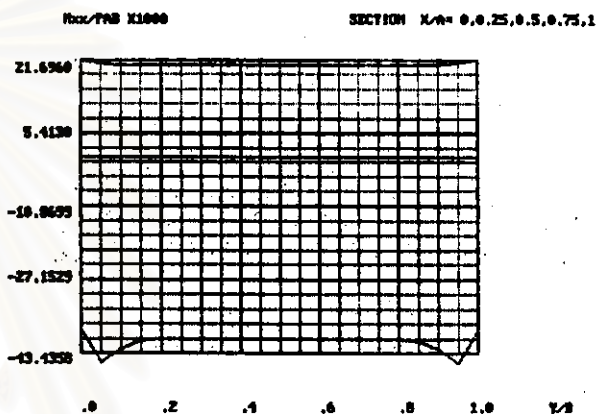
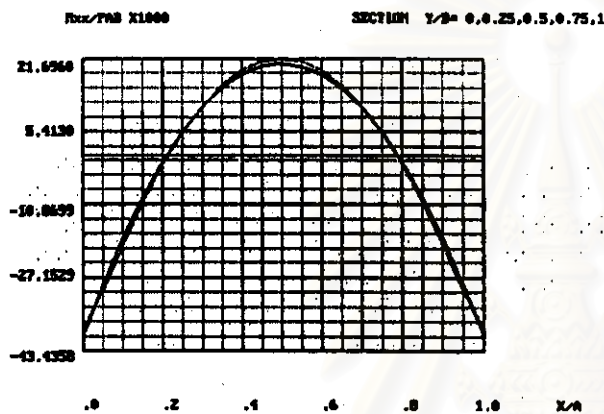
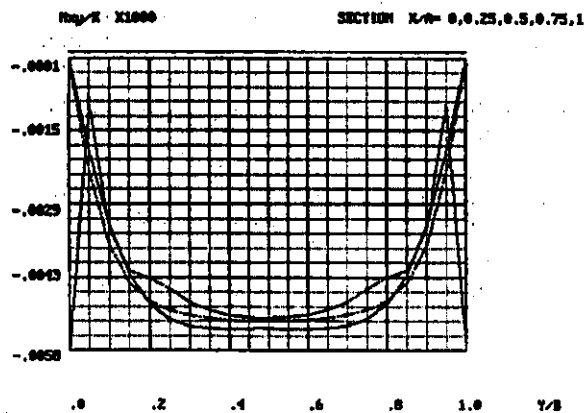
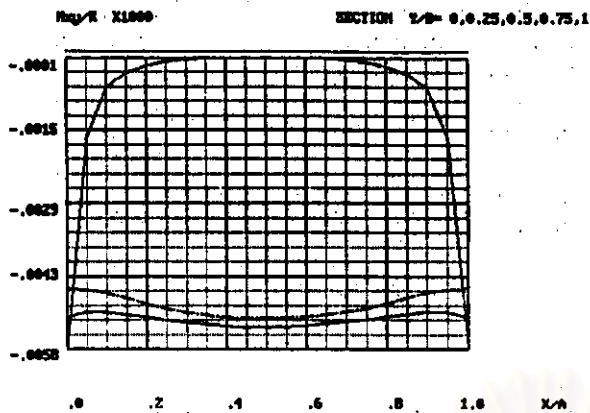
SECTION $Y/B = 0.0, 0.25, 0.5, 0.75, 1$



$\theta_{yz}/\epsilon \times 1000$

SECTION $X/h = 0.0, 0.25, 0.5, 0.75, 1$





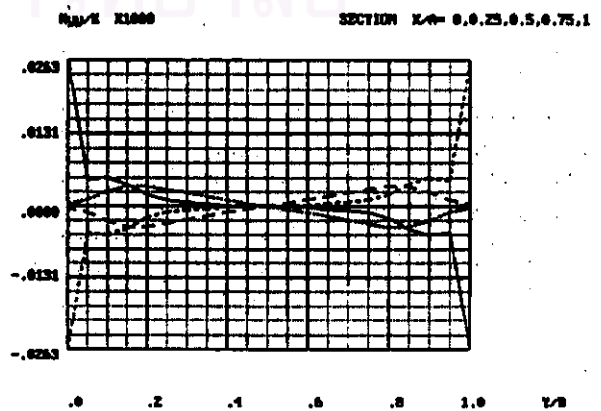
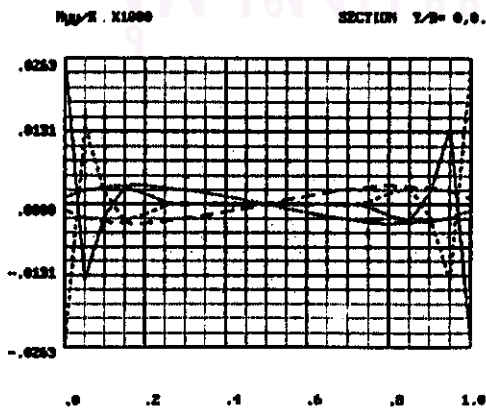
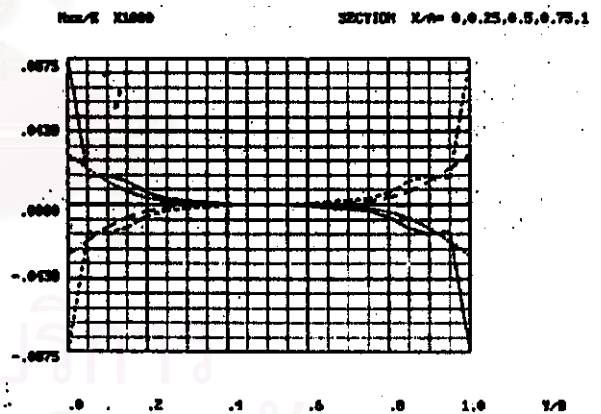
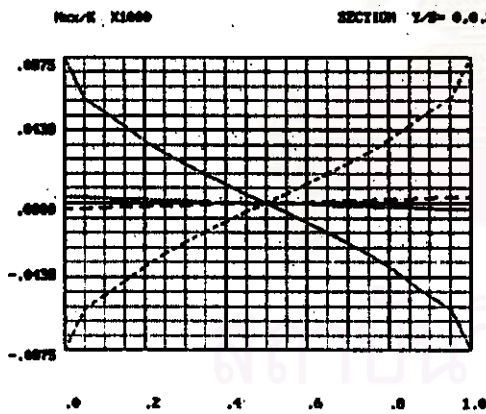
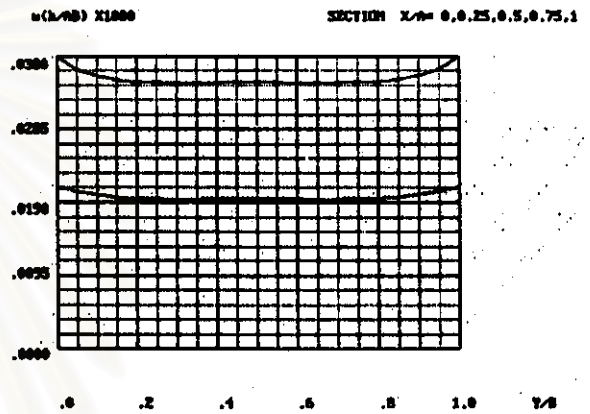
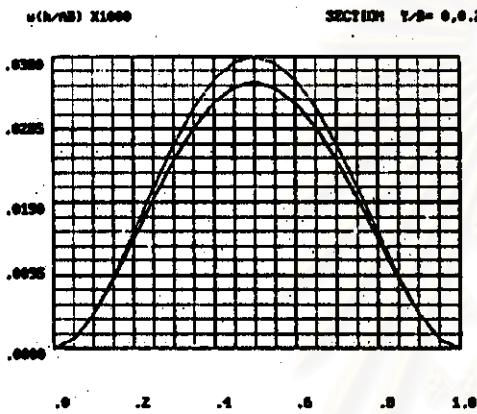
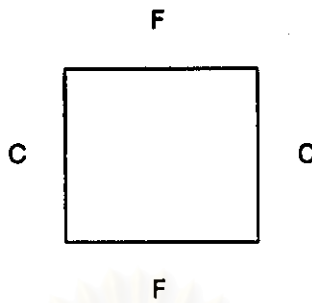
ผลของกรณีที่ 4 :

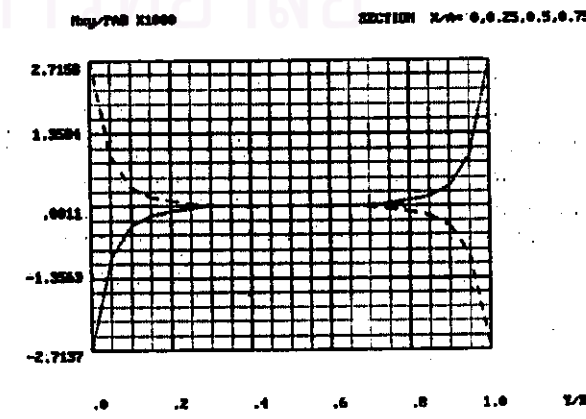
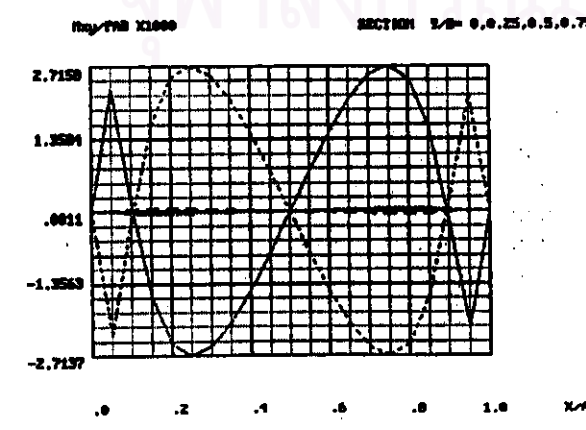
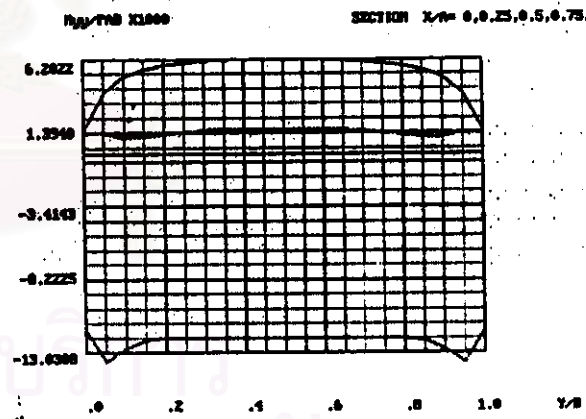
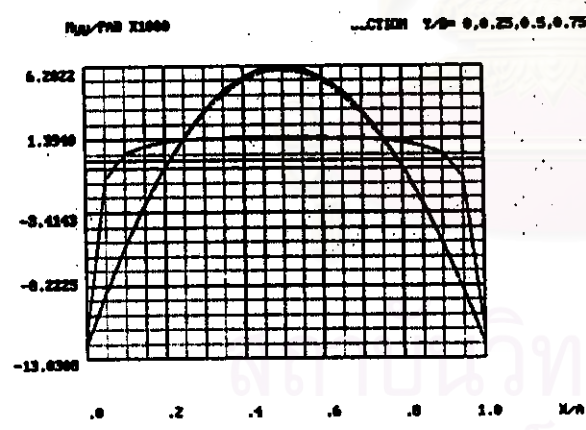
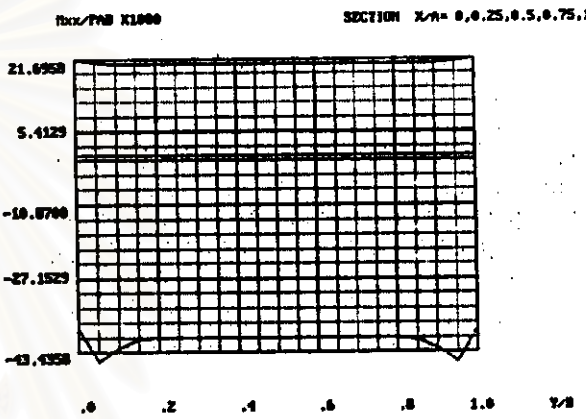
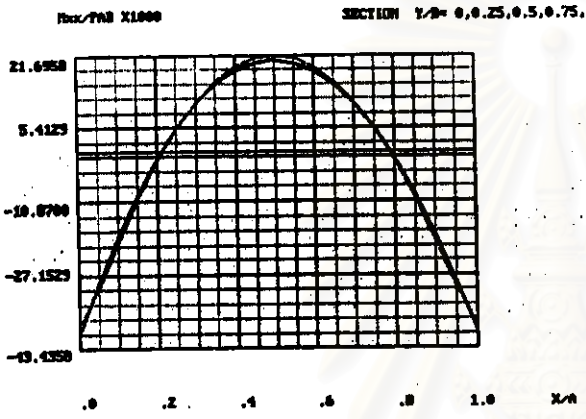
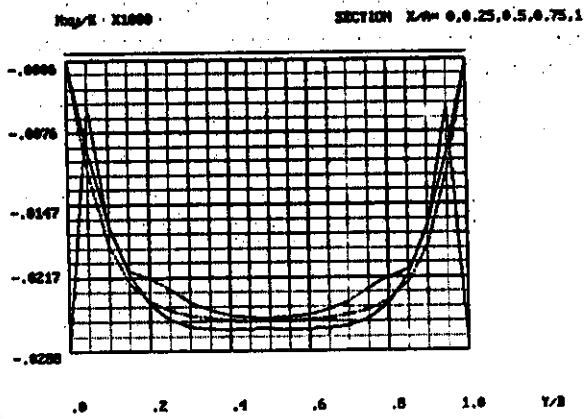
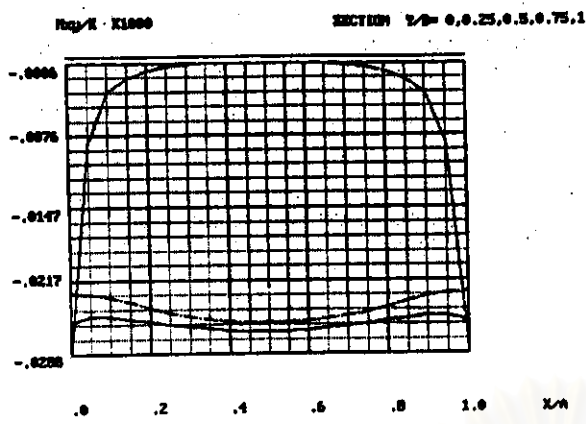
$$\frac{A}{B} = 0.5$$

$$\frac{f}{h} = 2.0$$

$$\frac{P_3 AB}{Eh^2} = 0.005$$

$$\nu = 0.3$$





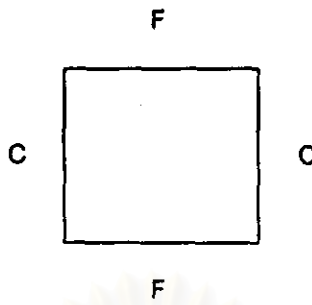
ผลของกรณีที่ 4 :

$$\frac{A}{B} = 0.5$$

$$\frac{f}{h} = 2.0$$

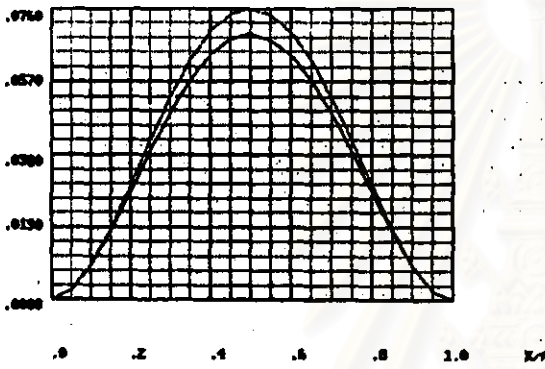
$$\frac{P_3 AB}{Eh^2} = 0.01$$

$$\nu = 0.3$$



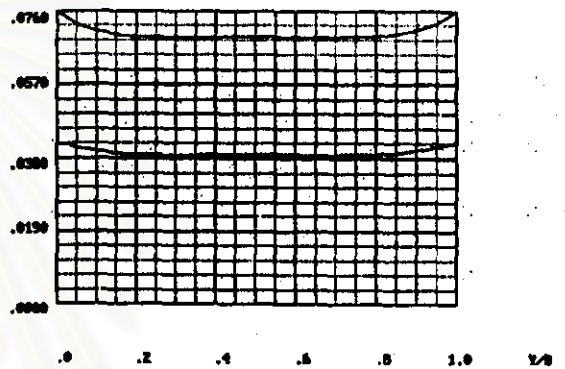
$w(h/AB) \times 1000$

SECTION $l/b = 0.0, 0.25, 0.5, 0.75, 1$



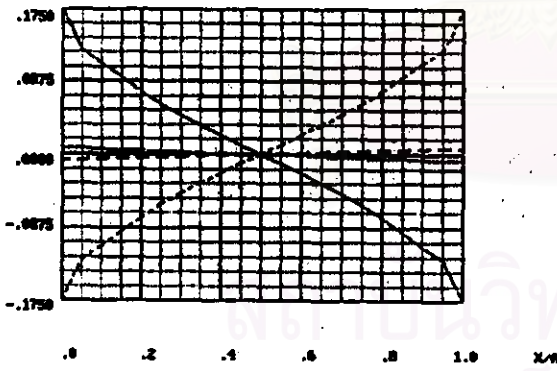
$w(h/AB) \times 1000$

SECTION $l/b = 0.0, 0.25, 0.5, 0.75, 1$



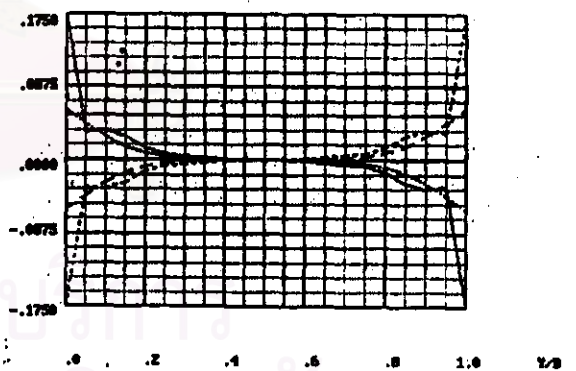
$\theta_{30}/K \times 10000$

SECTION $l/b = 0.0, 0.25, 0.5, 0.75, 1$



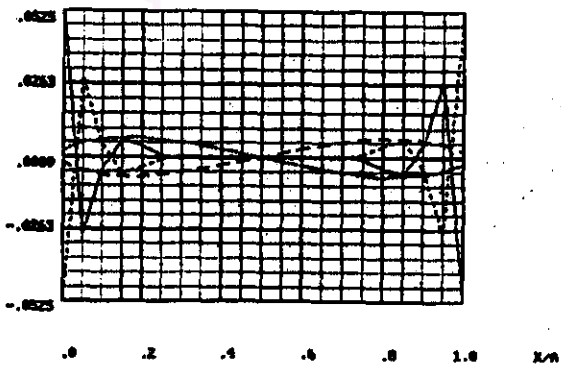
$\theta_{30}/K \times 10000$

SECTION $l/b = 0.0, 0.25, 0.5, 0.75, 1$



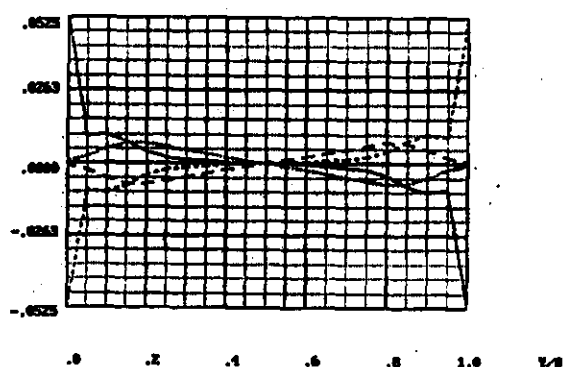
$\theta_{30}/K \times 10000$

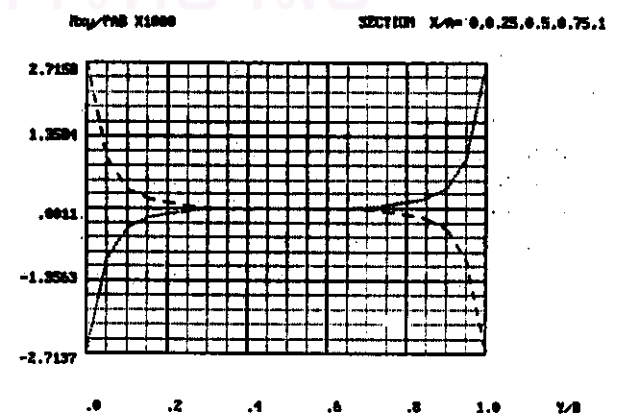
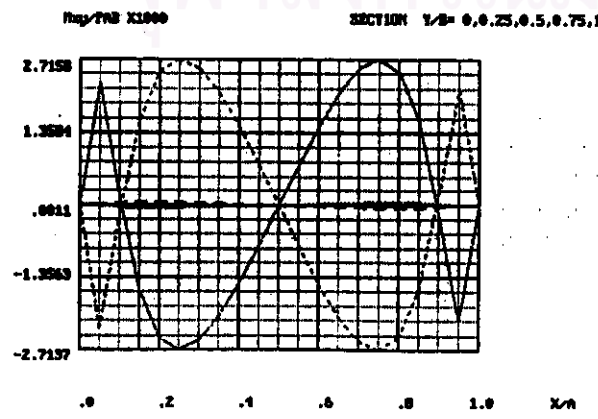
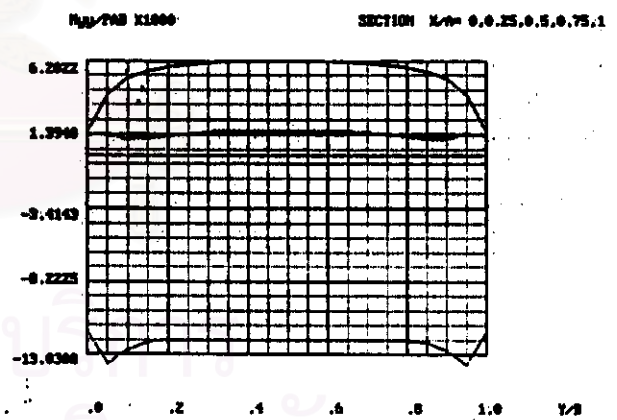
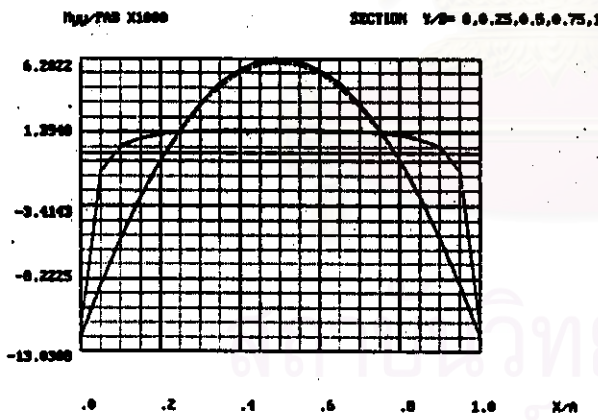
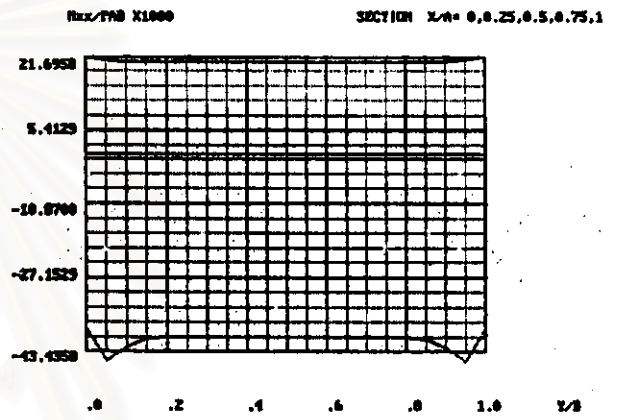
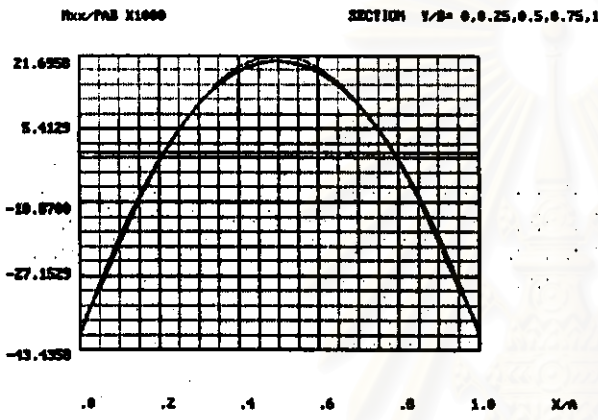
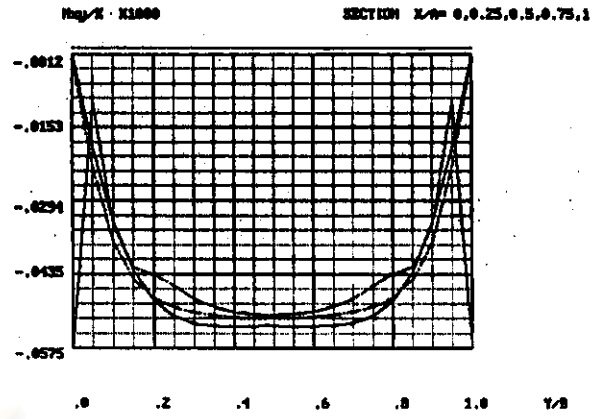
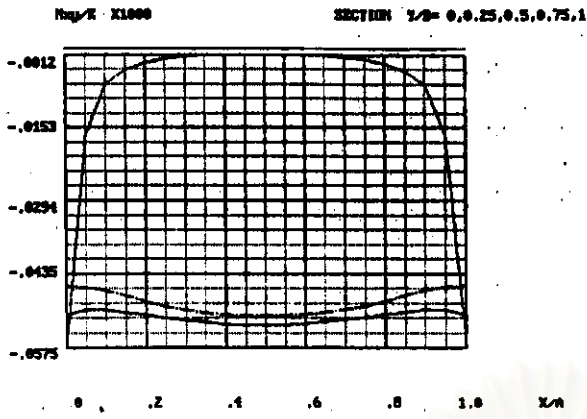
SECTION $l/b = 0.0, 0.25, 0.5, 0.75, 1$



$\theta_{30}/K \times 10000$

SECTION $l/b = 0.0, 0.25, 0.5, 0.75, 1$





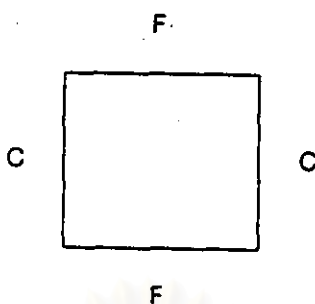
ผลของกรณีที่ 4 :

$$\frac{A}{B} = 0.5$$

$$\frac{f}{h} = 4.0$$

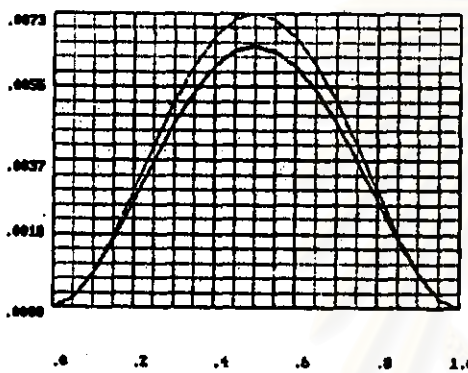
$$\frac{P_3 AB}{Eh^2} = 0.001$$

$$\nu = 0.3$$



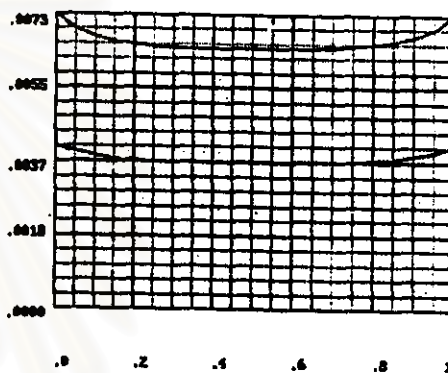
$w(h/AB) \times 1000$

SECTION $Y/B = 0, 0.25, 0.5, 0.75, 1$



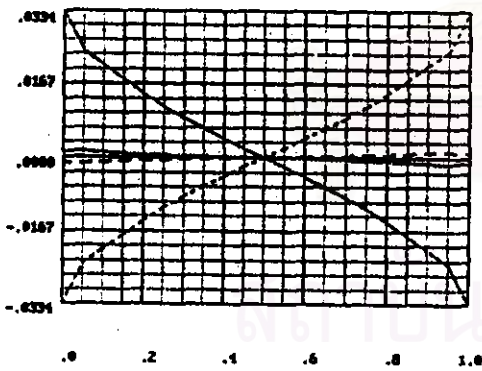
$w(h/AB) \times 1000$

SECTION $X/h = 0, 0.25, 0.5, 0.75, 1$



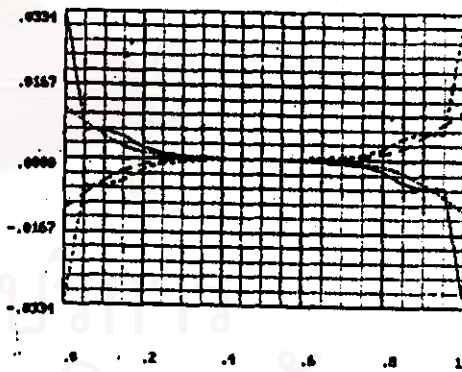
$M_{xx}/K \times 1000$

SECTION $Y/B = 0, 0.25, 0.5, 0.75, 1$



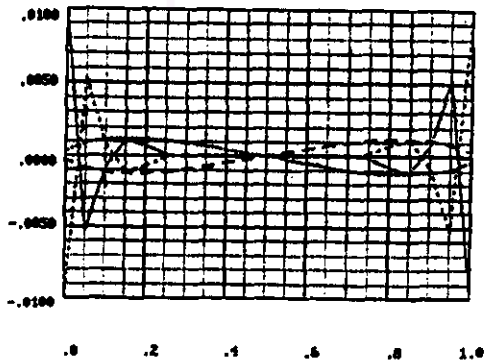
$M_{xx}/K \times 1000$

SECTION $X/h = 0, 0.25, 0.5, 0.75, 1$



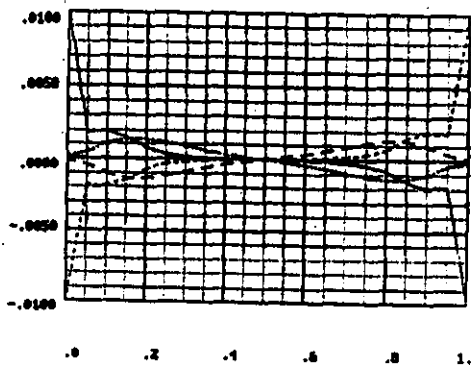
$M_{yy}/K \times 1000$

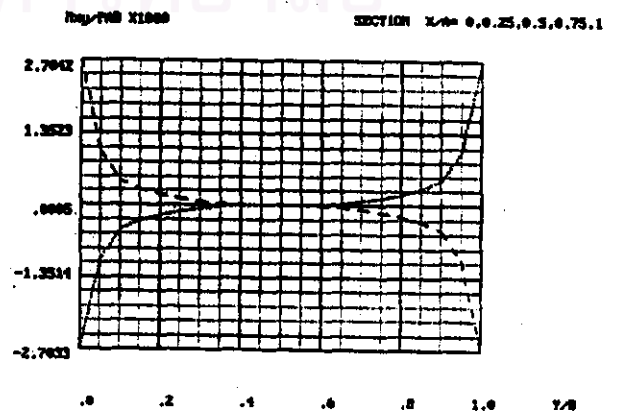
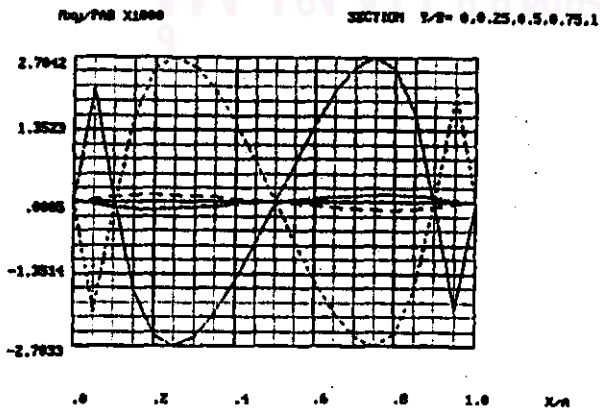
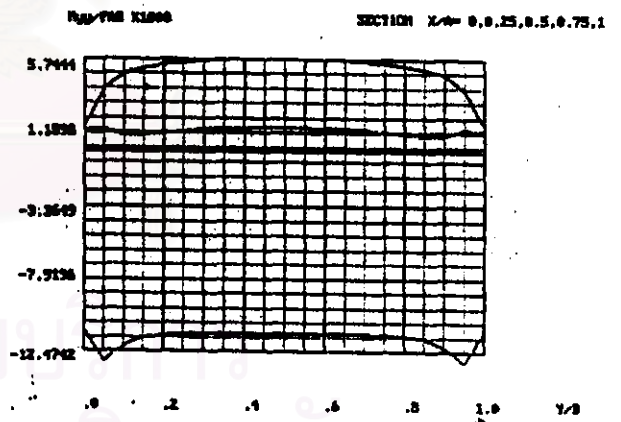
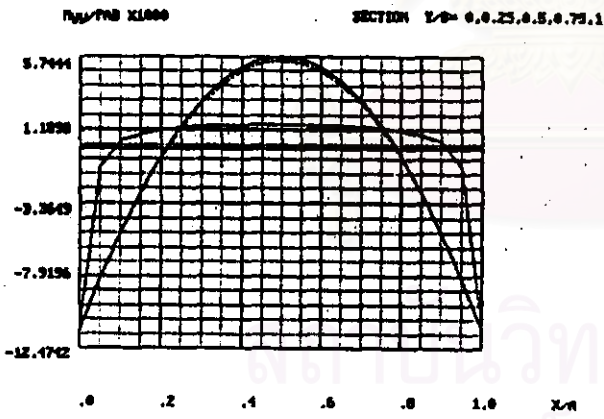
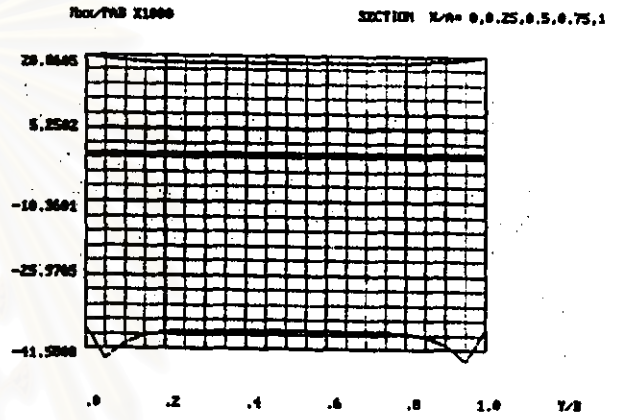
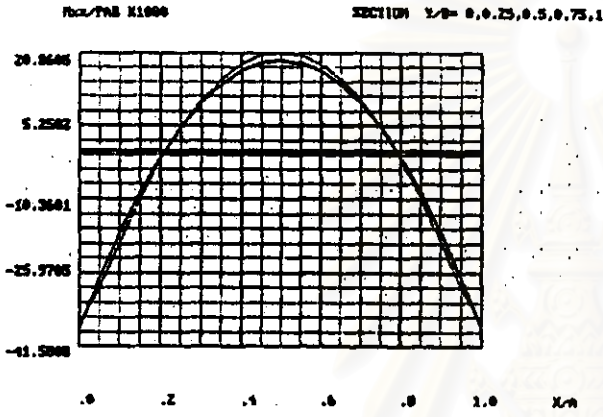
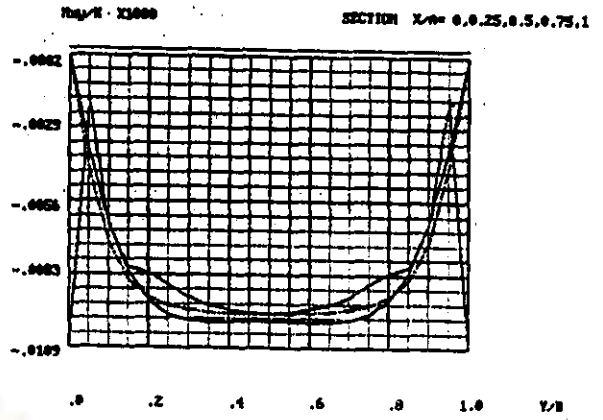
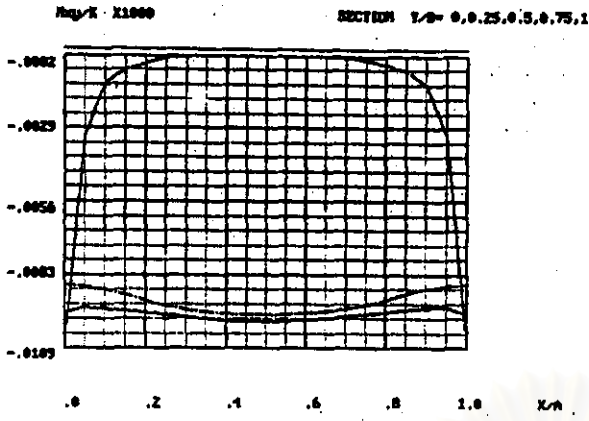
SECTION $Y/B = 0, 0.25, 0.5, 0.75, 1$



$M_{yy}/K \times 1000$

SECTION $X/h = 0, 0.25, 0.5, 0.75, 1$





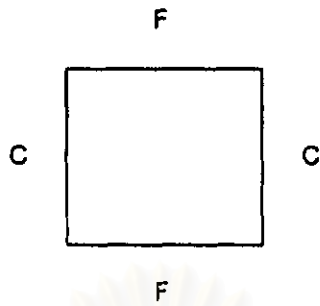
ผลของกรณีที่ 4 :

$$\frac{A}{B} = 0.5$$

$$\frac{f}{h} = 4.0$$

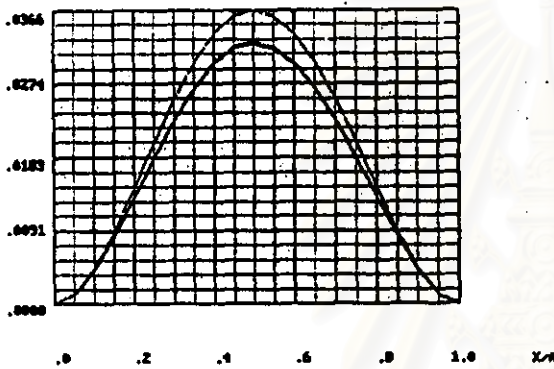
$$\frac{P_3 AB}{Eh^2} = 0.005$$

$$\nu = 0.3$$



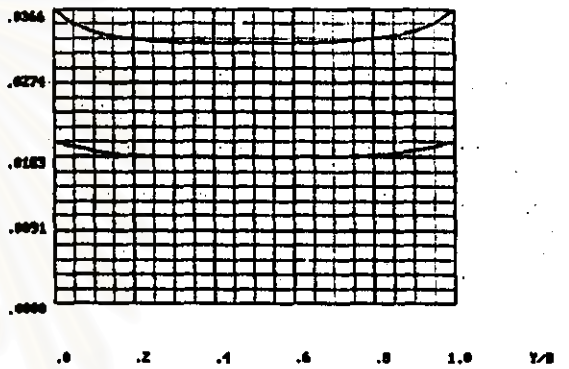
$u(h/8) \times 1000$

SECTION $Y/B = 0, 0.25, 0.5, 0.75, 1$



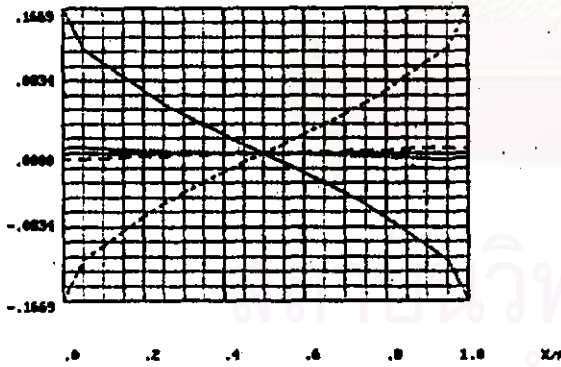
$u(h/8) \times 1000$

SECTION $X/h = 0, 0.25, 0.5, 0.75, 1$



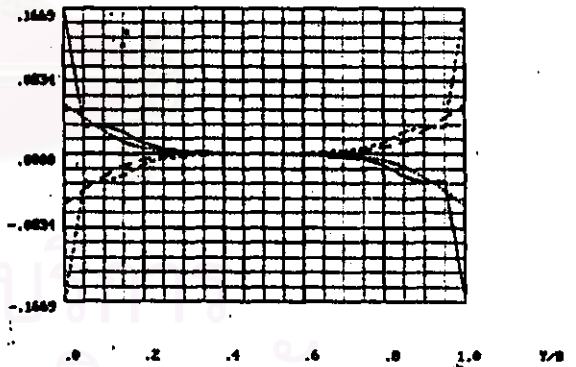
$\theta_{xx}(X) \times 10000$

SECTION $Y/B = 0, 0.25, 0.5, 0.75, 1$



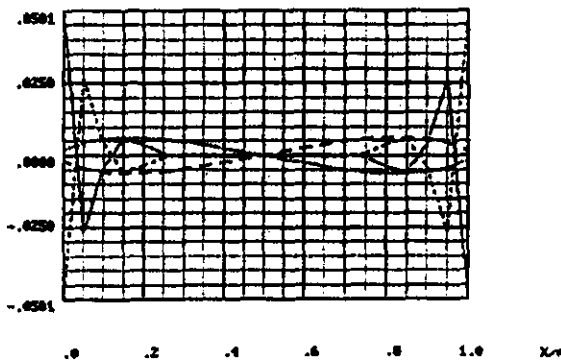
$\theta_{xx}(X) \times 10000$

SECTION $X/h = 0, 0.25, 0.5, 0.75, 1$



$\theta_{yy}(X) \times 10000$

SECTION $Y/B = 0, 0.25, 0.5, 0.75, 1$



$\theta_{yy}(X) \times 10000$

SECTION $X/h = 0, 0.25, 0.5, 0.75, 1$

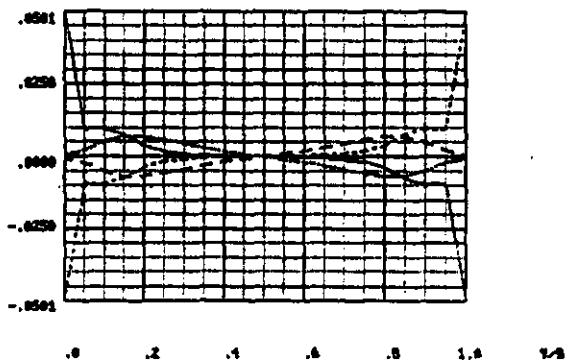


Fig. K X1000

SECTION Y/B = 0.0, 0.25, 0.5, 0.75, 1

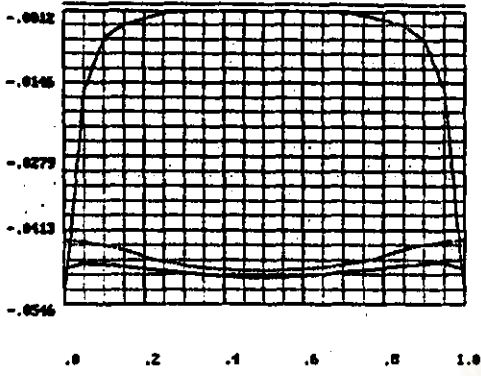


Fig. K X1000

SECTION X/A = 0.0, 0.25, 0.5, 0.75, 1

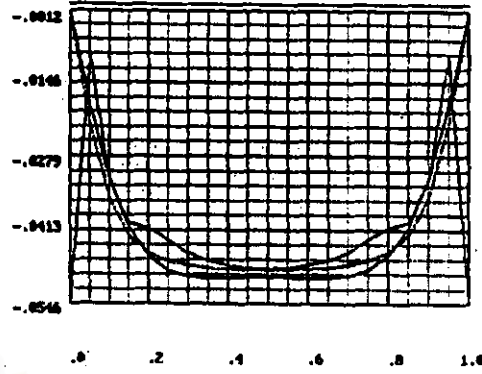


Fig. TAB X1000

SECTION Y/B = 0.0, 0.25, 0.5, 0.75, 1

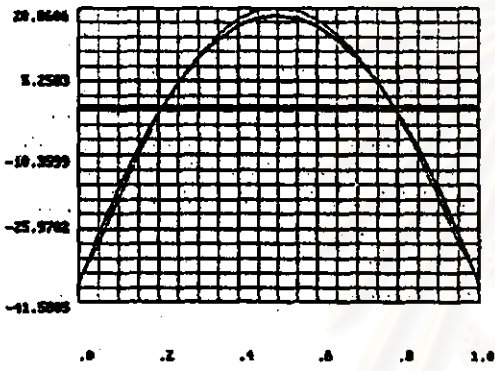


Fig. TAB X1000

SECTION X/A = 0.0, 0.25, 0.5, 0.75, 1

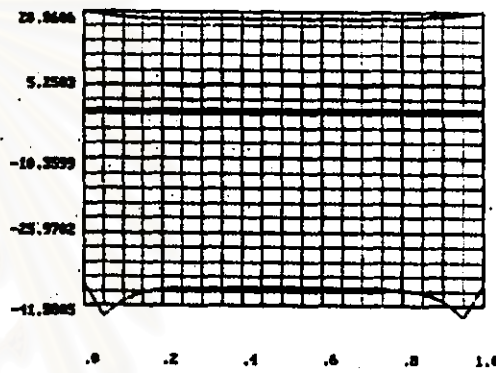


Fig. TAB X1000

SECTION Y/B = 0.0, 0.25, 0.5, 0.75, 1

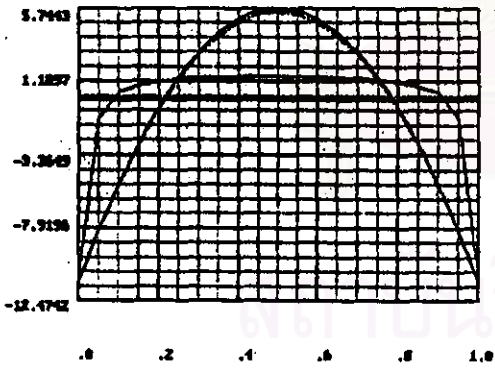


Fig. TAB X1000

SECTION X/A = 0.0, 0.25, 0.5, 0.75, 1

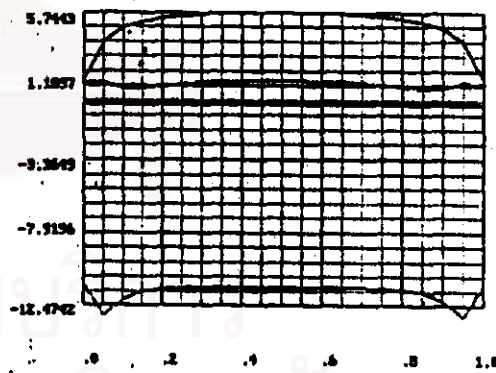


Fig. TAB X1000

SECTION Y/B = 0.0, 0.25, 0.5, 0.75, 1

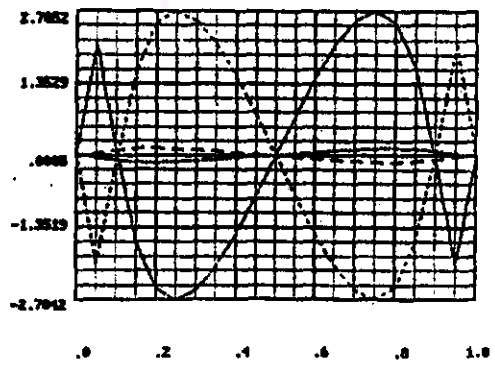
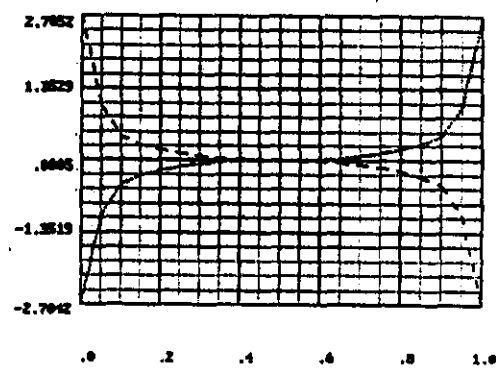


Fig. TAB X1000

SECTION X/A = 0.0, 0.25, 0.5, 0.75, 1



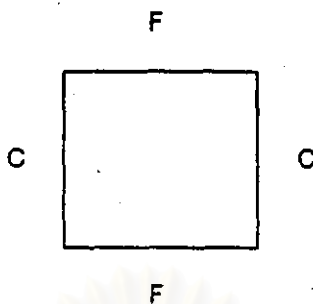
ผลของกรณีที่ 4 :

$$\frac{A}{B} = 0.5$$

$$\frac{f}{h} = 4.0$$

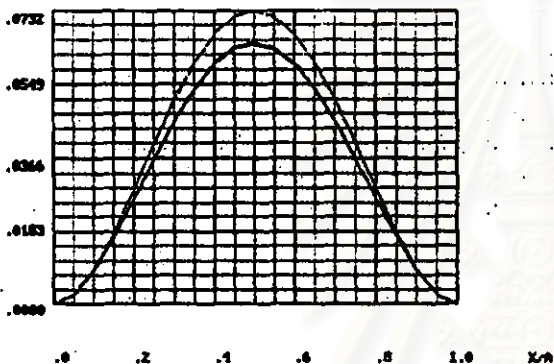
$$\frac{P_3 AB}{Eh^2} = 0.01$$

$$\nu = 0.3$$



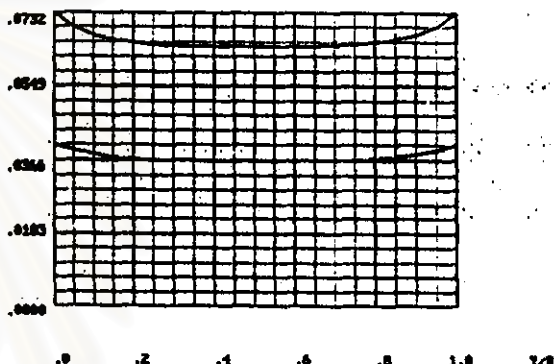
$v(L/AB) \times 1000$

SECTION $Y/B = 0, 0.25, 0.5, 0.75, 1$



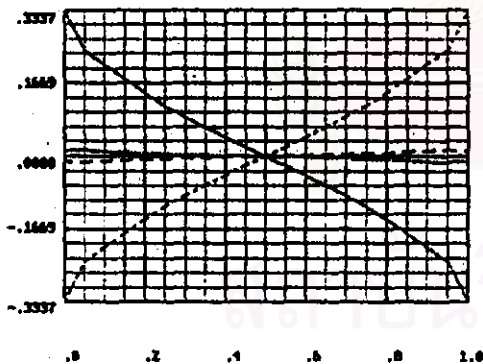
$v(L/AB) \times 1000$

SECTION $X/A = 0, 0.25, 0.5, 0.75, 1$



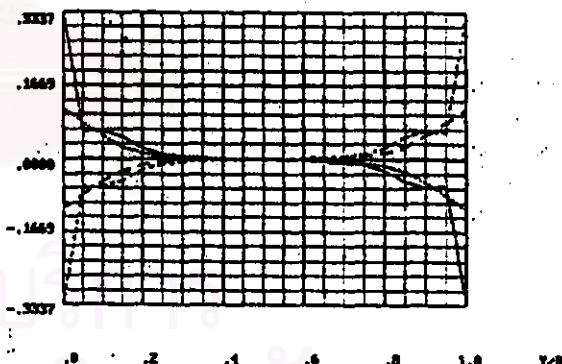
$w_{max}/A \times 1000$

SECTION $Y/B = 0, 0.25, 0.5, 0.75, 1$



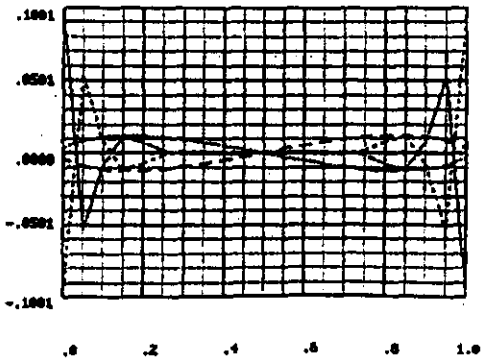
$w_{max}/A \times 1000$

SECTION $X/A = 0, 0.25, 0.5, 0.75, 1$



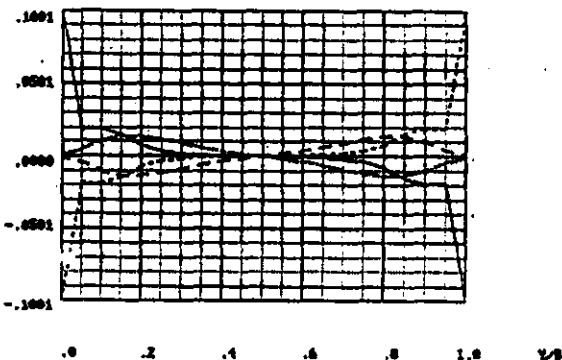
$\theta_{max}/A \times 1000$

SECTION $Y/B = 0, 0.25, 0.5, 0.75, 1$



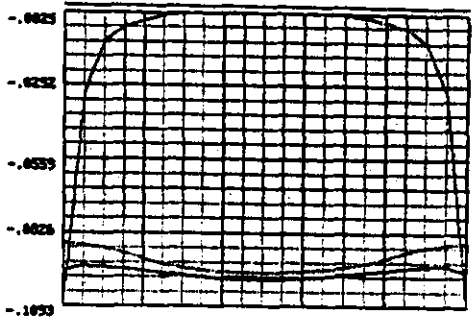
$\theta_{max}/A \times 1000$

SECTION $X/A = 0, 0.25, 0.5, 0.75, 1$



R_{xy}/K X1000

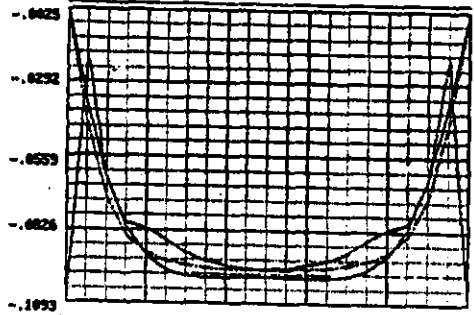
SECTION Y/B = 0.0, 0.25, 0.5, 0.75, 1



0 .2 .4 .6 .8 1.0 X/B

R_{xy}/K X1000

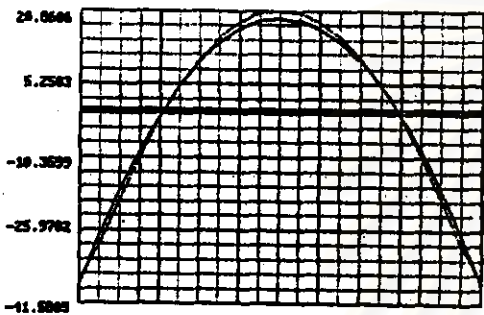
SECTION X/A = 0.0, 0.25, 0.5, 0.75, 1



0 .2 .4 .6 .8 1.0 Y/B

R_{xy}/PAB X1000

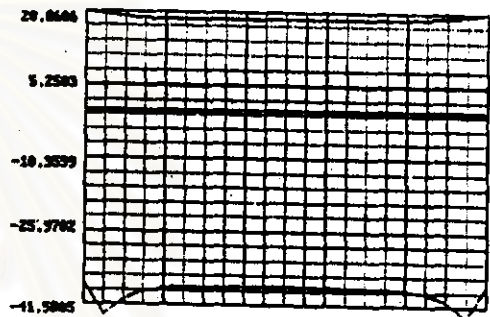
SECTION Y/B = 0.0, 0.25, 0.5, 0.75, 1



0 .2 .4 .6 .8 1.0 X/B

R_{xy}/PAB X1000

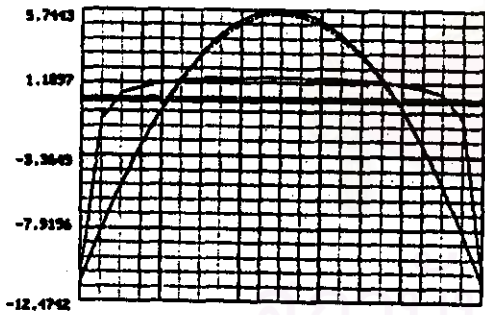
SECTION X/A = 0.0, 0.25, 0.5, 0.75, 1



0 .2 .4 .6 .8 1.0 Y/B

R_{xy}/PAB X1000

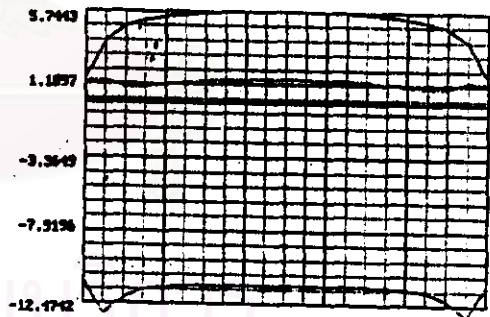
SECTION Y/B = 0.0, 0.25, 0.5, 0.75, 1



0 .2 .4 .6 .8 1.0 X/B

R_{xy}/PAB X1000

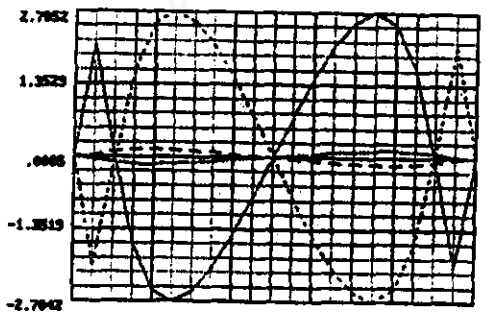
SECTION X/A = 0.0, 0.25, 0.5, 0.75, 1



0 .2 .4 .6 .8 1.0 Y/B

R_{xy}/PAB X1000

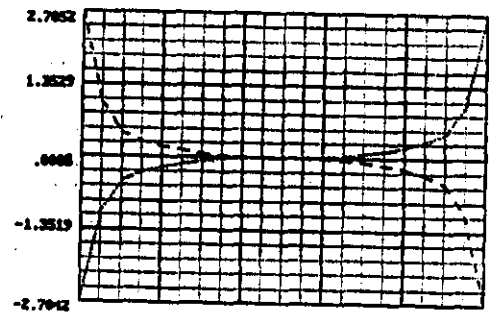
SECTION Y/B = 0.0, 0.25, 0.5, 0.75, 1



0 .2 .4 .6 .8 1.0 X/B

R_{xy}/PAB X1000

SECTION X/A = 0.0, 0.25, 0.5, 0.75, 1



0 .2 .4 .6 .8 1.0 Y/B

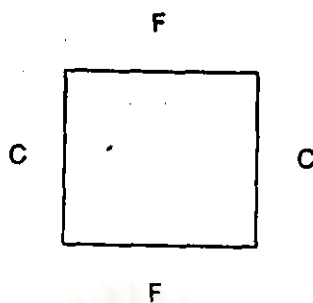
ผลของกรณีที่ 4 :

$$\frac{A}{B} = 0.5$$

$$\frac{f}{h} = 6.0$$

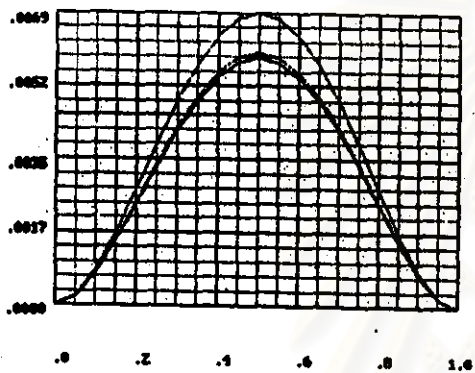
$$\frac{P_3 AB}{Eh^2} = 0.001$$

$$\nu = 0.3$$



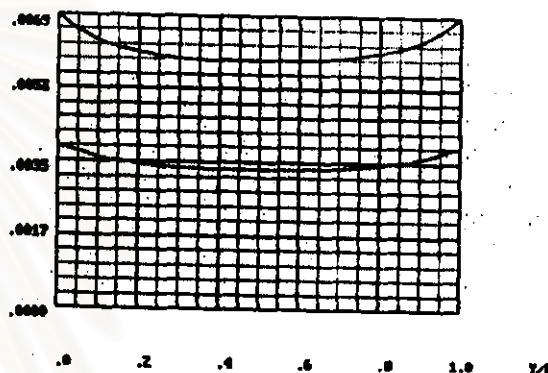
$u(h/\nu B) \times 1000$

SECTION $Y/B = 0, 0.25, 0.5, 0.75, 1$



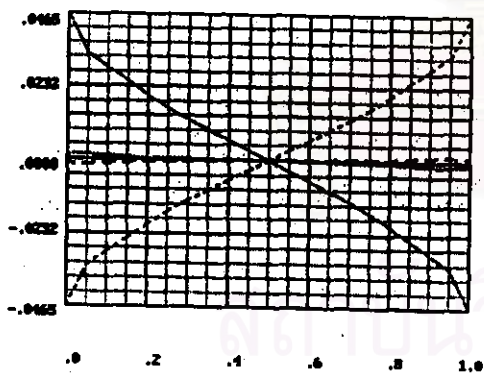
$v(h/\nu B) \times 1000$

SECTION $X/h = 0, 0.25, 0.5, 0.75, 1$



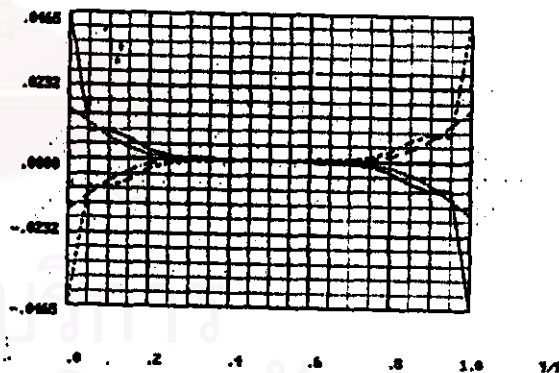
$\theta_{xz}/E \times 1000$

SECTION $Y/B = 0, 0.25, 0.5, 0.75, 1$



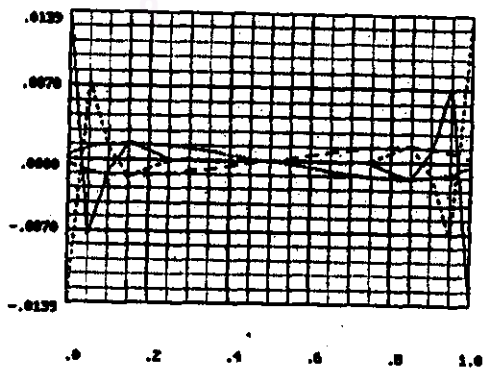
$\theta_{yz}/E \times 1000$

SECTION $X/h = 0, 0.25, 0.5, 0.75, 1$



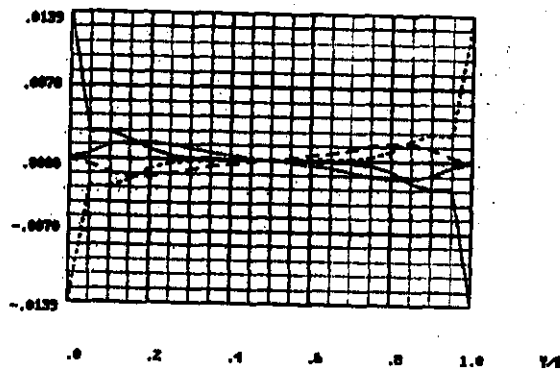
$\theta_{xy}/E \times 1000$

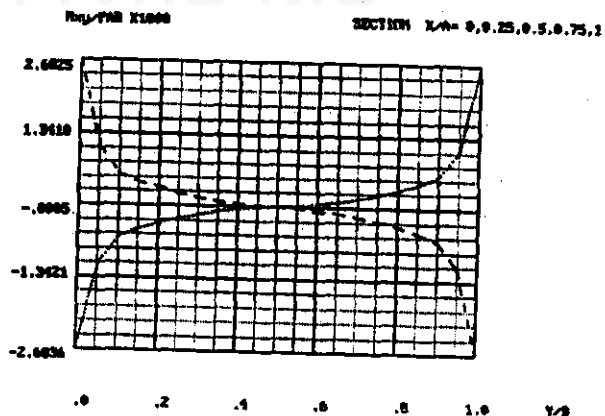
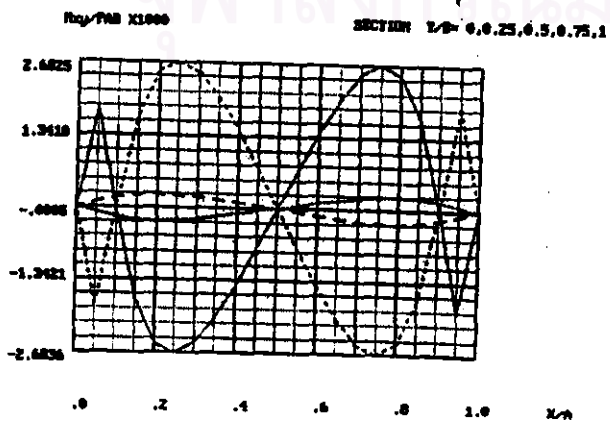
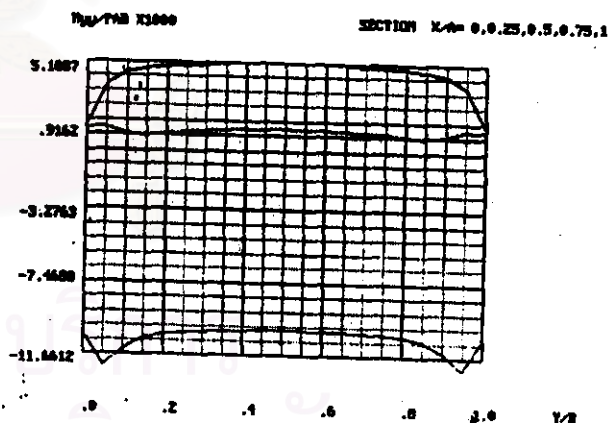
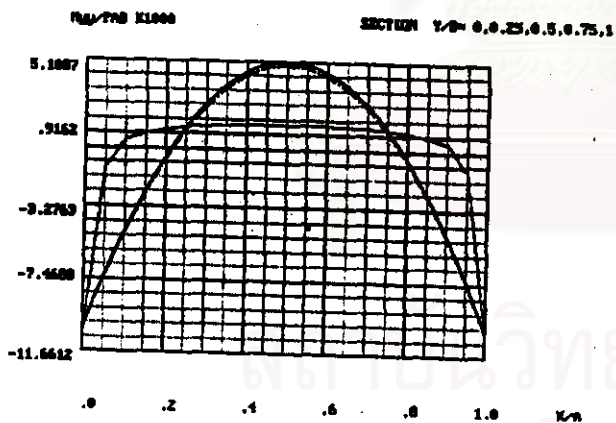
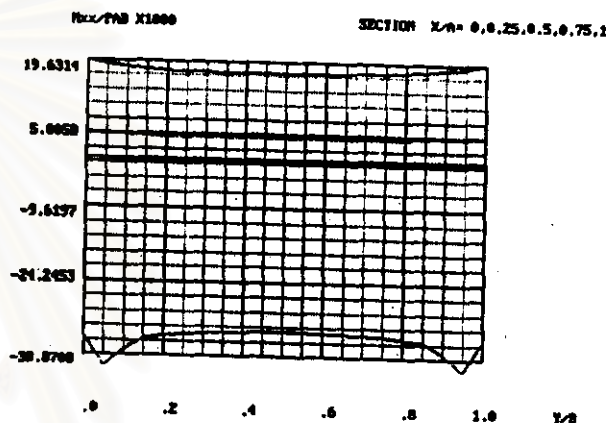
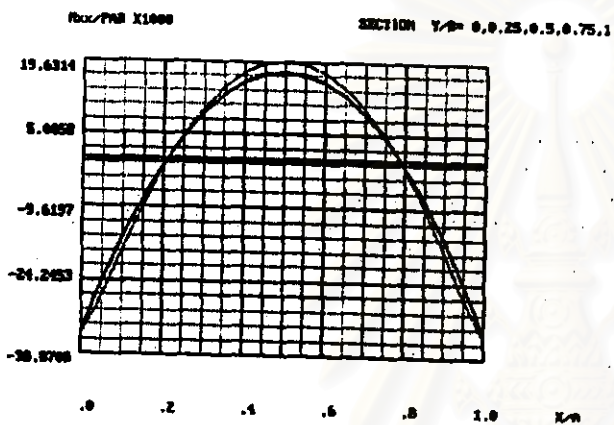
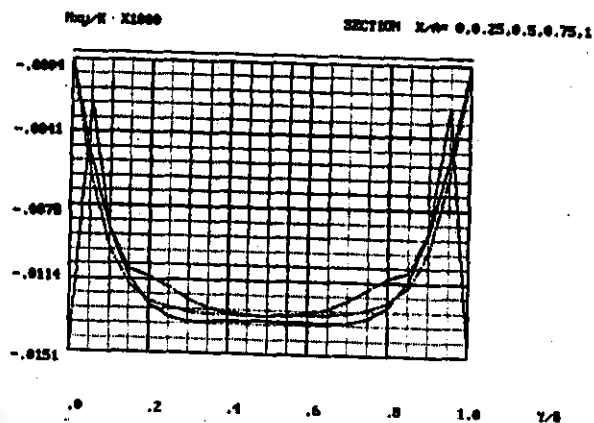
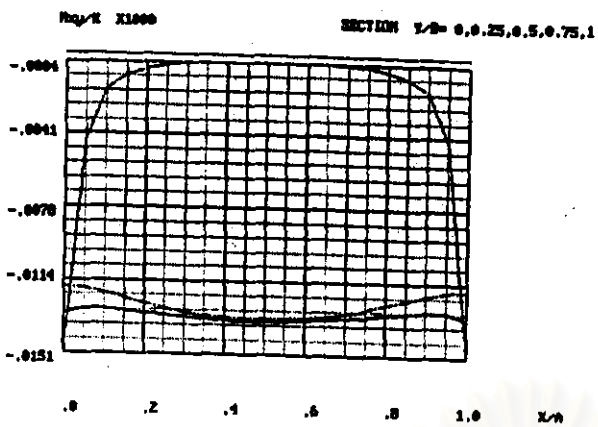
SECTION $Y/B = 0, 0.25, 0.5, 0.75, 1$



$\theta_{yx}/E \times 1000$

SECTION $X/h = 0, 0.25, 0.5, 0.75, 1$





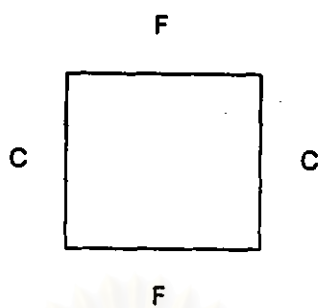
ผลของกรณีที่ 4 :

$$\frac{A}{B} = 0.5$$

$$\frac{f}{h} = 6.0$$

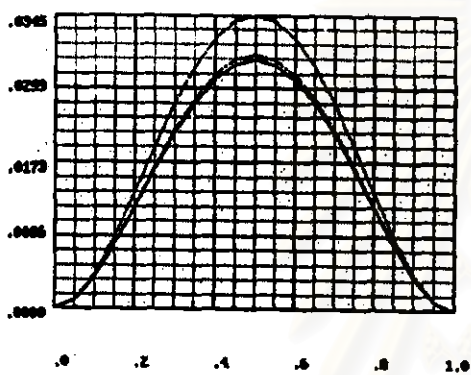
$$\frac{P_3 AB}{Eh^2} = 0.005$$

$$\nu = 0.3$$



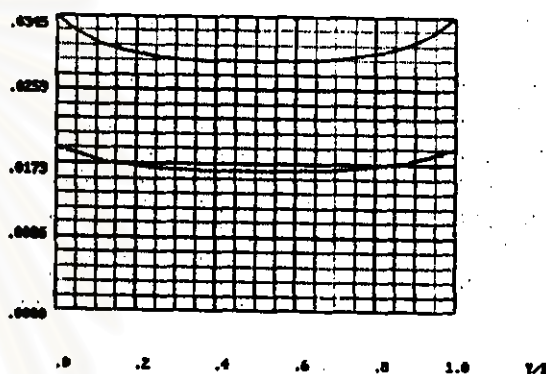
$w(h/AB) \times 1000$

SECTION $L/h = 0, 0.25, 0.5, 0.75, 1$



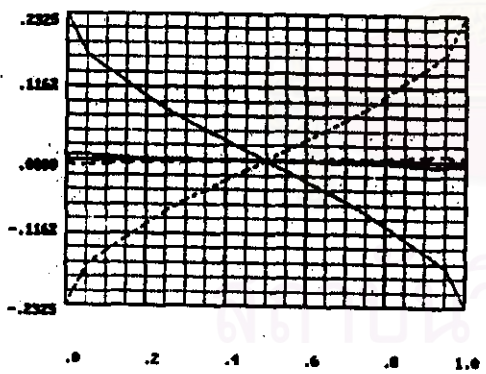
$w(h/AB) \times 1000$

SECTION $L/h = 0, 0.25, 0.5, 0.75, 1$



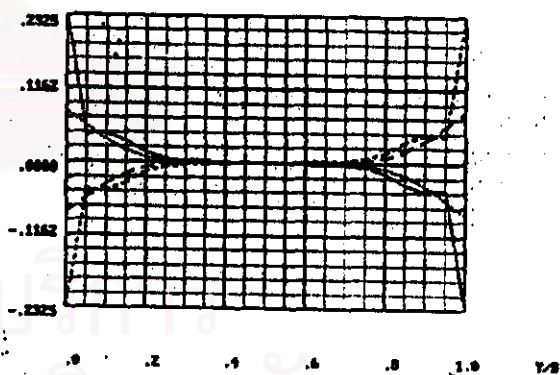
$\theta_{max} \times 1000$

SECTION $L/h = 0, 0.25, 0.5, 0.75, 1$



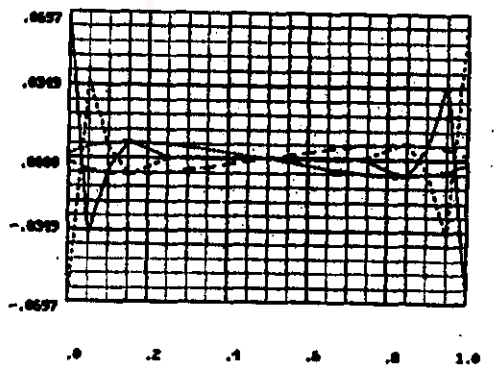
$\theta_{max} \times 1000$

SECTION $L/h = 0, 0.25, 0.5, 0.75, 1$



$\theta_{min} \times 1000$

SECTION $L/h = 0, 0.25, 0.5, 0.75, 1$



$\theta_{min} \times 1000$

SECTION $L/h = 0, 0.25, 0.5, 0.75, 1$

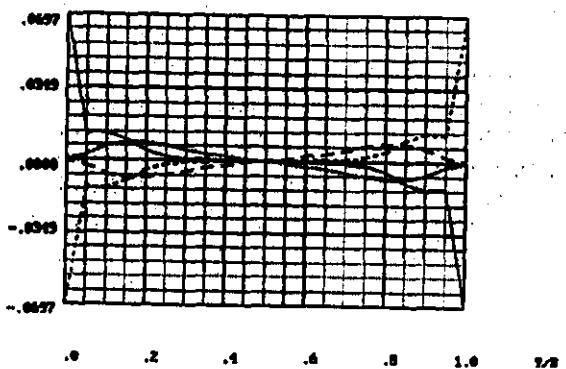


Fig. 2 X1000

SECTION Y/B = 0.0, 0.25, 0.5, 0.75, 1

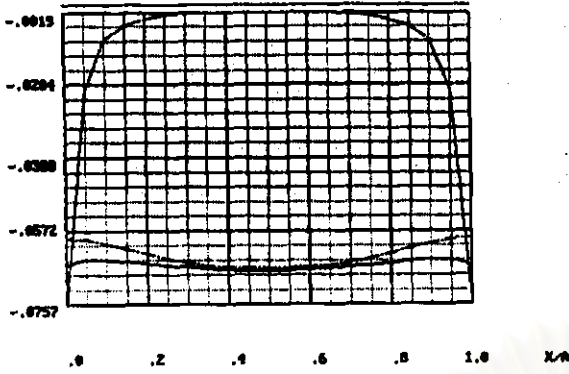


Fig. 2 X1000

SECTION X/A = 0.0, 0.25, 0.5, 0.75, 1

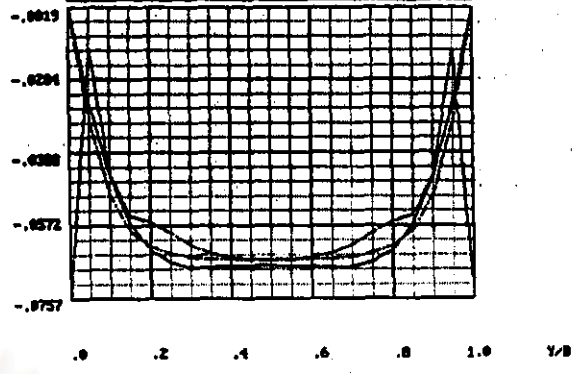


Fig. 7A X1000

SECTION Y/B = 0.0, 0.25, 0.5, 0.75, 1

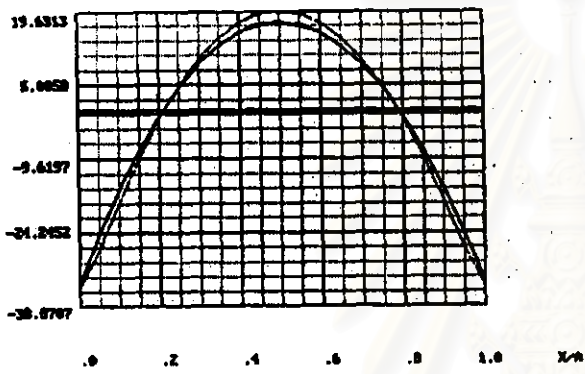


Fig. 7A X1000

SECTION X/A = 0.0, 0.25, 0.5, 0.75, 1

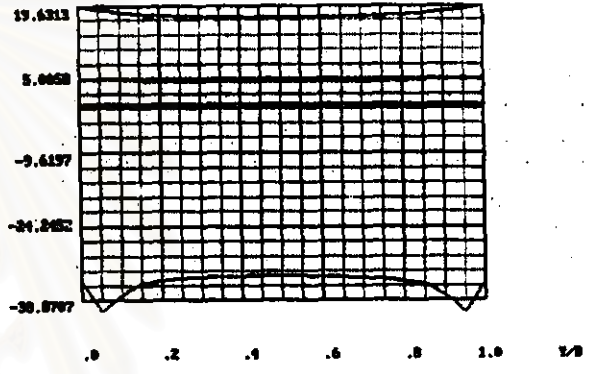


Fig. 7B X1000

SECTION Y/B = 0.0, 0.25, 0.5, 0.75, 1

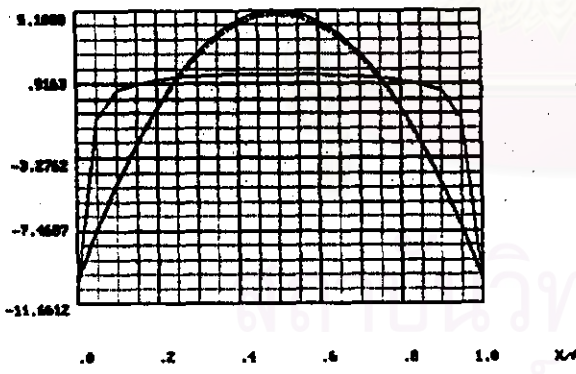


Fig. 7B X1000

SECTION X/A = 0.0, 0.25, 0.5, 0.75, 1

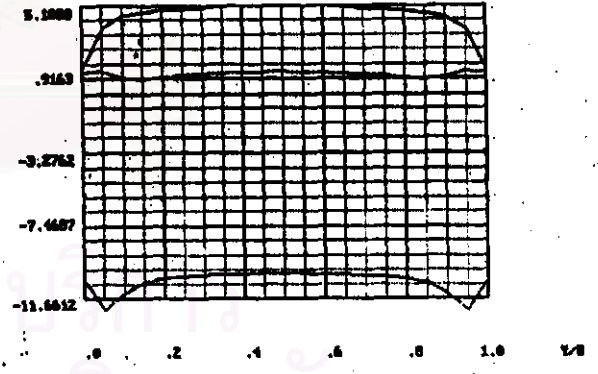


Fig. 7C X1000

SECTION Y/B = 0.0, 0.25, 0.5, 0.75, 1

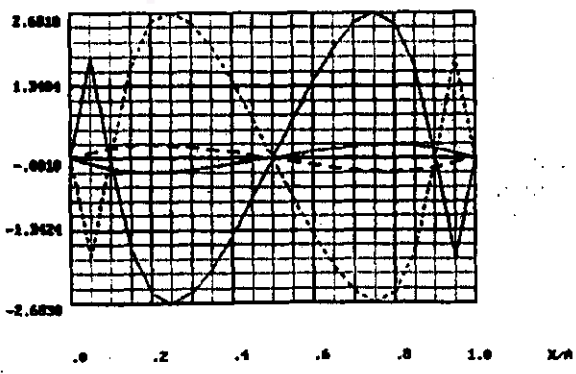
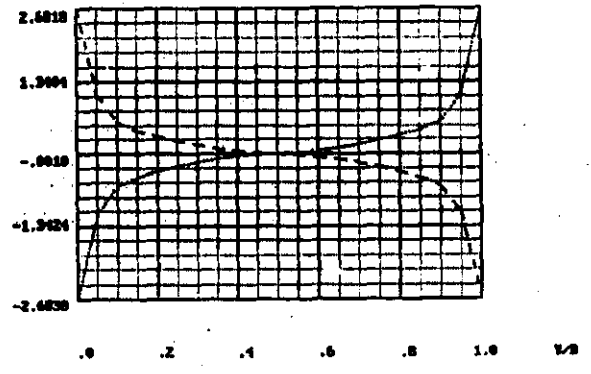


Fig. 7C X1000

SECTION X/A = 0.0, 0.25, 0.5, 0.75, 1



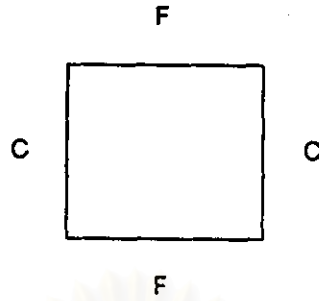
ผลของกรณีที่ 4 :

$$\frac{A}{B} = 0.5$$

$$\frac{f}{h} = 6.0$$

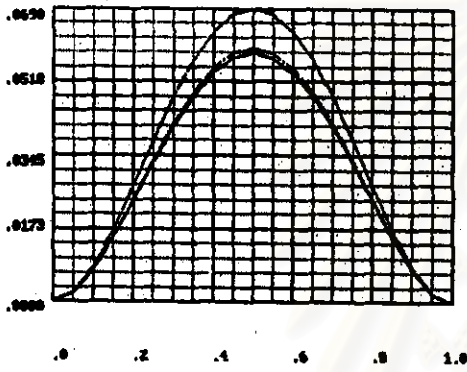
$$\frac{P_3 AB}{Eh^2} = 0.01$$

$$\nu = 0.3$$



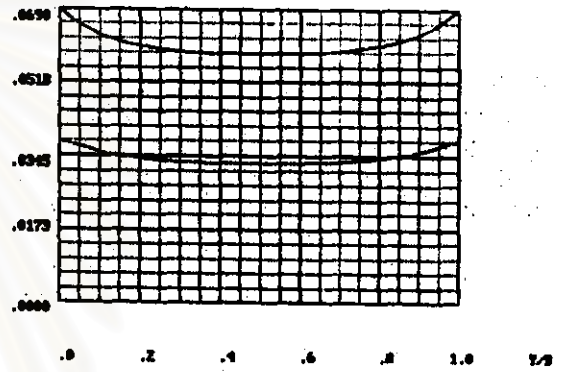
$v(h/AB) \times 1000$

SECTION $L/B = 0.0, 0.25, 0.5, 0.75, 1$



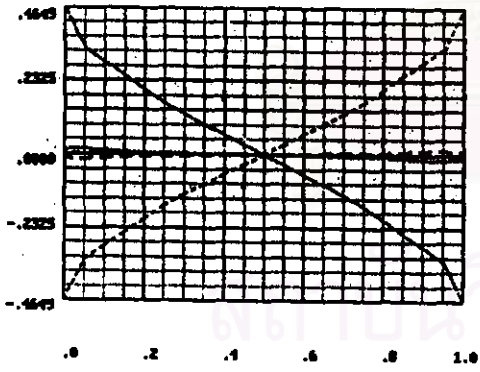
$v(h/AB) \times 1000$

SECTION $L/B = 0.0, 0.25, 0.5, 0.75, 1$



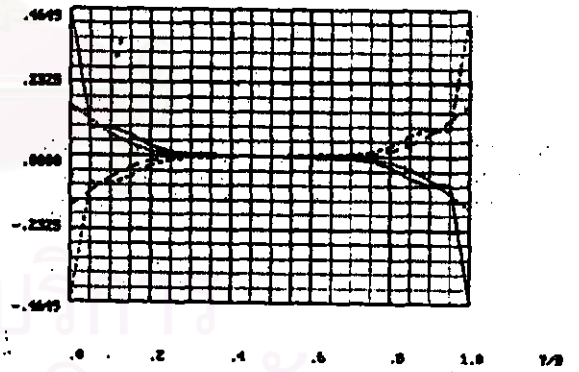
$M_{xx}/K \times 1000$

SECTION $L/B = 0.0, 0.25, 0.5, 0.75, 1$



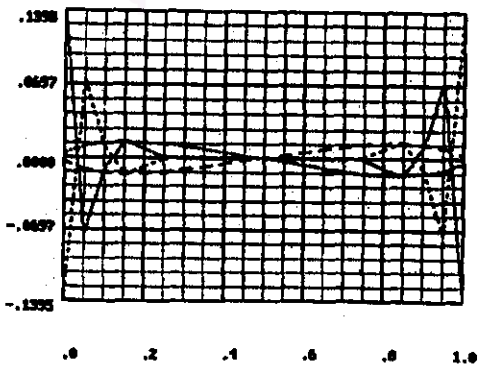
$M_{xx}/K \times 1000$

SECTION $L/B = 0.0, 0.25, 0.5, 0.75, 1$



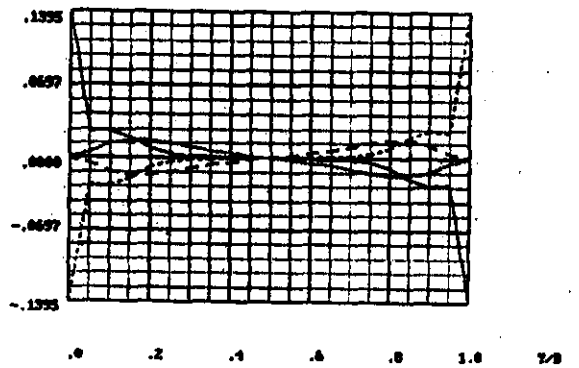
$M_{yy}/K \times 1000$

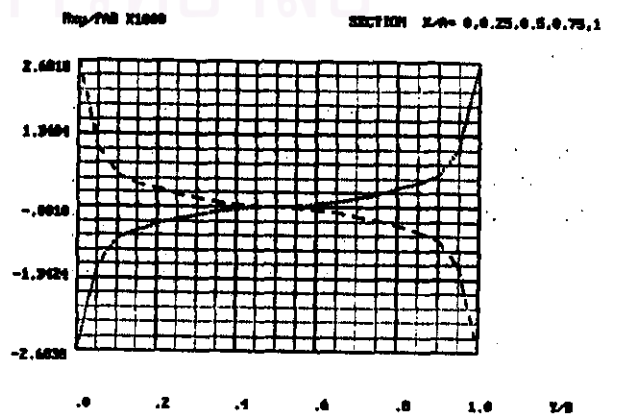
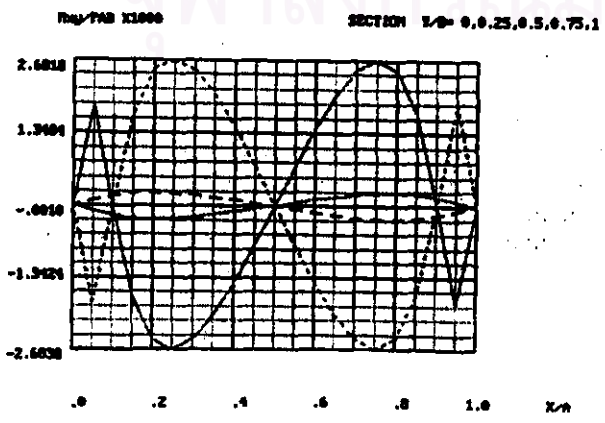
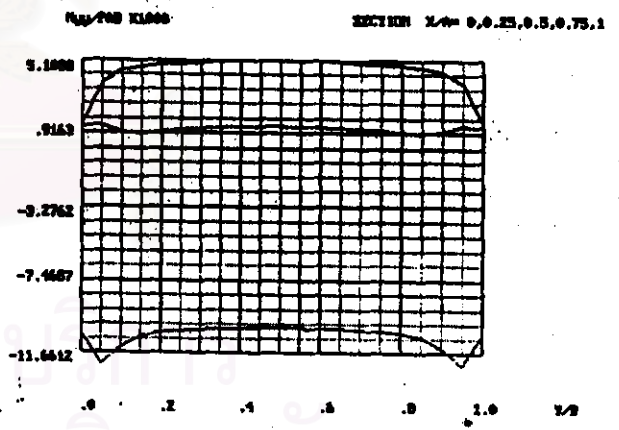
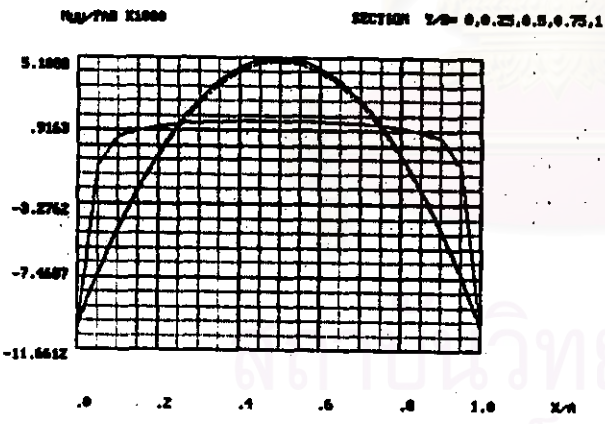
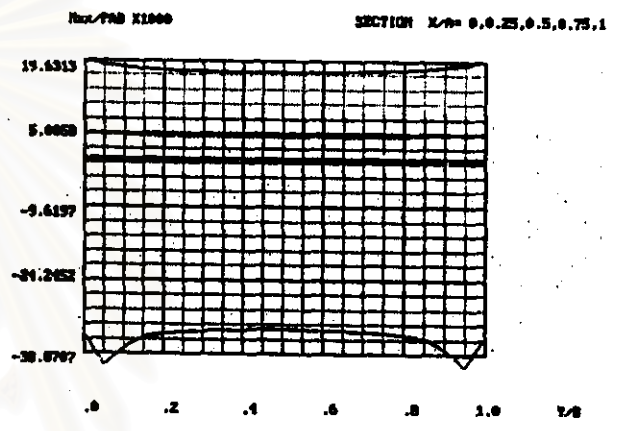
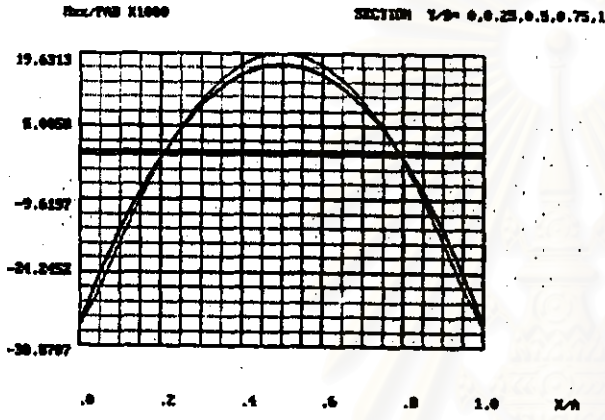
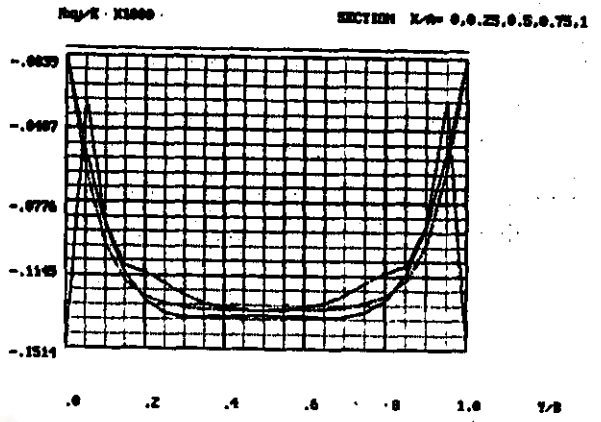
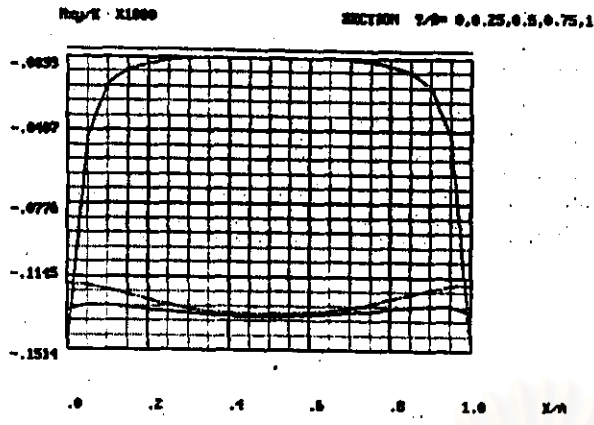
SECTION $L/B = 0.0, 0.25, 0.5, 0.75, 1$



$M_{yy}/K \times 1000$

SECTION $L/B = 0.0, 0.25, 0.5, 0.75, 1$





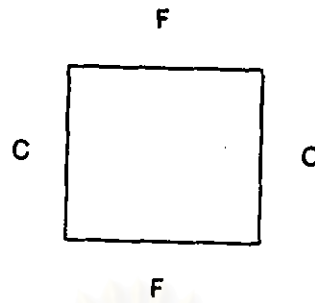
ผลของกรณีที่ 4 :

$$\frac{A}{B} = 1.0$$

$$\frac{f}{h} = 2.0$$

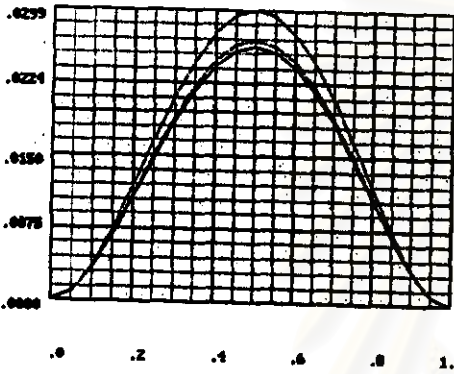
$$\frac{P_3 AB}{Eh^2} = 0.001$$

$$\nu = 0.3$$



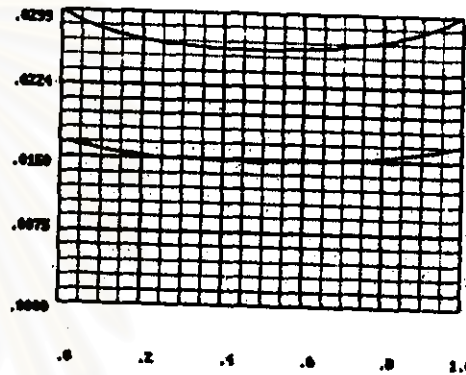
$u(h/AB) \times 1000$

SECTION $L/h = 0, 0.25, 0.5, 0.75, 1$



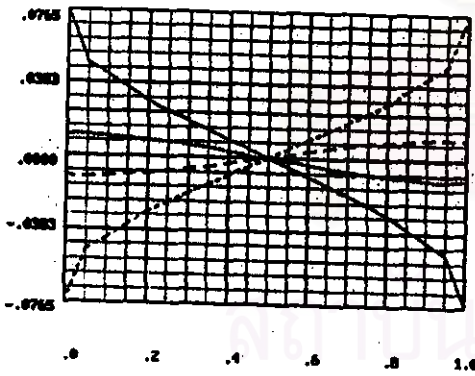
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SECTION $L/h = 0, 0.25, 0.5, 0.75, 1$



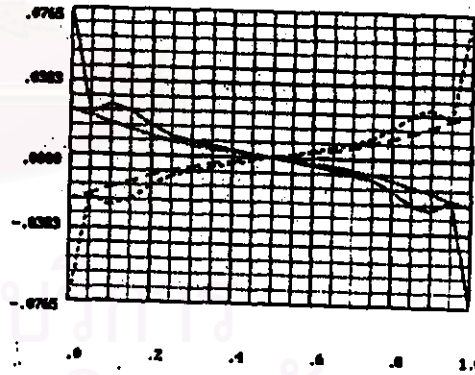
$\rho_{30}/K \times 1000$

SECTION $L/h = 0, 0.25, 0.5, 0.75, 1$



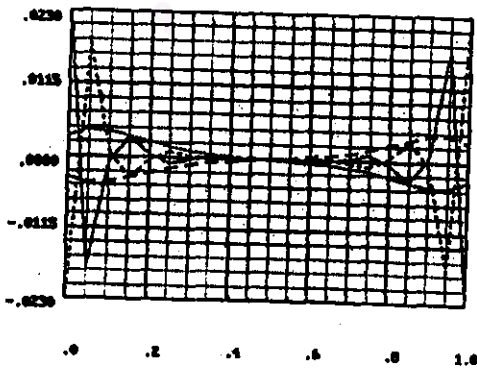
$\rho_{30}/K \times 1000$

SECTION $L/h = 0, 0.25, 0.5, 0.75, 1$



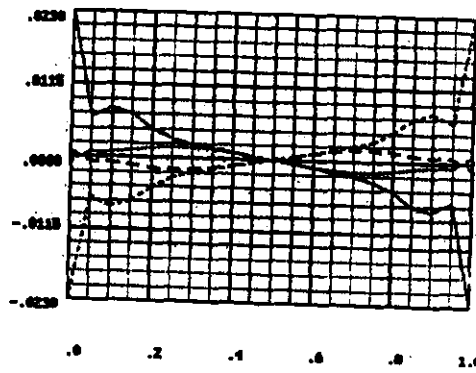
$\rho_{30}/K \times 1000$

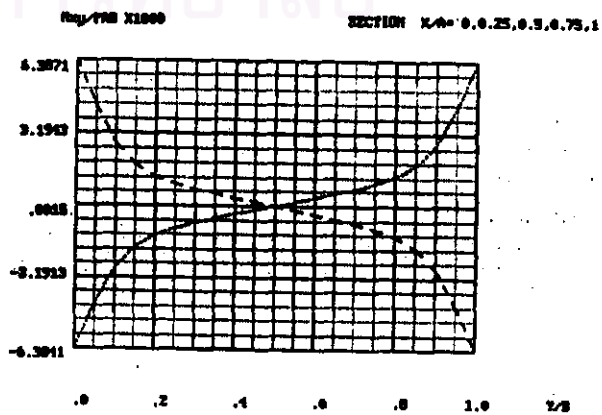
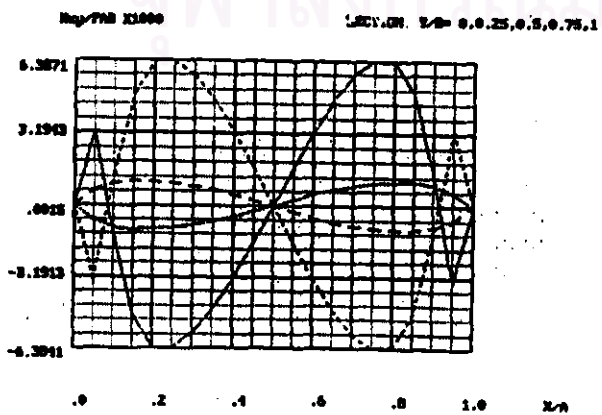
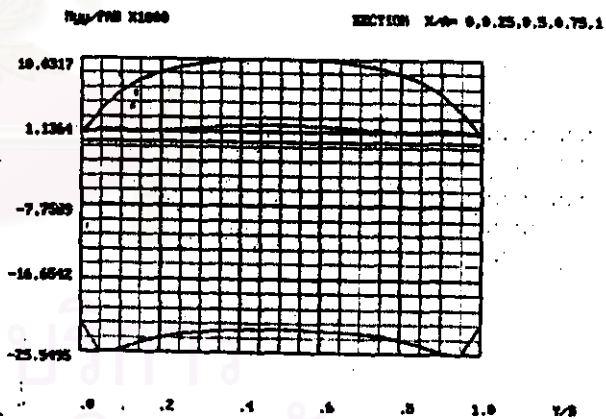
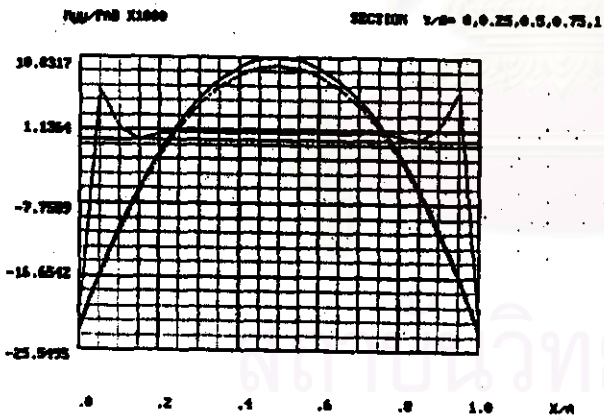
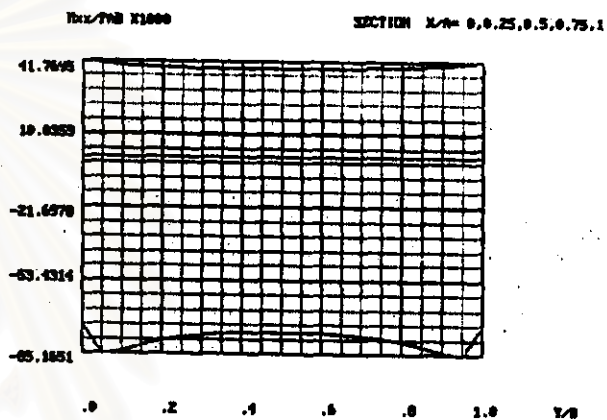
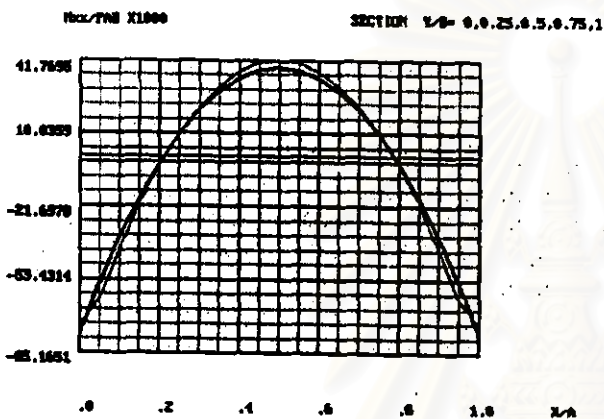
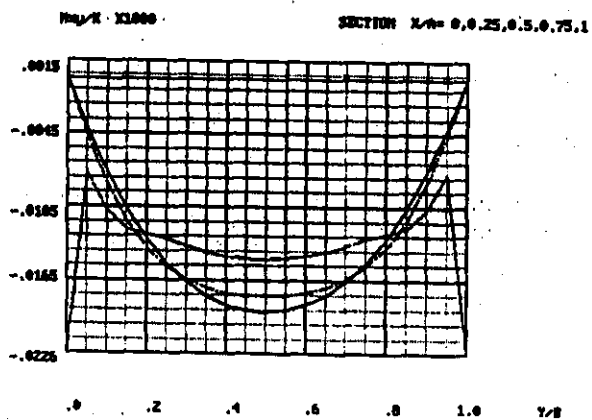
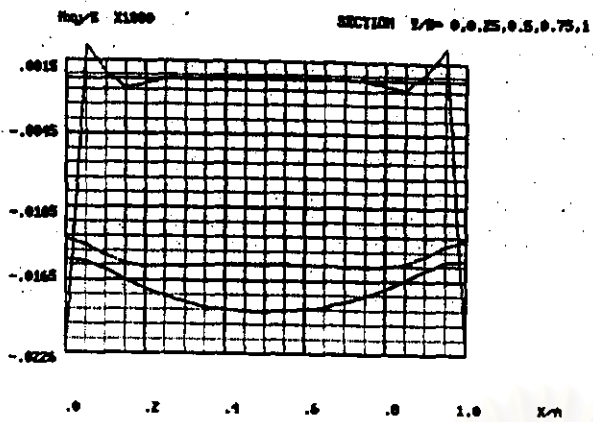
SECTION $L/h = 0, 0.25, 0.5, 0.75, 1$



$\rho_{30}/K \times 1000$

SECTION $L/h = 0, 0.25, 0.5, 0.75, 1$





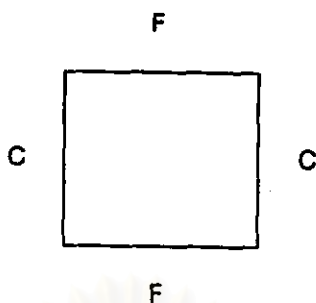
ผลของกรณีที่ 4 :

$$\frac{A}{B} = 1.0$$

$$\frac{f}{h} = 2.0$$

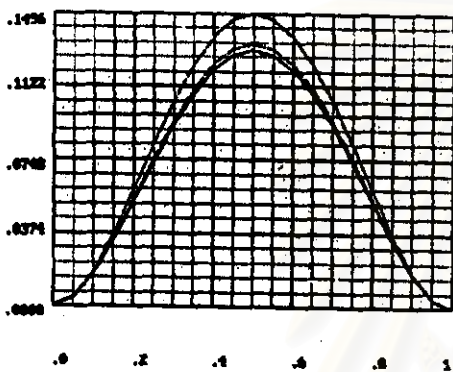
$$\frac{P_3 AB}{Eh^2} = 0.005$$

$$\nu = 0.3$$



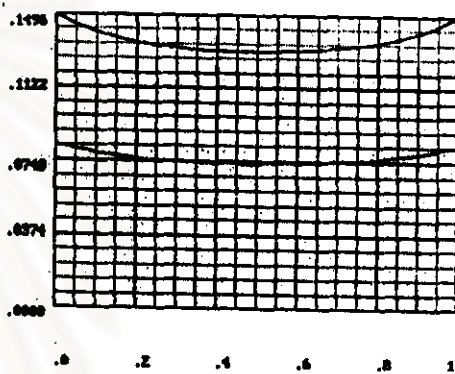
$w(h/AB) \times 1000$

SECTION $x/a = 0, 0.25, 0.5, 0.75, 1$



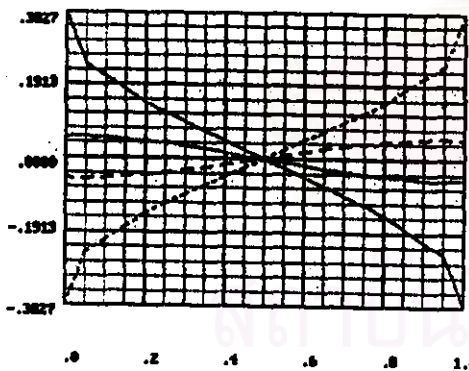
$w(h/AB) \times 1000$

SECTION $x/a = 0, 0.25, 0.5, 0.75, 1$



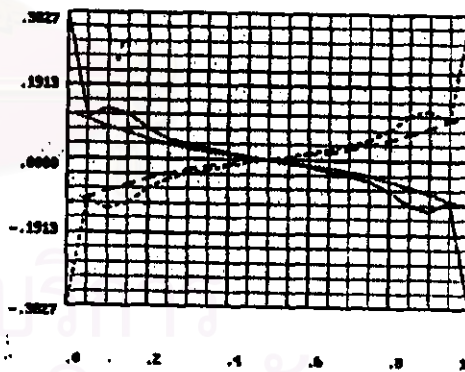
$M_{xx}/K \times 1000$

SECTION $x/a = 0, 0.25, 0.5, 0.75, 1$



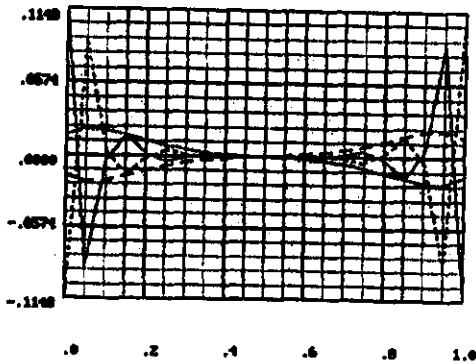
$M_{xx}/K \times 1000$

SECTION $x/a = 0, 0.25, 0.5, 0.75, 1$



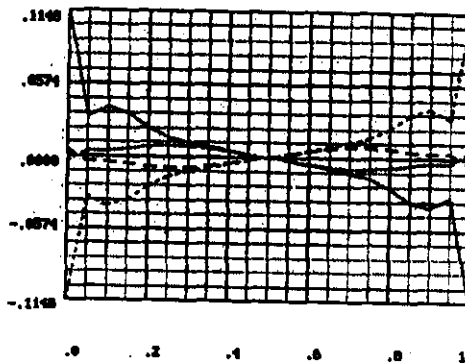
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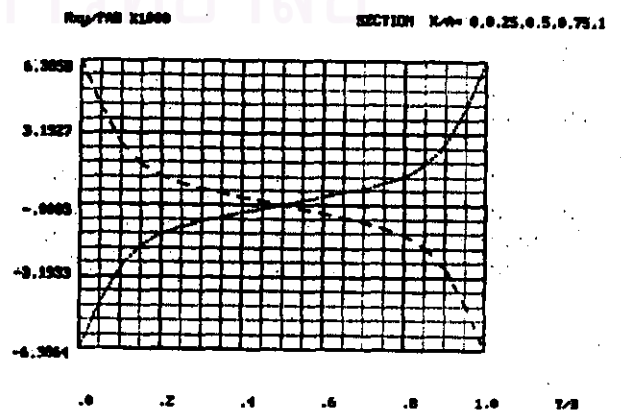
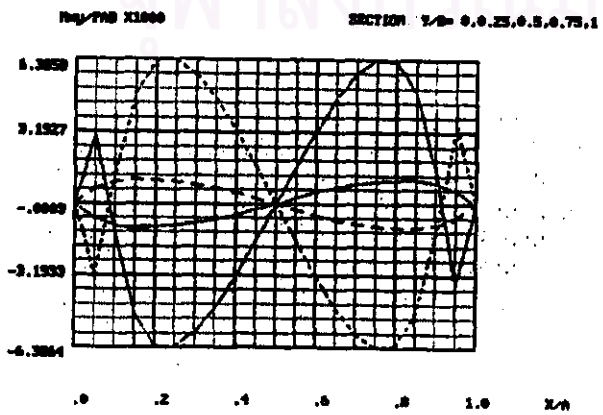
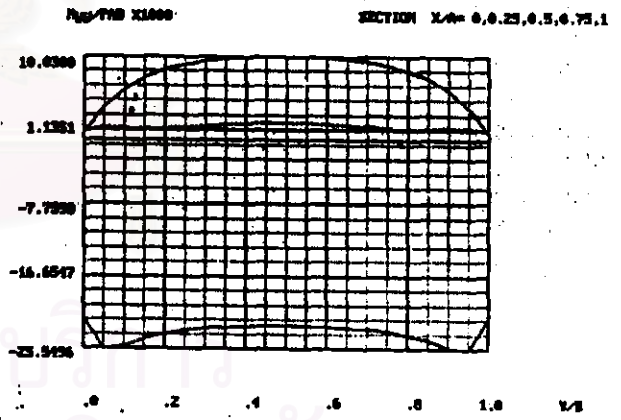
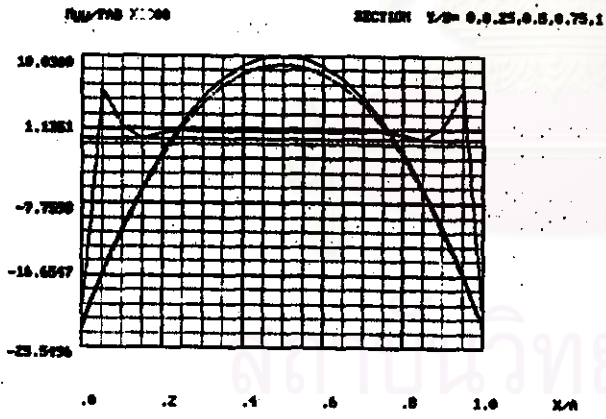
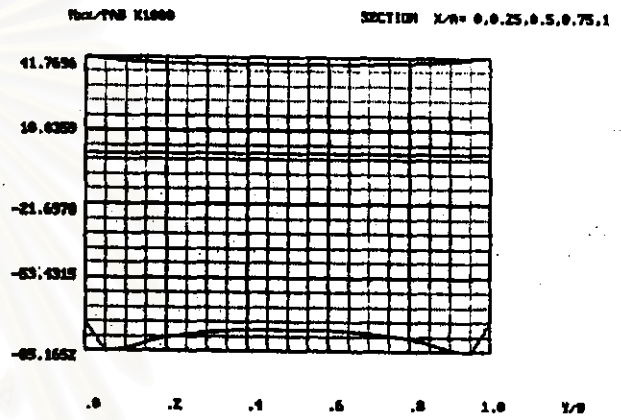
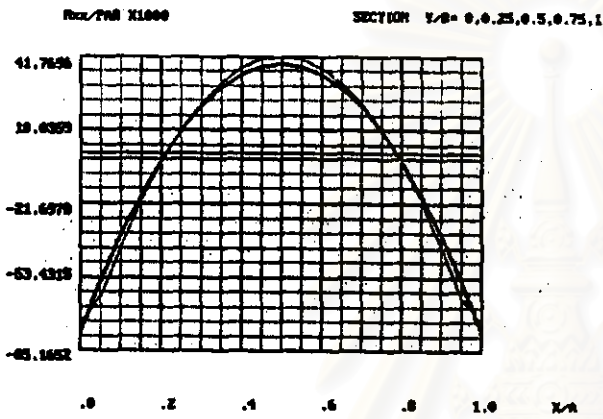
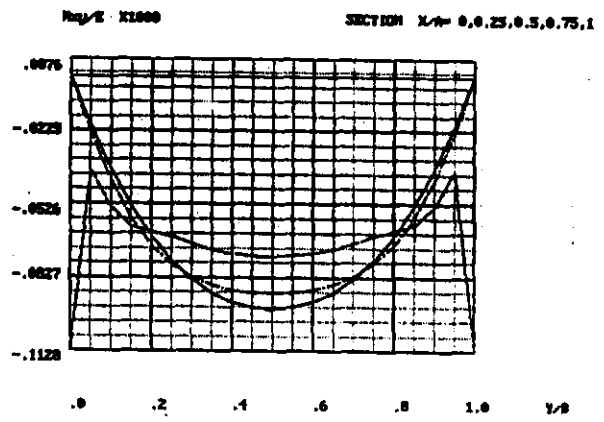
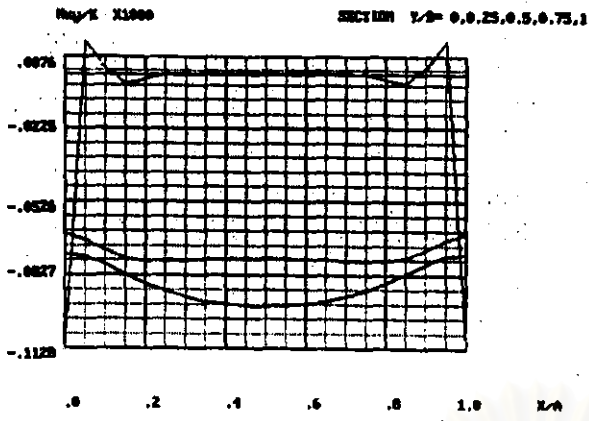
SECTION $x/a = 0, 0.25, 0.5, 0.75, 1$



$M_{yy}/K \times 1000$

SECTION $x/a = 0, 0.25, 0.5, 0.75, 1$





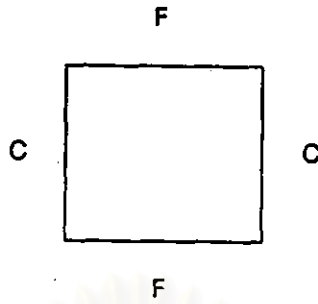
ผลของกรณีที่ 4 :

$$\frac{A}{B} = 1.0$$

$$\frac{f}{h} = 2.0$$

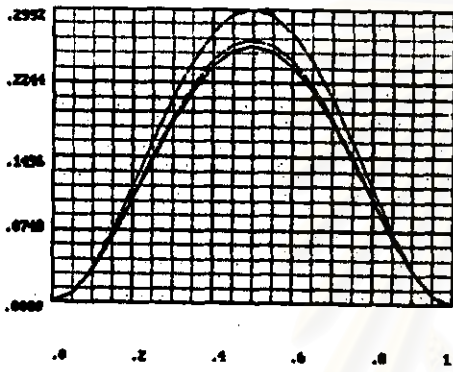
$$\frac{P_3 AB}{Eh^2} = 0.01$$

$$\nu = 0.3$$



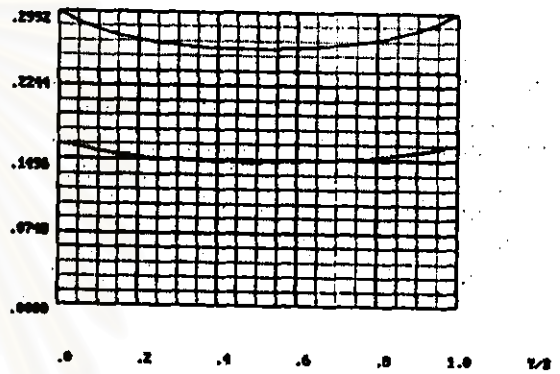
$w(h/\alpha B) \times 1000$

SECTION $\lambda/\alpha = 0.0, 0.25, 0.5, 0.75, 1$



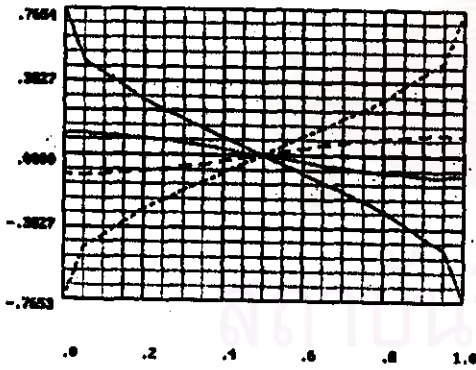
$w(h/\alpha B) \times 1000$

SECTION $\lambda/\alpha = 0.0, 0.25, 0.5, 0.75, 1$



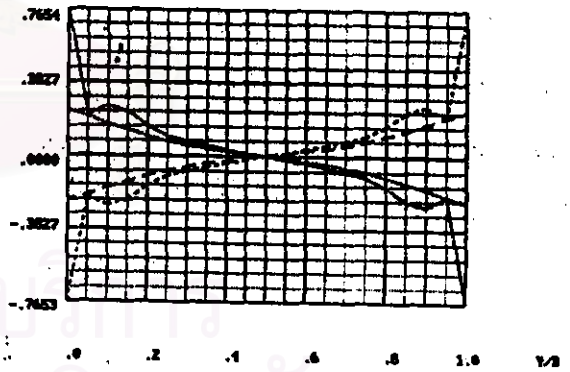
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SECTION $\lambda/\alpha = 0.0, 0.25, 0.5, 0.75, 1$



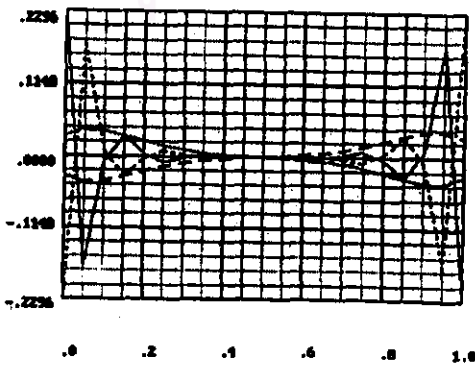
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SECTION $\lambda/\alpha = 0.0, 0.25, 0.5, 0.75, 1$



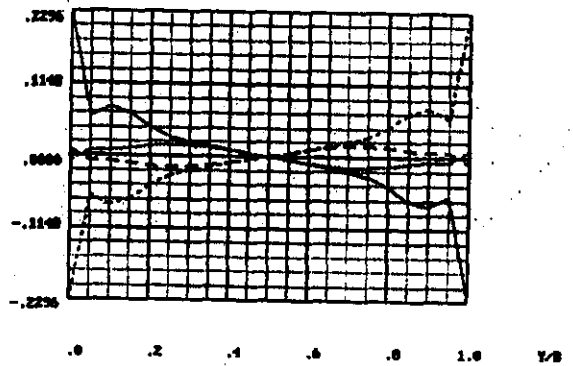
$\theta_{\beta\beta}/\alpha \times 10000$

SECTION $\lambda/\alpha = 0.0, 0.25, 0.5, 0.75, 1$



$\theta_{\beta\beta}/\alpha \times 10000$

SECTION $\lambda/\alpha = 0.0, 0.25, 0.5, 0.75, 1$





ต้นฉบับไม่มีหน้า
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สถาบันวิทยบริการ
จุฬาลงกรณ์มหาวิทยาลัย

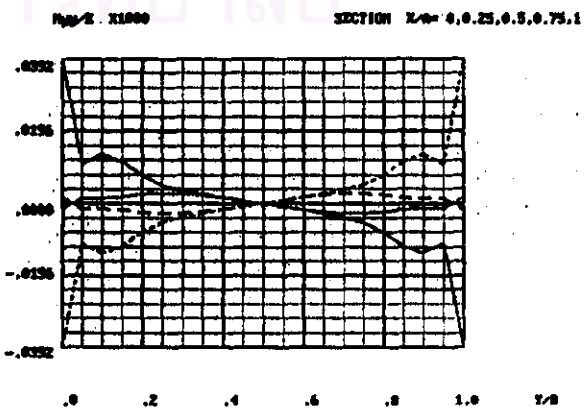
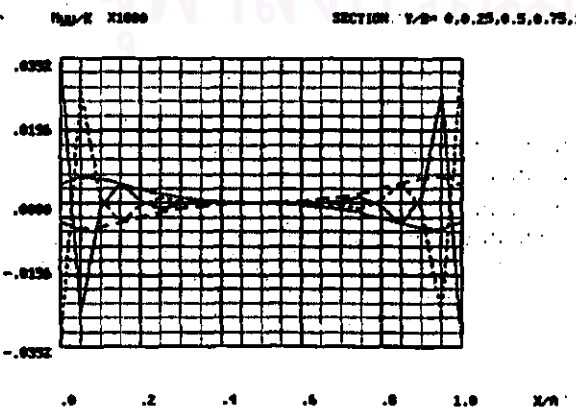
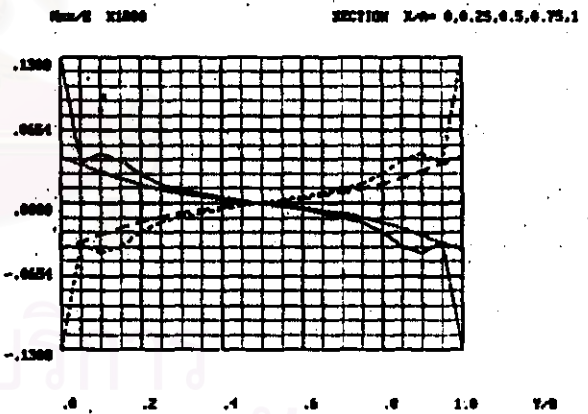
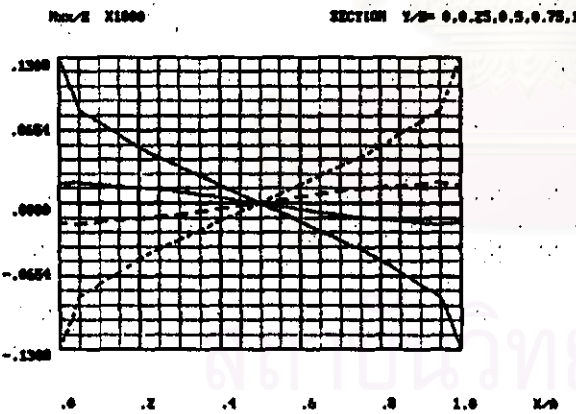
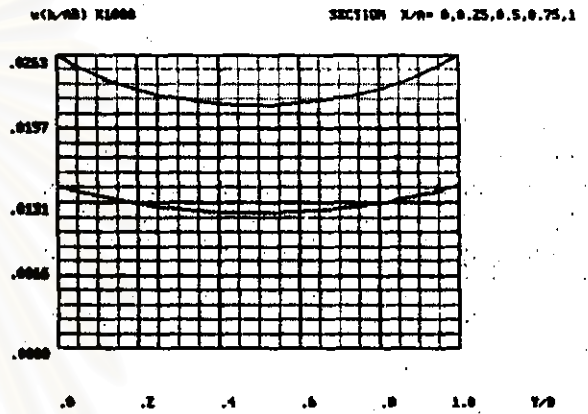
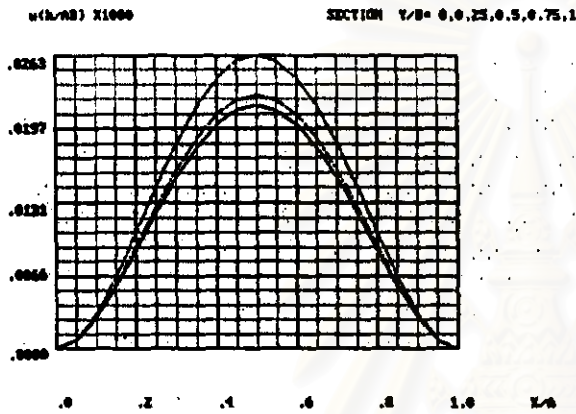
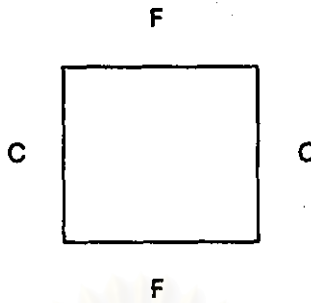
ผลของกรณีที่ 4 :

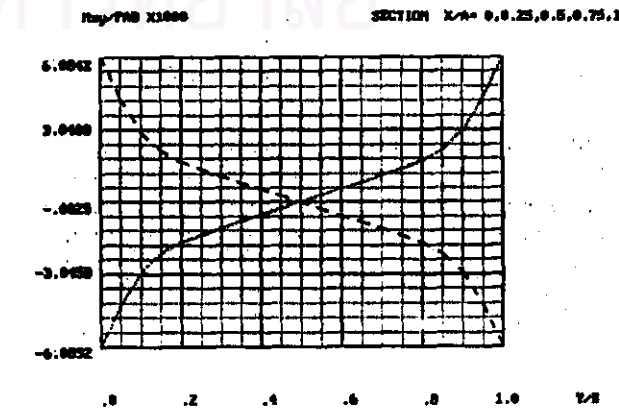
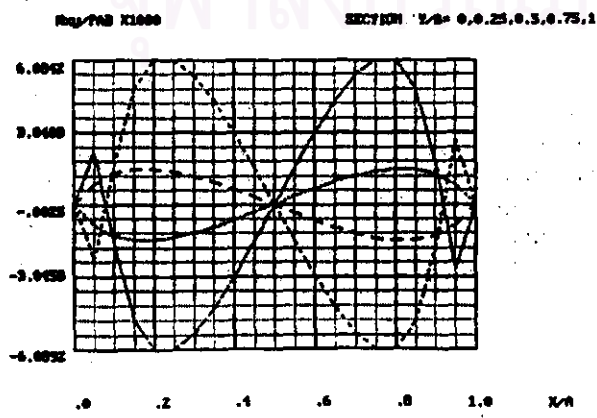
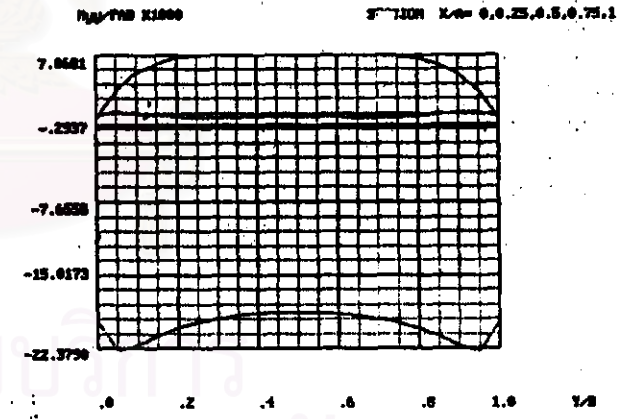
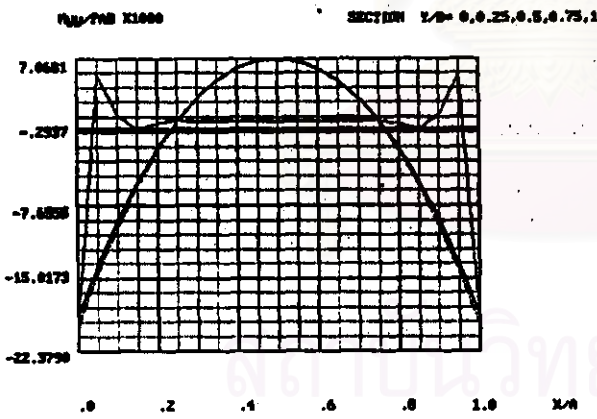
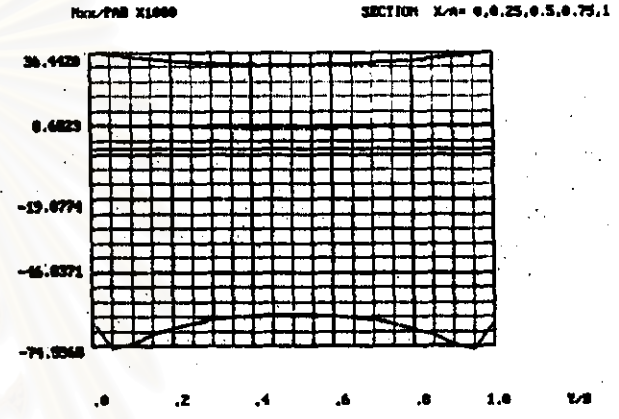
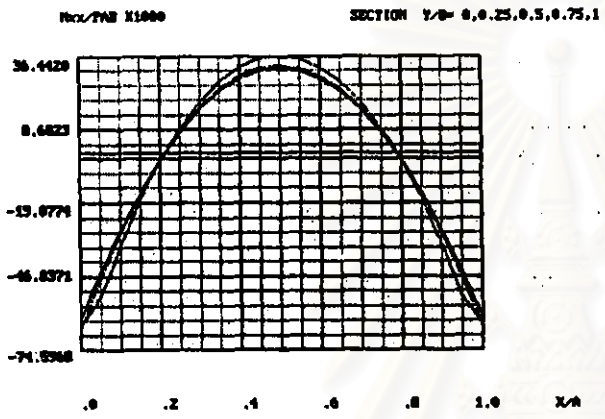
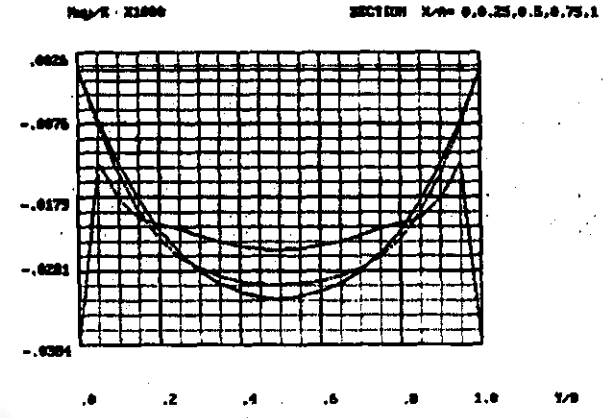
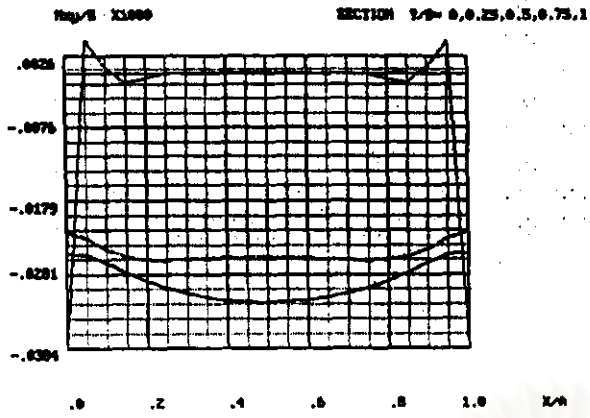
$$\frac{A}{B} = 1.0$$

$$\frac{f}{h} = 4.0$$

$$\frac{P_3 AB}{Eh^2} = 0.001$$

$$\nu = 0.3$$





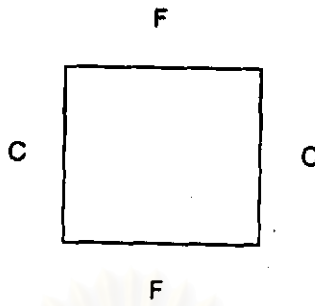
ผลของกรณีที่ 4 :

$$\frac{A}{B} = 1.0$$

$$\frac{f}{h} = 4.0$$

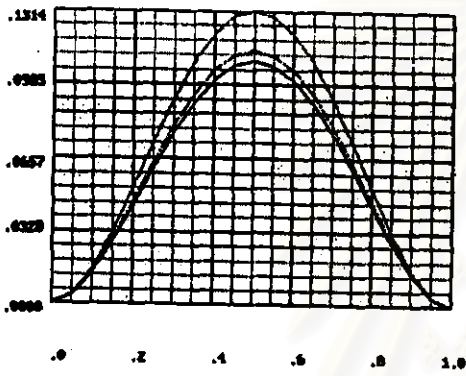
$$\frac{P_3 AB}{Eh^2} = 0.005$$

$$\nu = 0.3$$



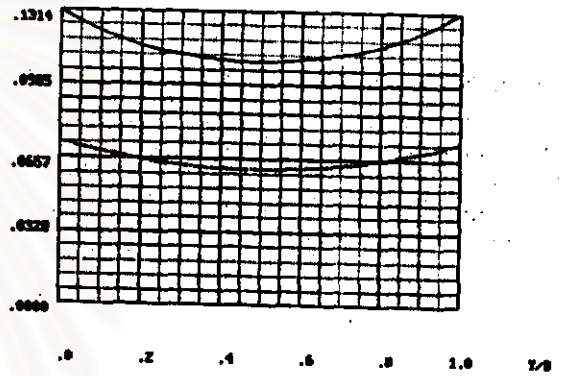
$w(h/\delta) \times 1000$

SECTION $L/\delta = 0, 0.25, 0.5, 0.75, 1$



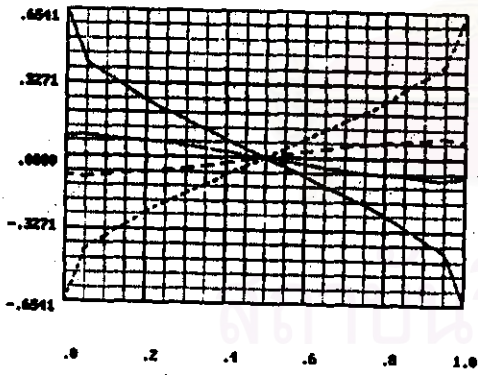
$w(h/\delta) \times 1000$

SECTION $L/\delta = 0, 0.25, 0.5, 0.75, 1$



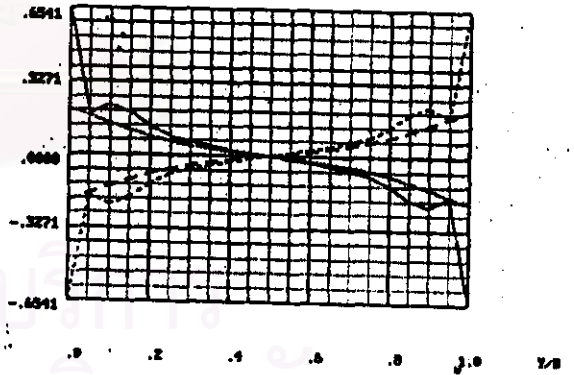
$\theta_{max}/\delta \times 1000$

SECTION $L/\delta = 0, 0.25, 0.5, 0.75, 1$



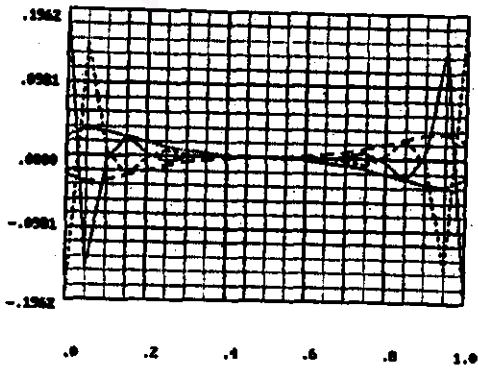
$\theta_{max}/\delta \times 1000$

SECTION $L/\delta = 0, 0.25, 0.5, 0.75, 1$



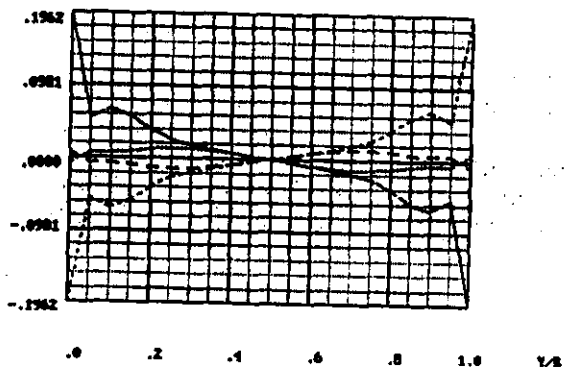
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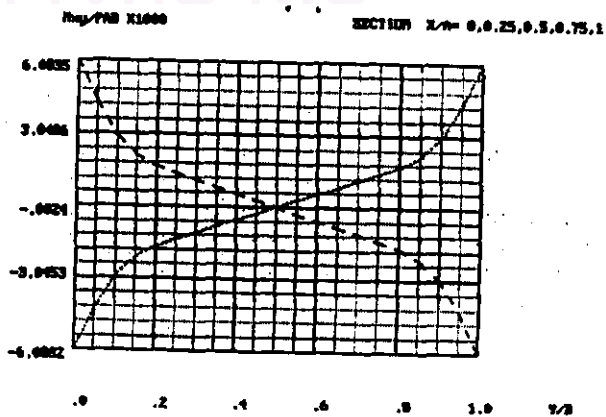
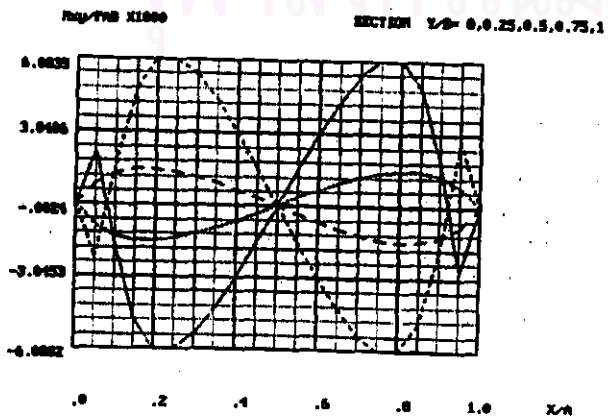
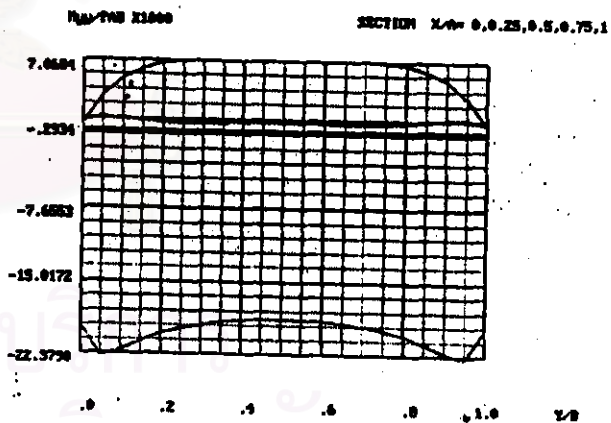
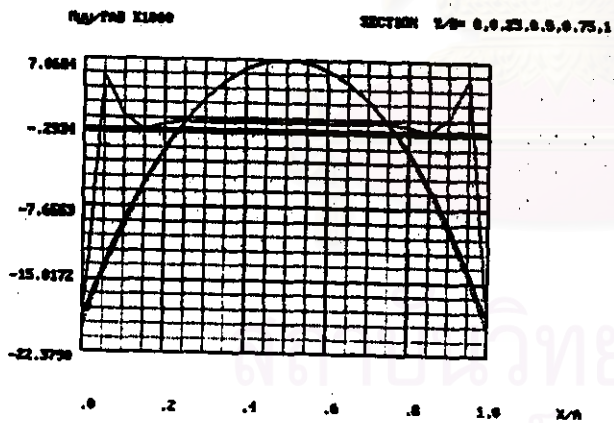
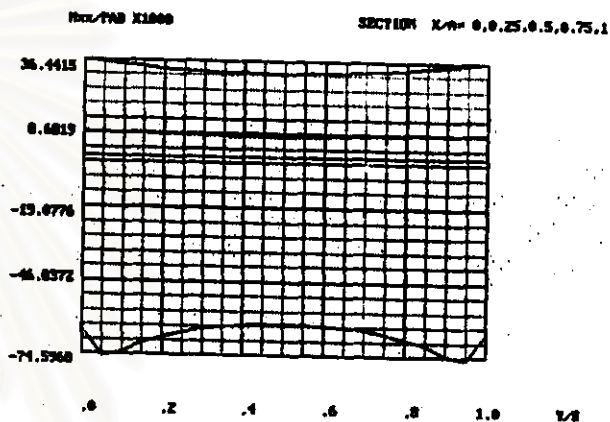
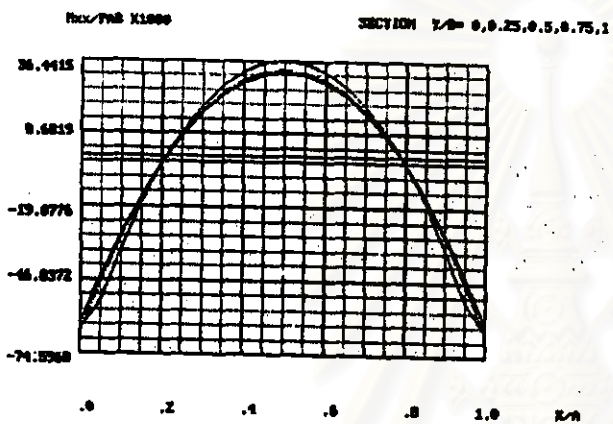
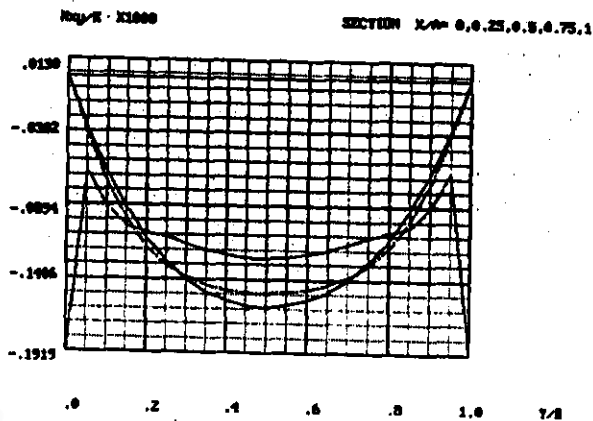
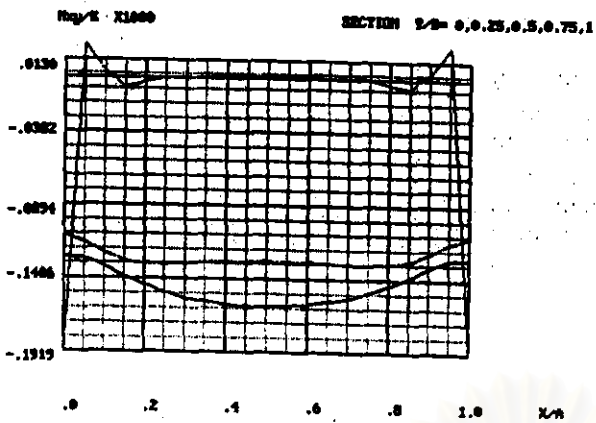
SECTION $L/\delta = 0, 0.25, 0.5, 0.75, 1$



$\theta_{min}/\delta \times 1000$

SECTION $L/\delta = 0, 0.25, 0.5, 0.75, 1$





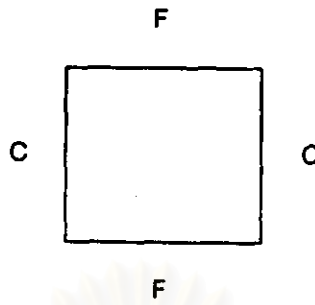
ผลของกรณีที่ 4 :

$$\frac{A}{B} = 1.0$$

$$\frac{f}{h} = 4.0$$

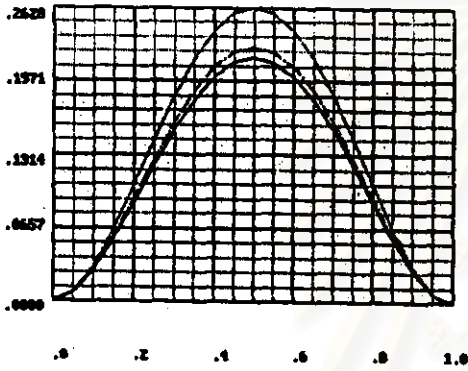
$$\frac{P_3 AB}{Eh^2} = 0.01$$

$$\nu = 0.3$$



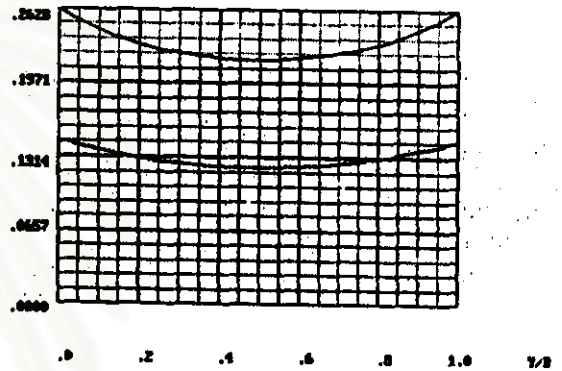
$w(h/\delta) \times 1000$

SECTION $\eta/\delta = 0.0, 0.25, 0.5, 0.75, 1$



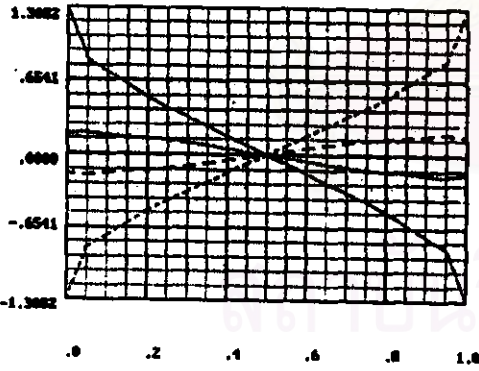
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SECTION $\eta/\delta = 0.0, 0.25, 0.5, 0.75, 1$



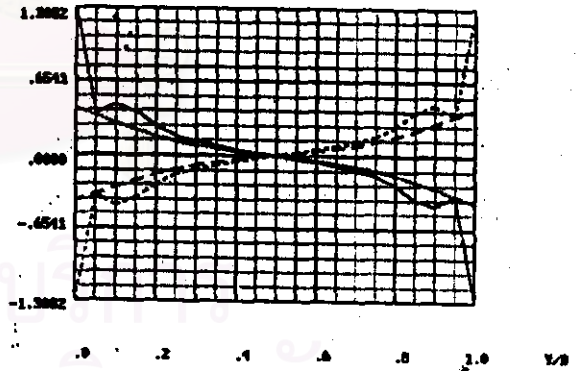
$M_x/K \times 10000$

SECTION $\eta/\delta = 0.0, 0.25, 0.5, 0.75, 1$



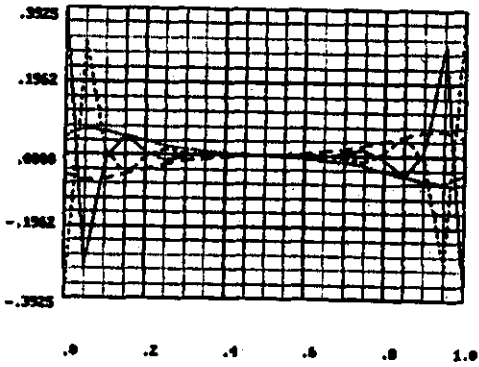
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SECTION $\eta/\delta = 0.0, 0.25, 0.5, 0.75, 1$



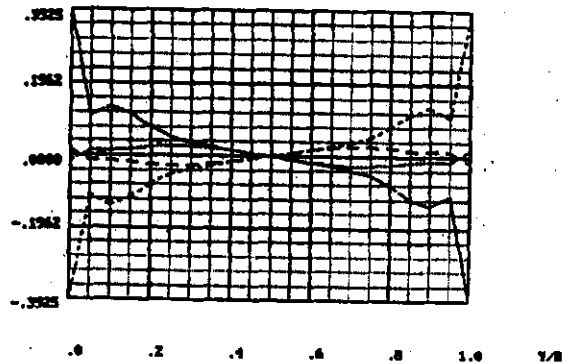
$M_y/K \times 10000$

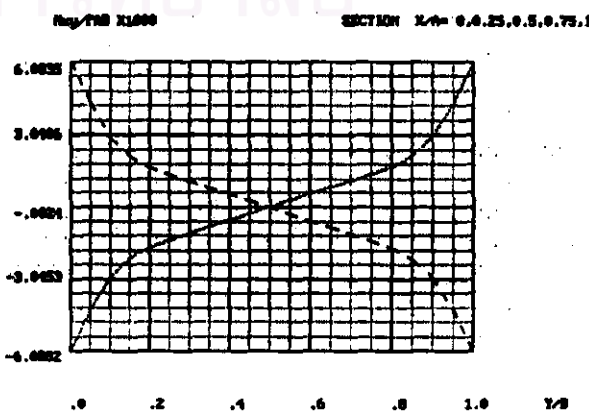
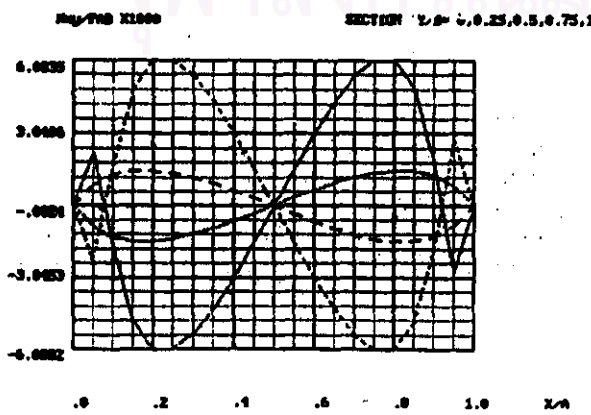
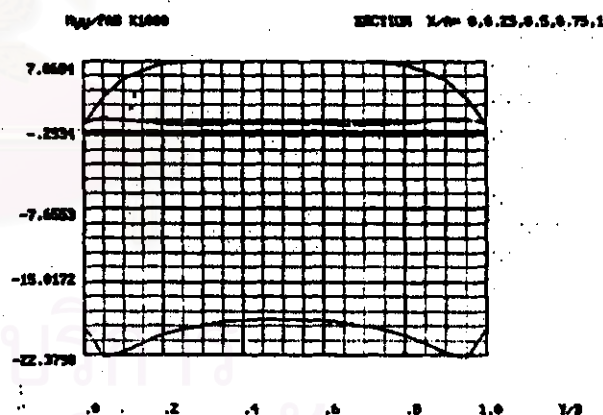
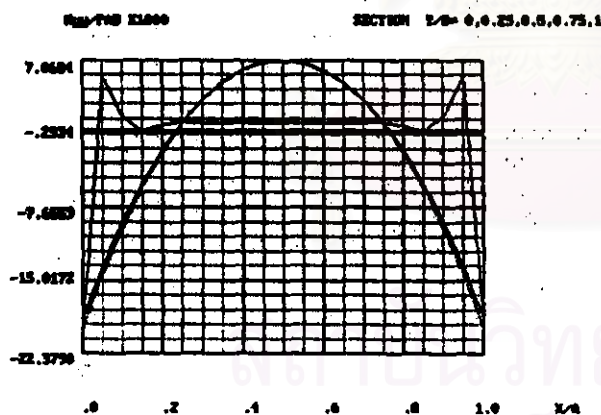
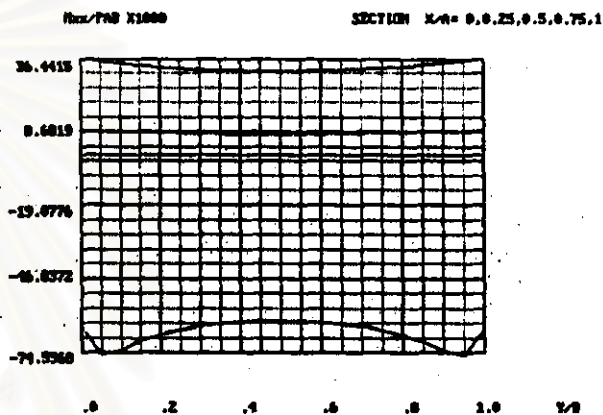
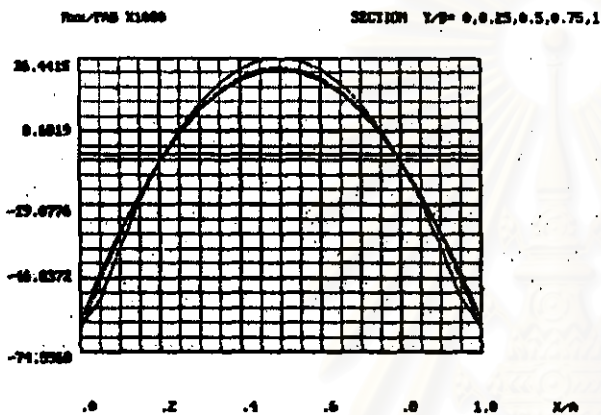
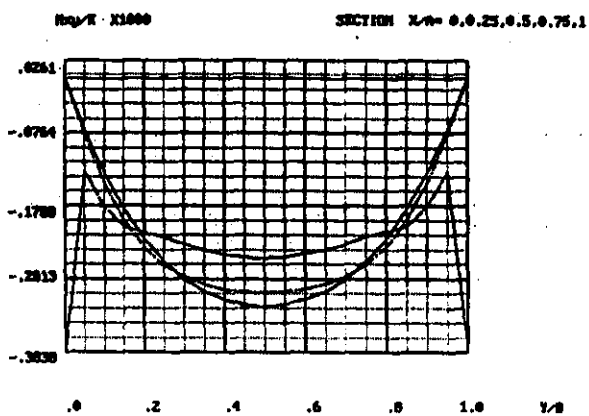
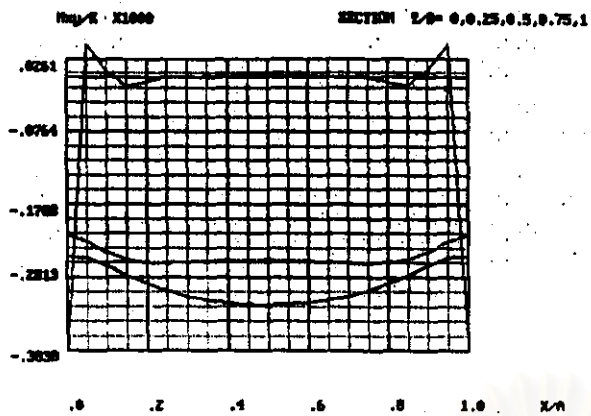
SECTION $\eta/\delta = 0.0, 0.25, 0.5, 0.75, 1$



$M_y/K \times 10000$

SECTION $\eta/\delta = 0.0, 0.25, 0.5, 0.75, 1$





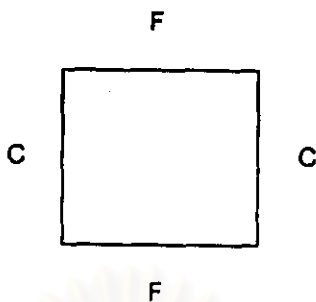
ผลของกรณีที่ 4 :

$$\frac{A}{B} = 1.0$$

$$\frac{f}{h} = 6.0$$

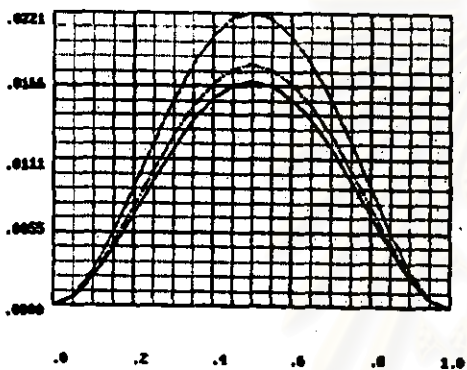
$$\frac{P_3 AB}{Eh^2} = 0.001$$

$$\nu = 0.3$$



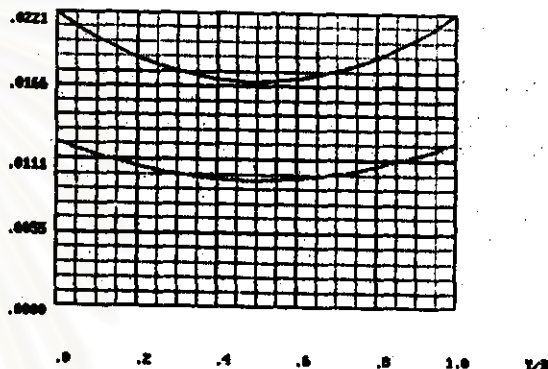
$w(h/\delta) \times 1000$

SECTION $\eta/\delta = 0, 0.25, 0.5, 0.75, 1$



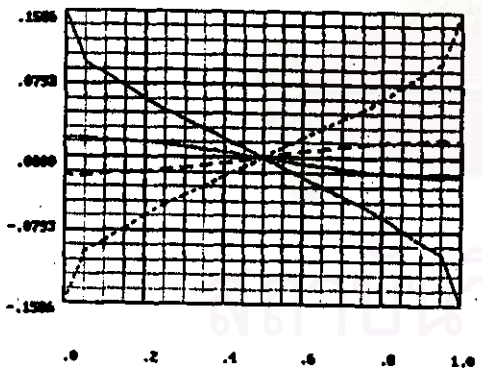
$\phi(h/\delta) \times 1000$

SECTION $\eta/\delta = 0, 0.25, 0.5, 0.75, 1$



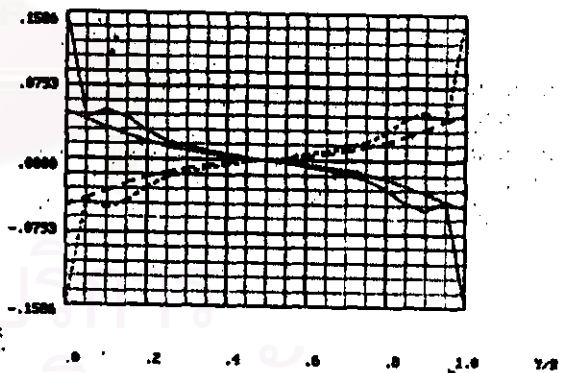
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SECTION $\eta/\delta = 0, 0.25, 0.5, 0.75, 1$



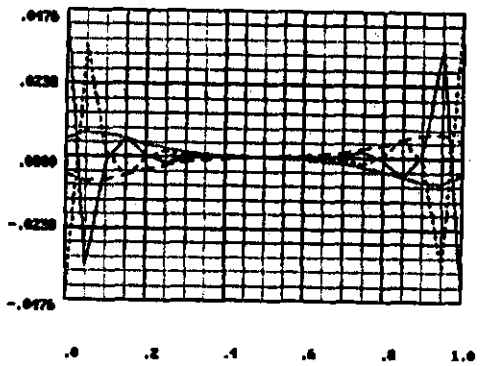
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SECTION $\eta/\delta = 0, 0.25, 0.5, 0.75, 1$



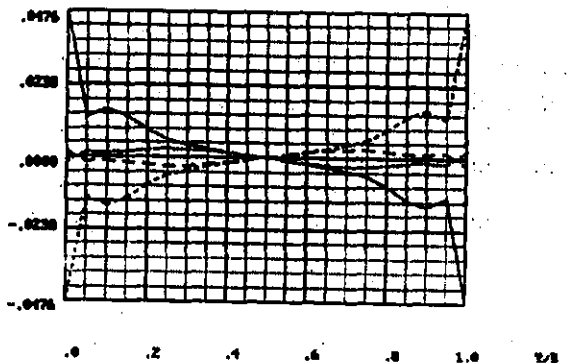
$N_{xx}/K \times 1000$

SECTION $\eta/\delta = 0, 0.25, 0.5, 0.75, 1$



$N_{yy}/K \times 1000$

SECTION $\eta/\delta = 0, 0.25, 0.5, 0.75, 1$





ต้นฉบับไม่มีหน้า
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สถาบันวิทยบริการ
จุฬาลงกรณ์มหาวิทยาลัย

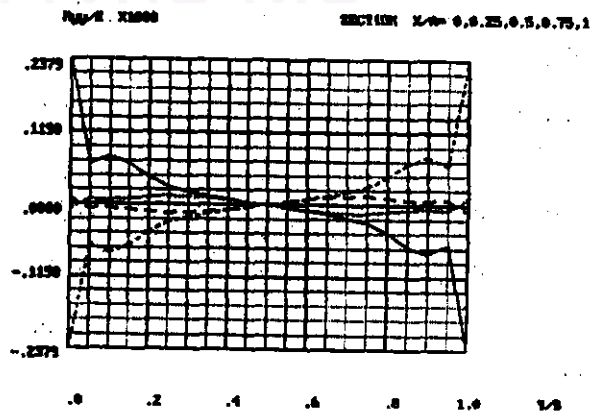
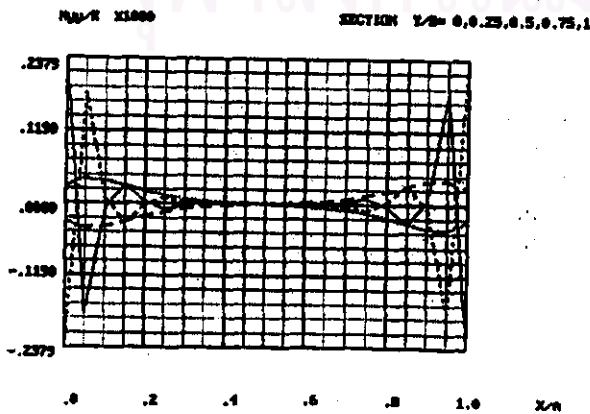
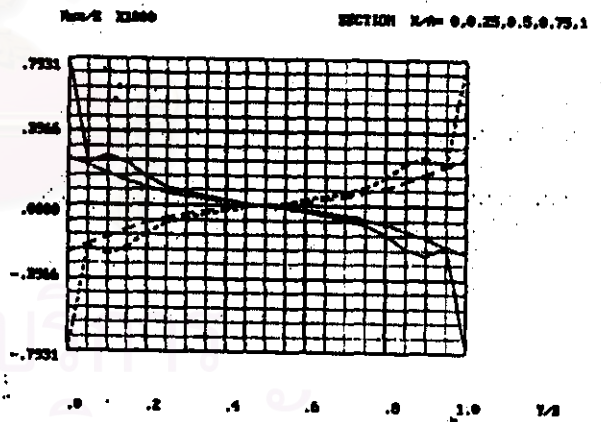
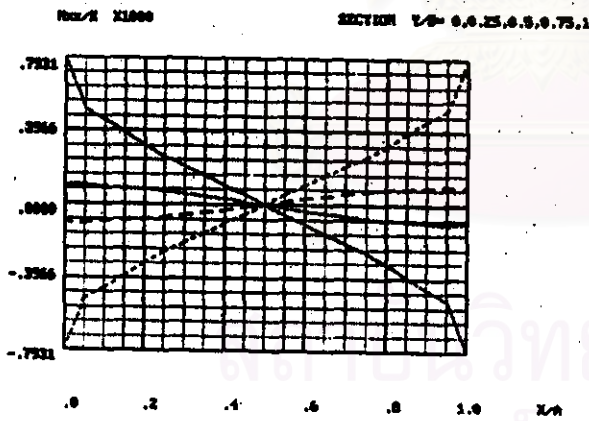
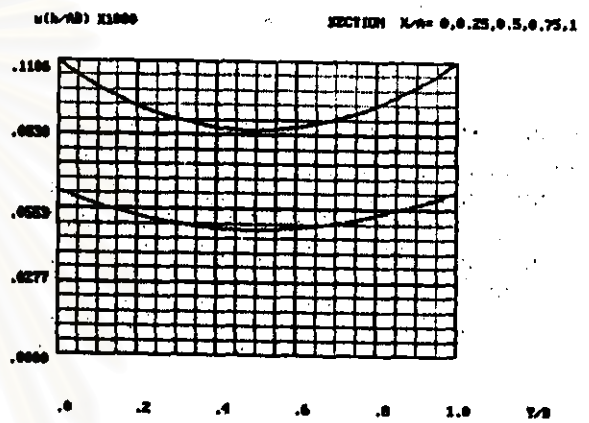
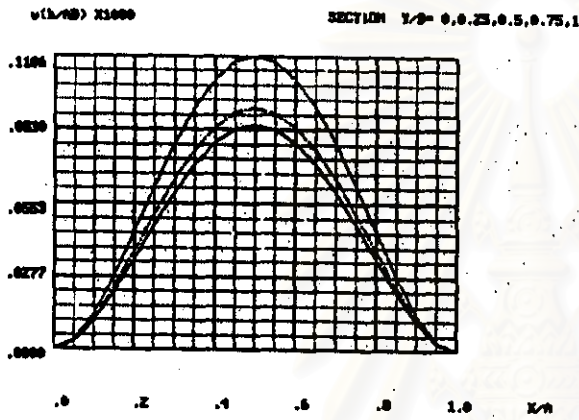
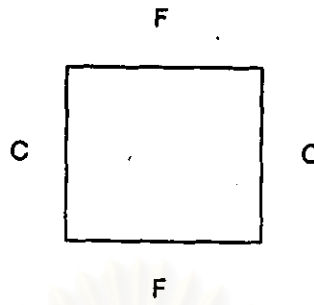
ผลของกรณีที่ 4 :

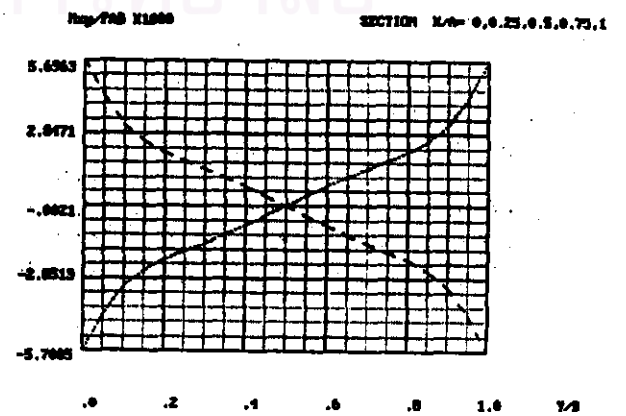
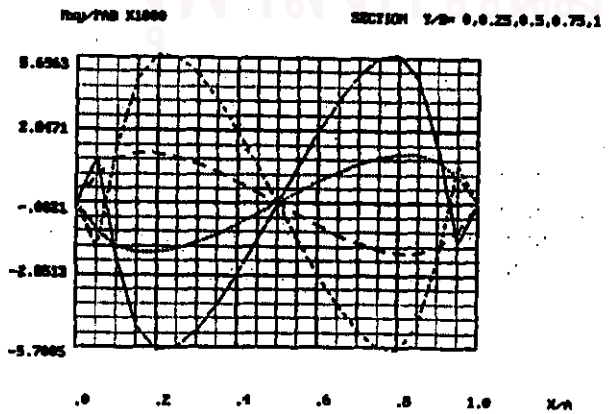
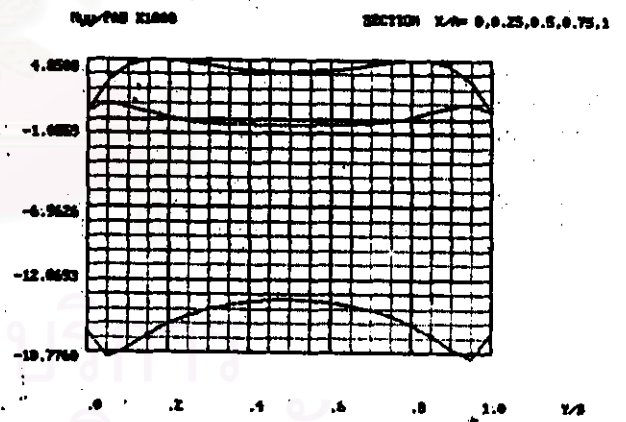
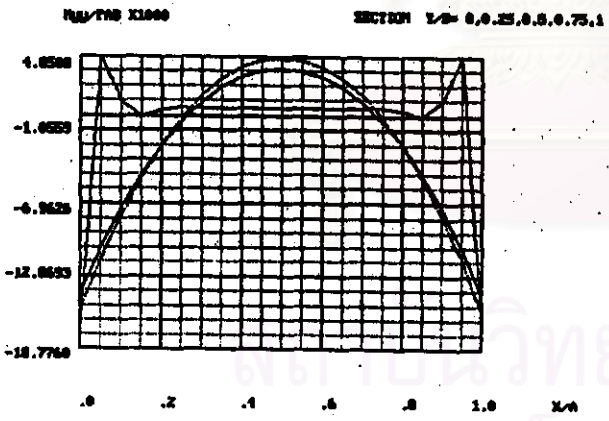
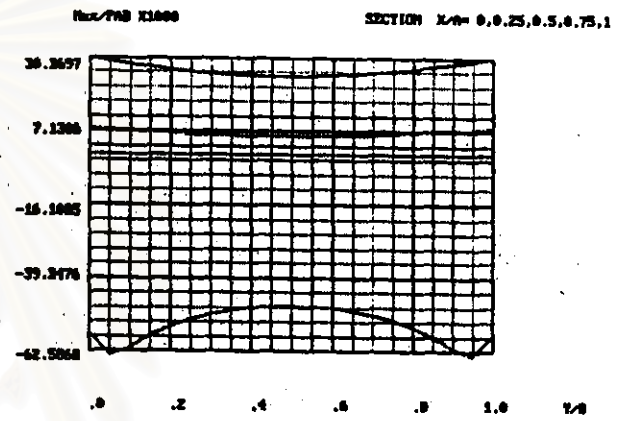
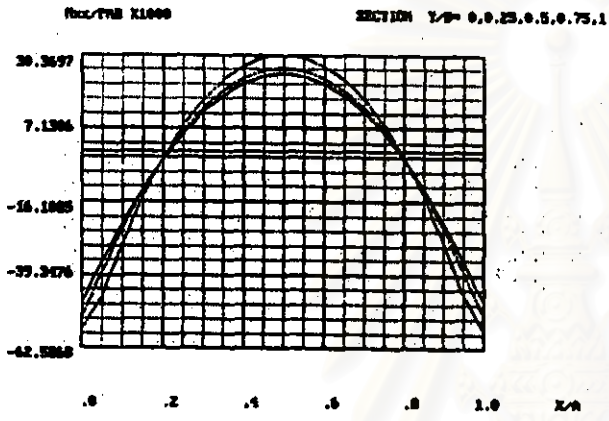
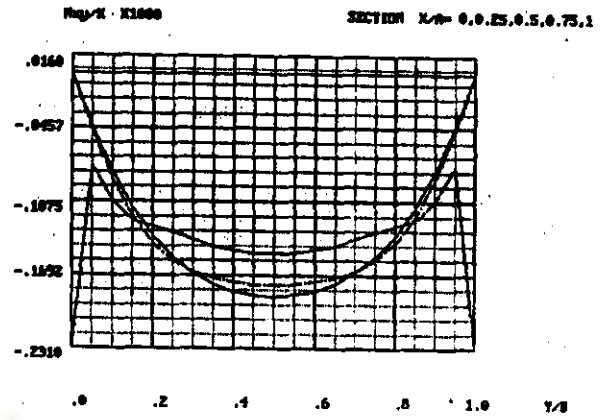
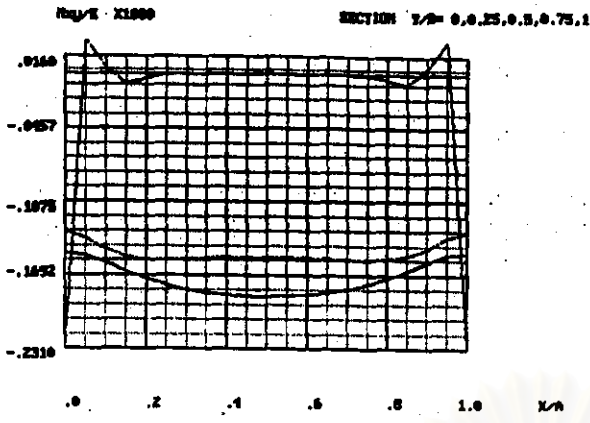
$$\frac{A}{B} = 1.0$$

$$\frac{f}{h} = 6.0$$

$$\frac{P_3 AB}{Eh^2} = 0.005$$

$$\nu = 0.3$$





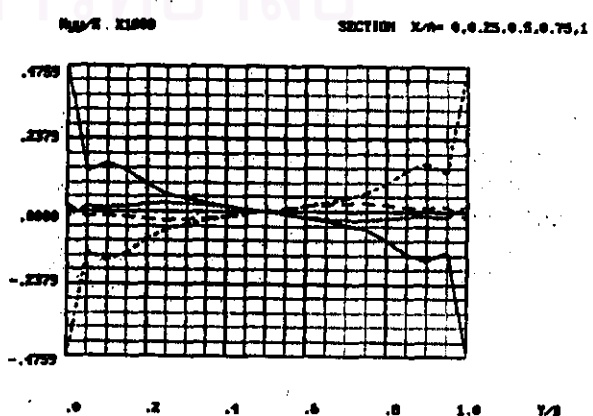
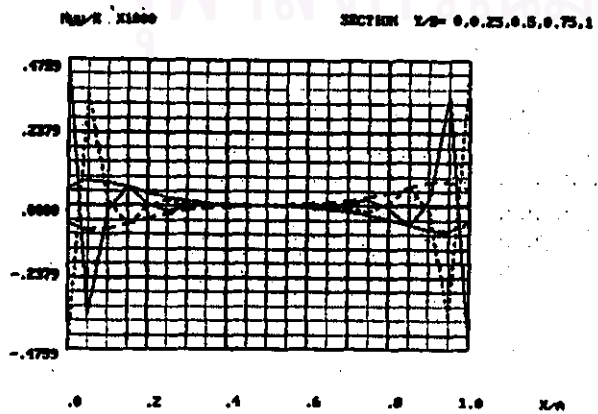
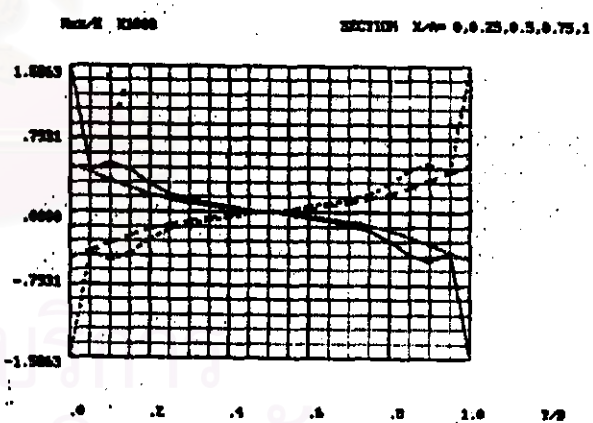
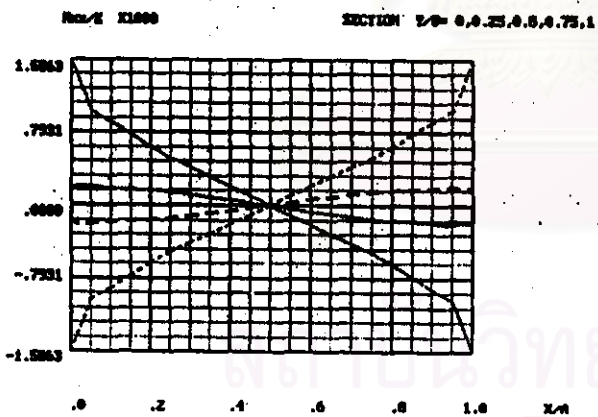
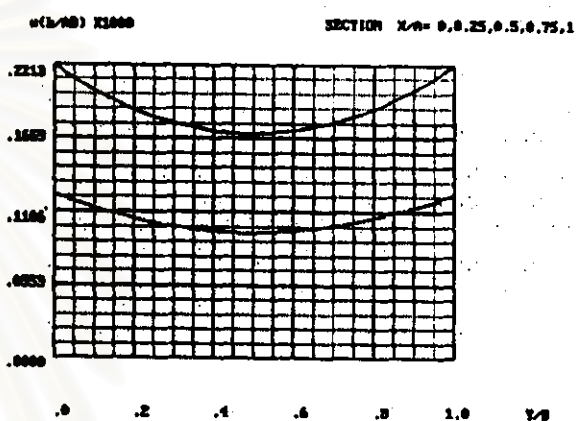
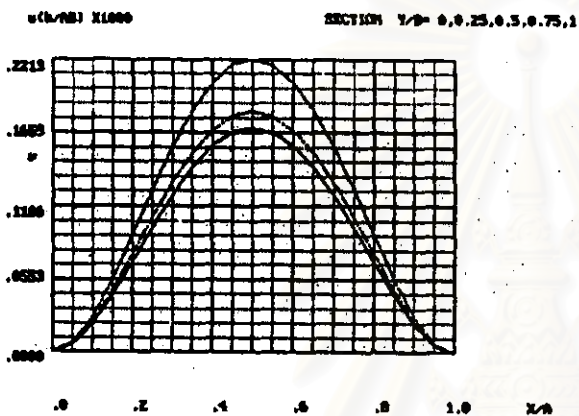
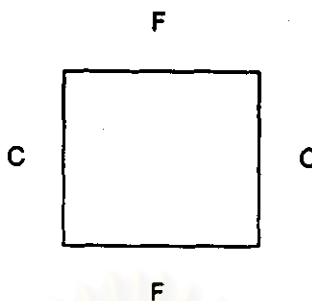
ผลของกรณีที่ 4 :

$$\frac{A}{B} = 1.0$$

$$\frac{f}{h} = 6.0$$

$$\frac{P_3 AB}{Eh^2} = 0.01$$

$$\nu = 0.3$$





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จุฬาลงกรณ์มหาวิทยาลัย

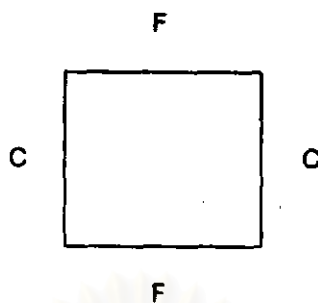
ผลของกรณีที่ 4 :

$$\frac{A}{B} = 2.0$$

$$\frac{f}{h} = 2.0$$

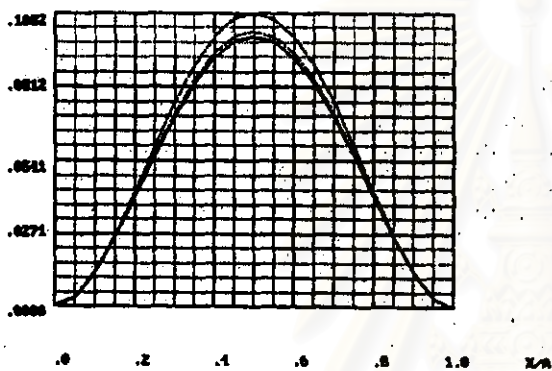
$$\frac{P_3 AB}{Eh^2} = 0.001$$

$$\nu = 0.3$$



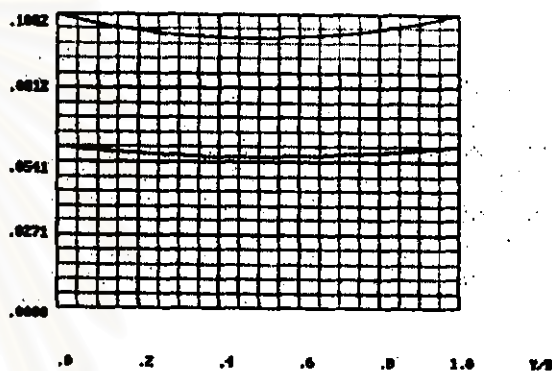
$u(h/AB) \times 1000$

SECTION $X/h = 0.0, 0.25, 0.5, 0.75, 1$



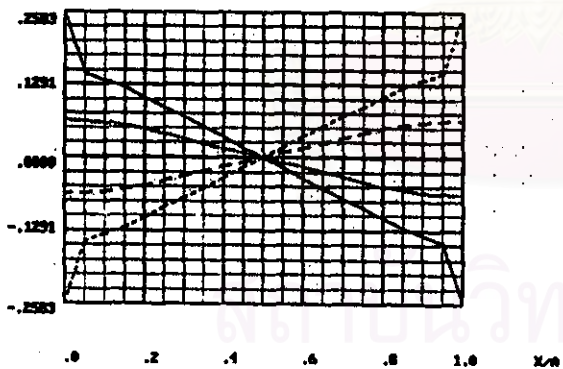
$u(h/AB) \times 1000$

SECTION $X/h = 0.0, 0.25, 0.5, 0.75, 1$



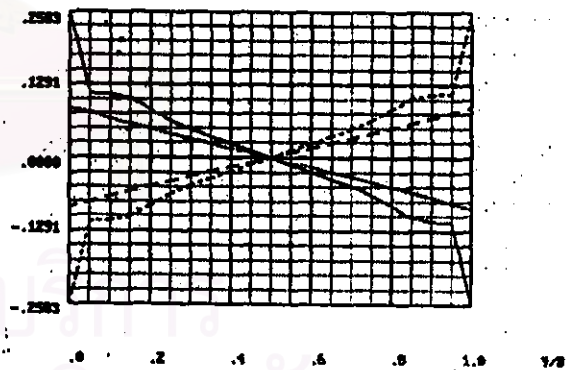
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SECTION $X/h = 0.0, 0.25, 0.5, 0.75, 1$



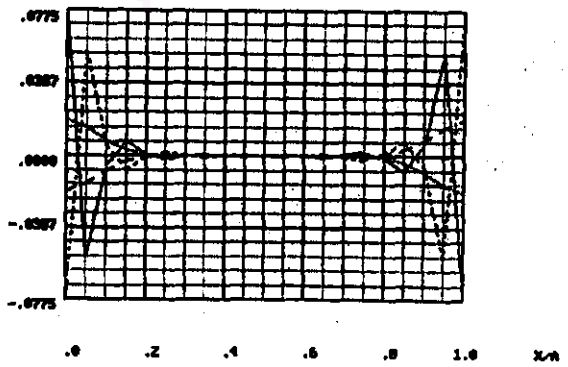
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SECTION $X/h = 0.0, 0.25, 0.5, 0.75, 1$



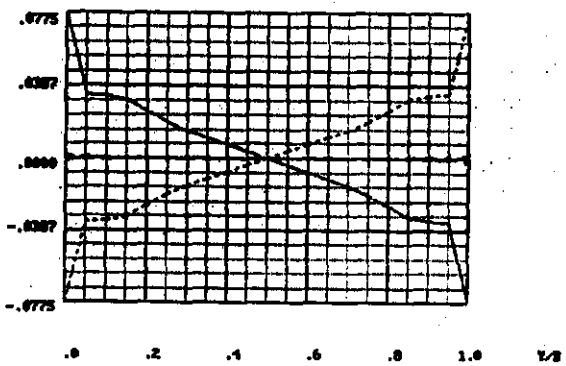
$\theta_{yy}/K \times 1000$

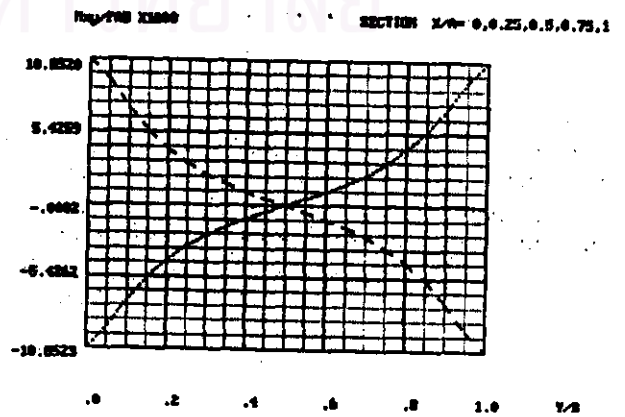
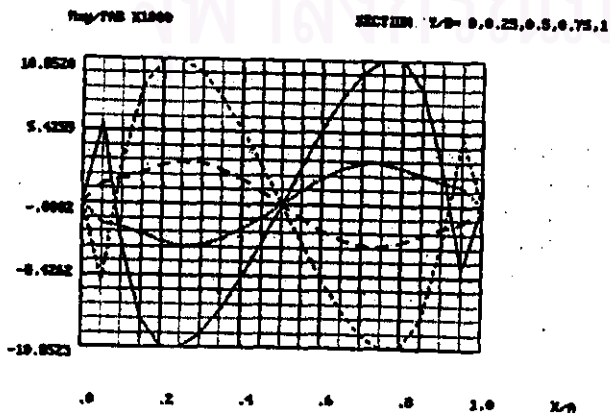
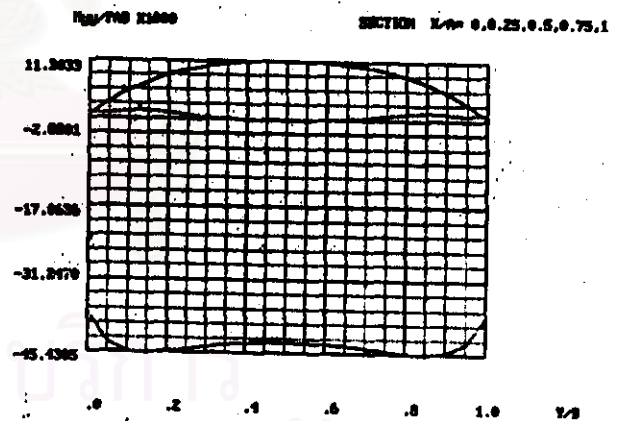
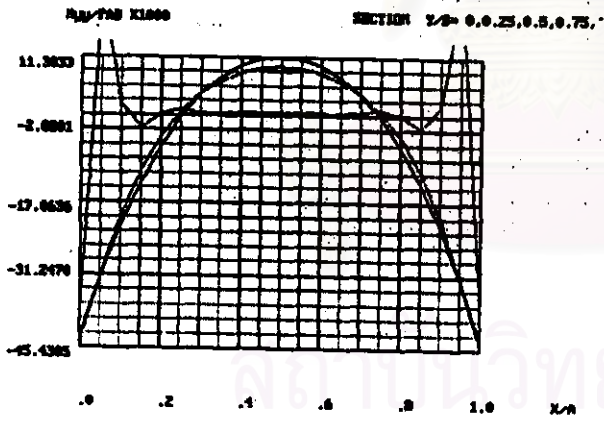
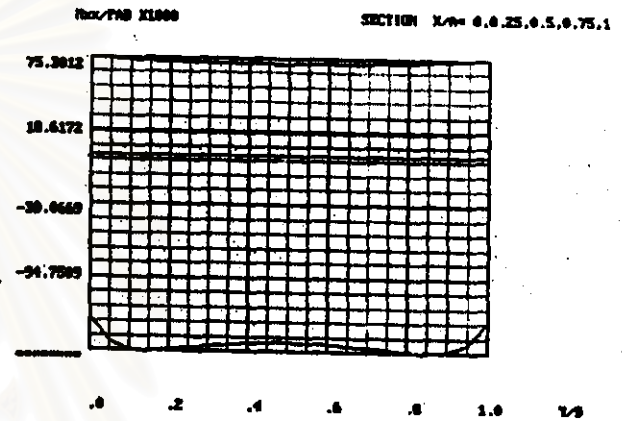
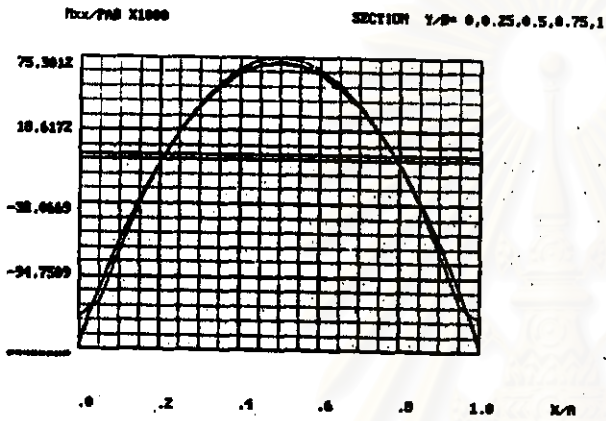
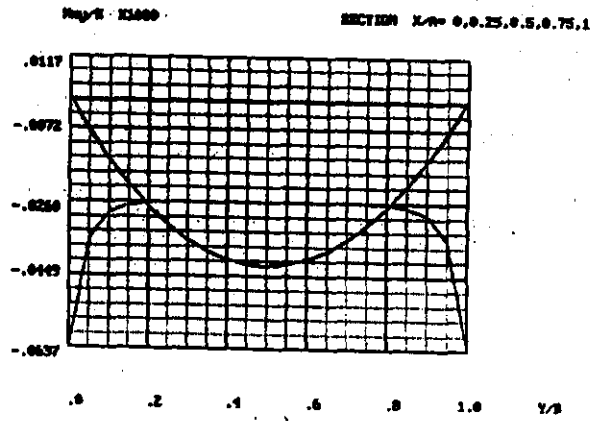
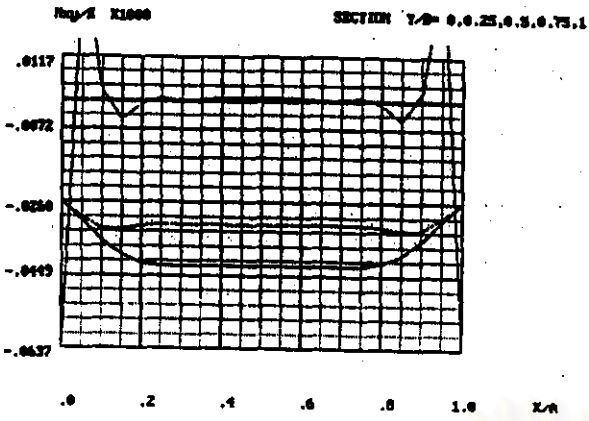
SECTION $X/h = 0.0, 0.25, 0.5, 0.75, 1$



$\theta_{yy}/K \times 1000$

SECTION $X/h = 0.0, 0.25, 0.5, 0.75, 1$





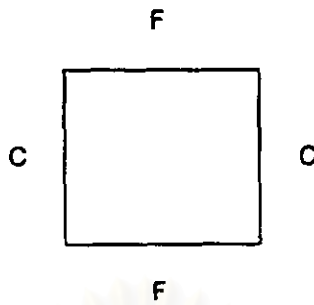
ผลของกรณีที่ 4 :

$$\frac{A}{B} = 2.0$$

$$\frac{f}{h} = 2.0$$

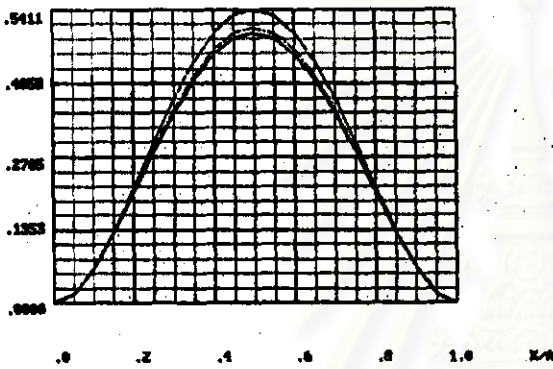
$$\frac{P_3 AB}{Eh^2} = 0.005$$

$$\nu = 0.3$$



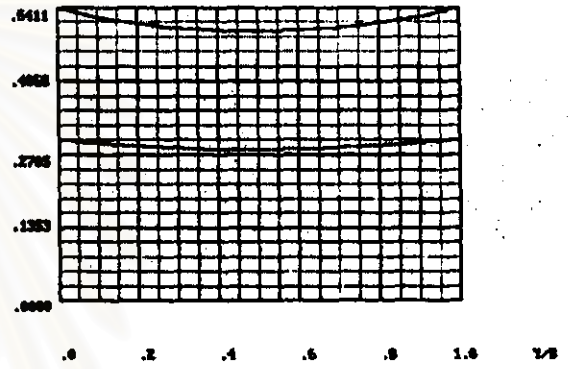
$v(L/AB) \times 1000$

SECTION $Y/B = 0.0, 0.25, 0.5, 0.75, 1$



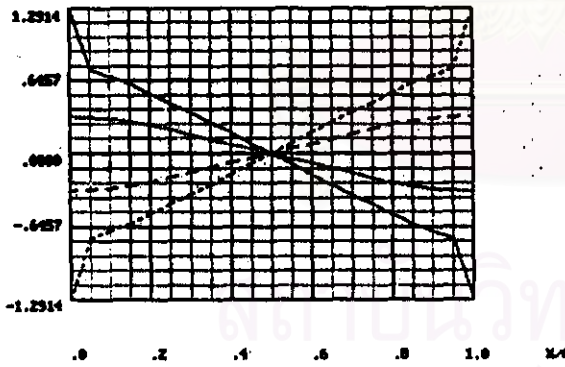
$w(L/AB) \times 1000$

SECTION $X/A = 0.0, 0.25, 0.5, 0.75, 1$



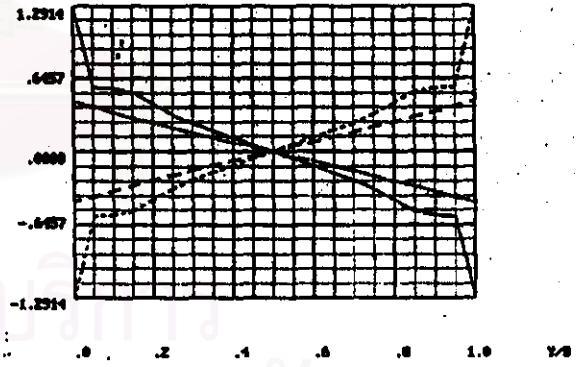
$M_{xx}/E \times 1000$

SECTION $Y/B = 0.0, 0.25, 0.5, 0.75, 1$



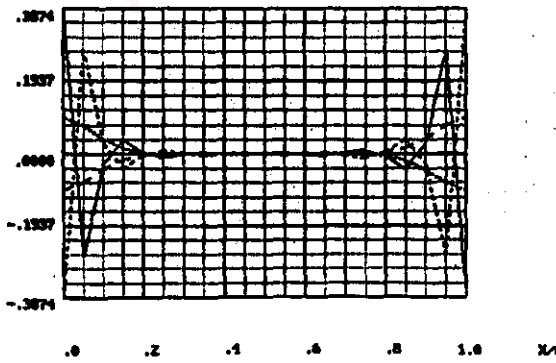
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SECTION $X/A = 0.0, 0.25, 0.5, 0.75, 1$



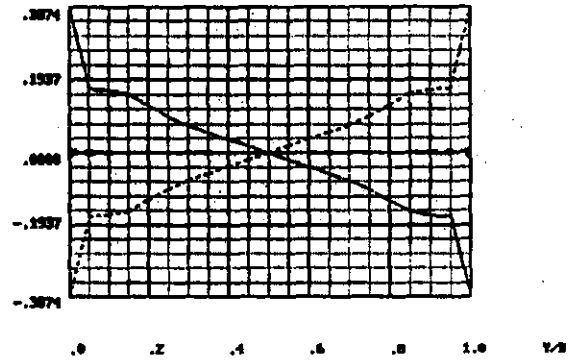
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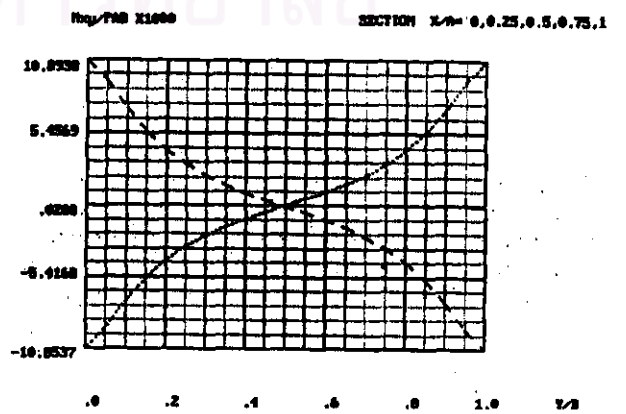
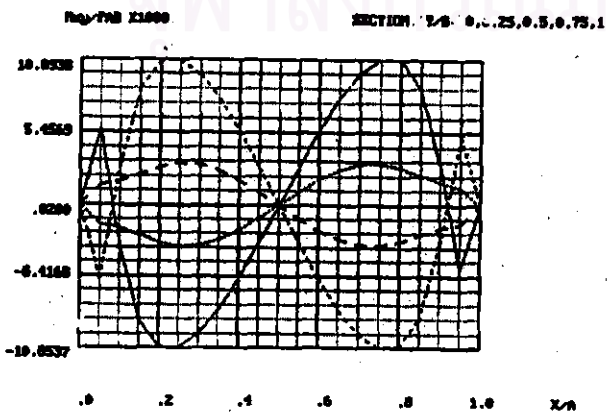
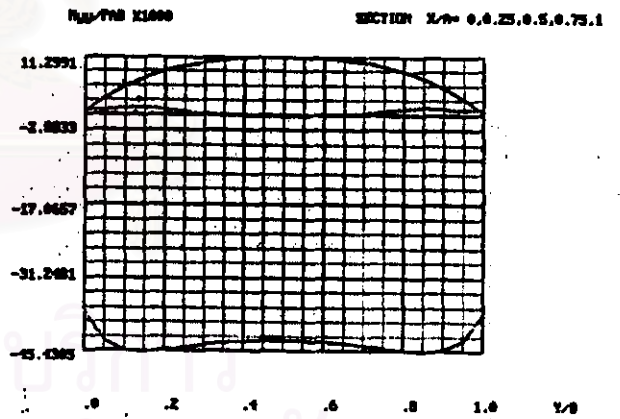
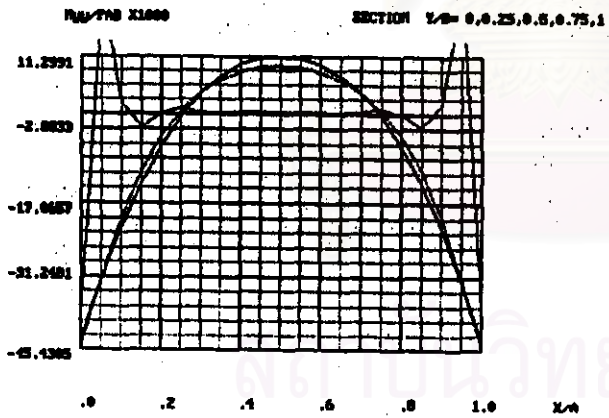
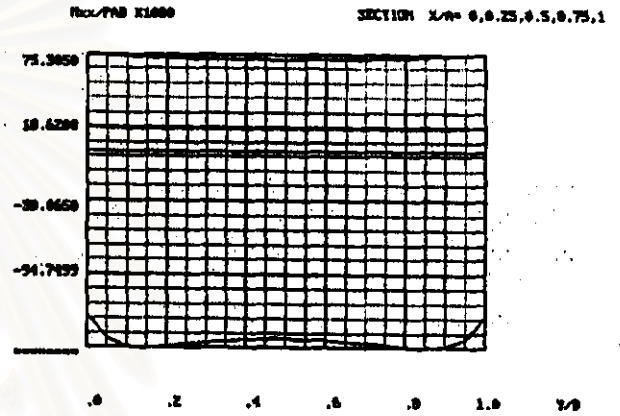
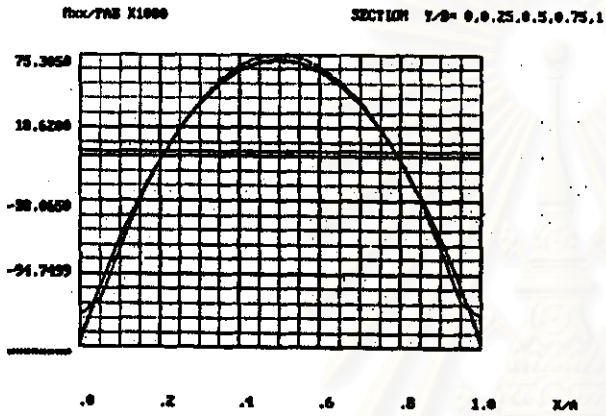
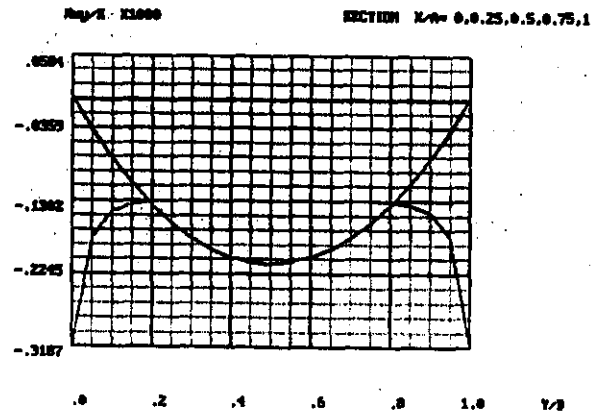
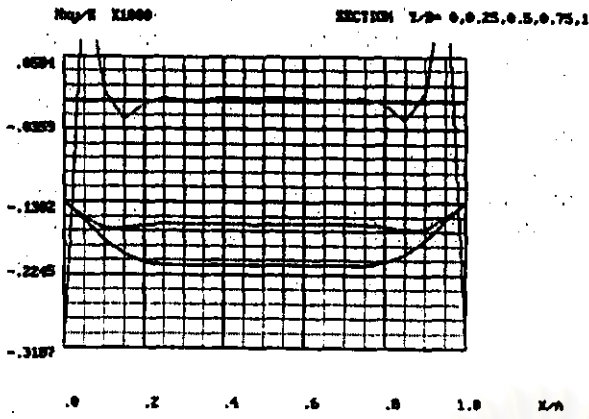
SECTION $Y/B = 0.0, 0.25, 0.5, 0.75, 1$



$M_{yx}/E \times 1000$

SECTION $X/A = 0.0, 0.25, 0.5, 0.75, 1$





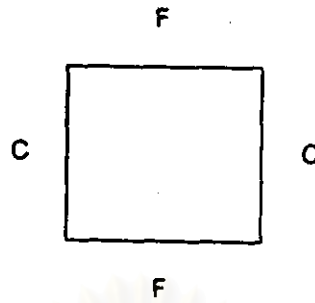
ผลของกรณีที่ 4 :

$$\frac{A}{B} = 2.0$$

$$\frac{f}{h} = 2.0$$

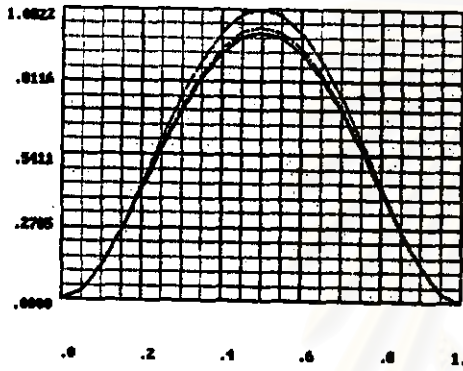
$$\frac{P_3 AB}{Eh^2} = 0.01$$

$$\nu = 0.3$$



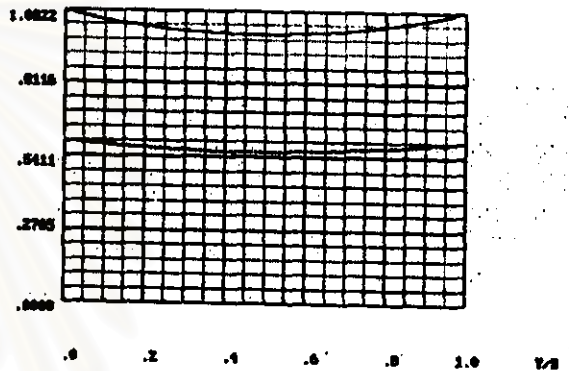
$w(h/AB) \times 1000$

SECTION $X/A = 0, 0.25, 0.5, 0.75, 1$



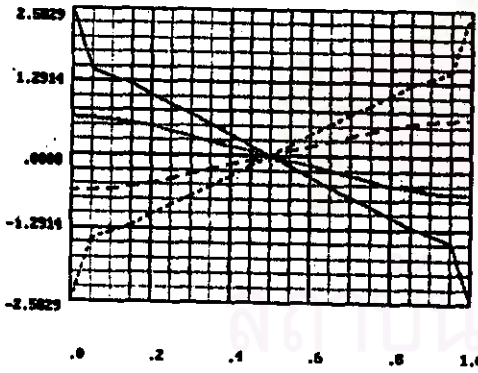
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SECTION $X/A = 0, 0.25, 0.5, 0.75, 1$



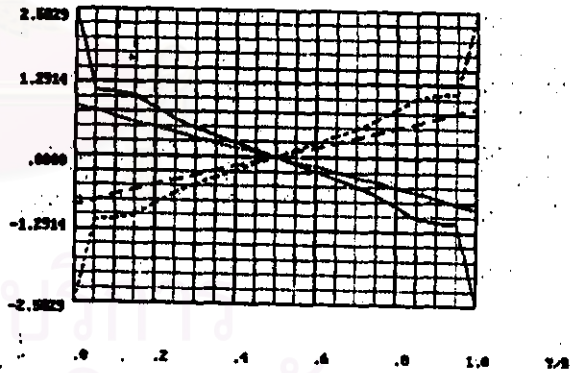
$\theta_{xx}/K \times 10000$

SECTION $X/A = 0, 0.25, 0.5, 0.75, 1$



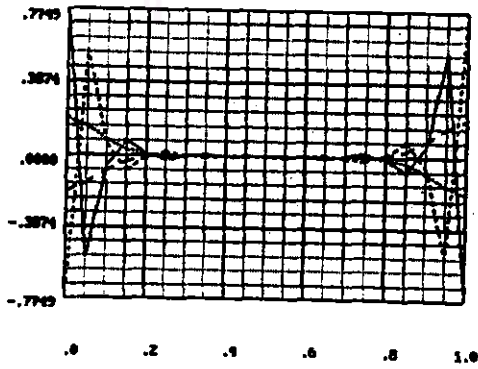
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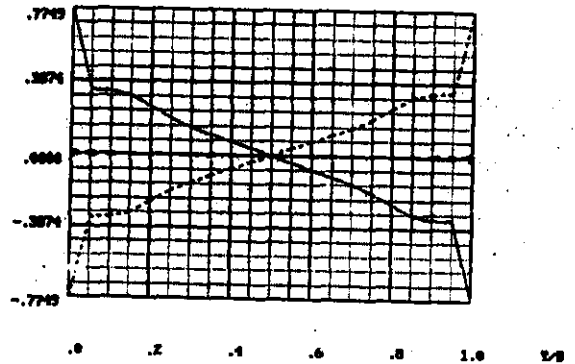
$\theta_{yy}/K \times 10000$

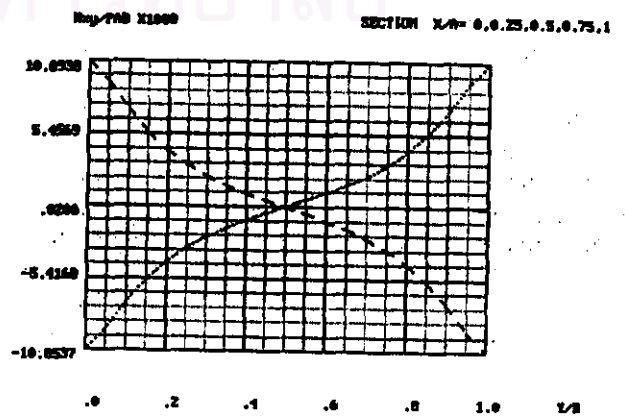
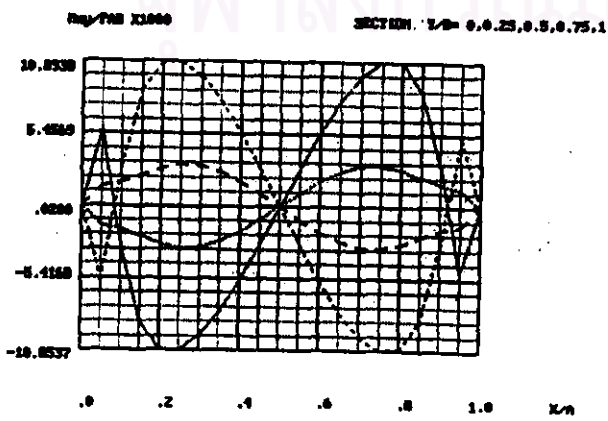
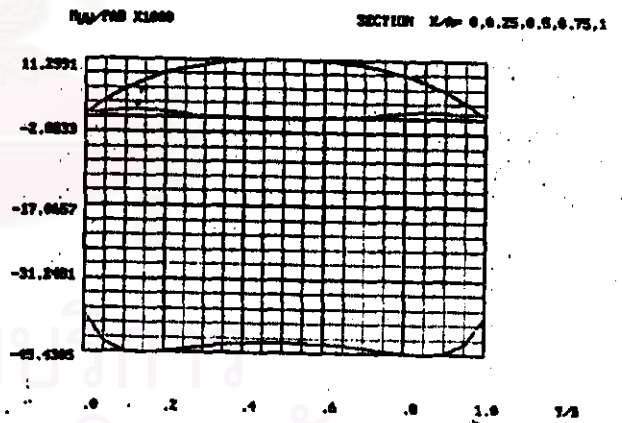
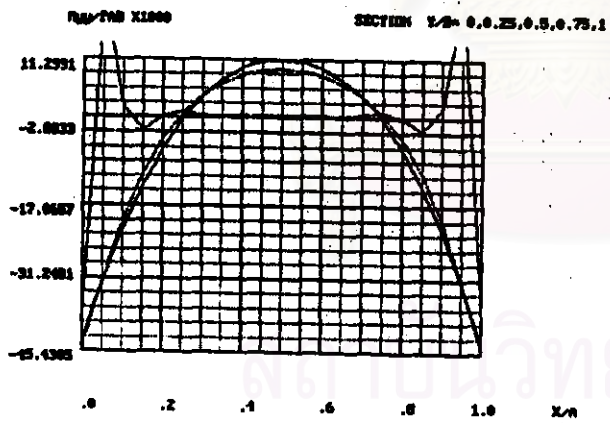
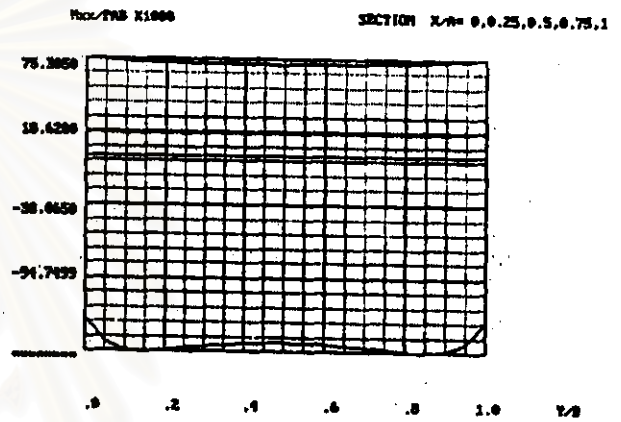
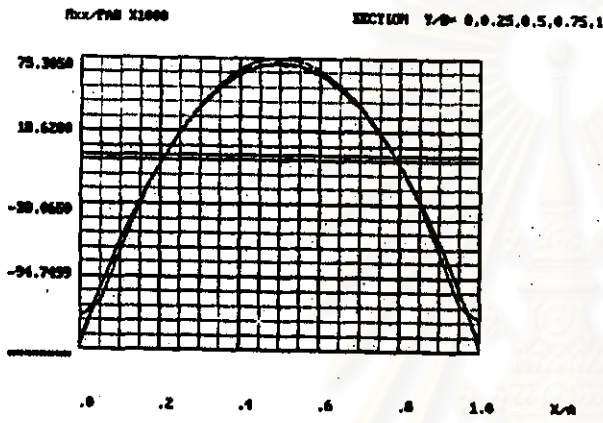
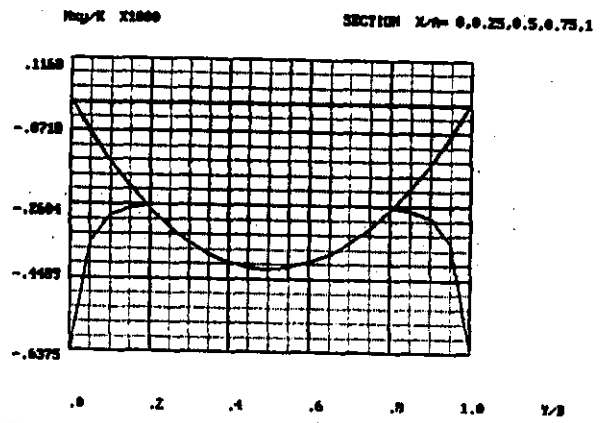
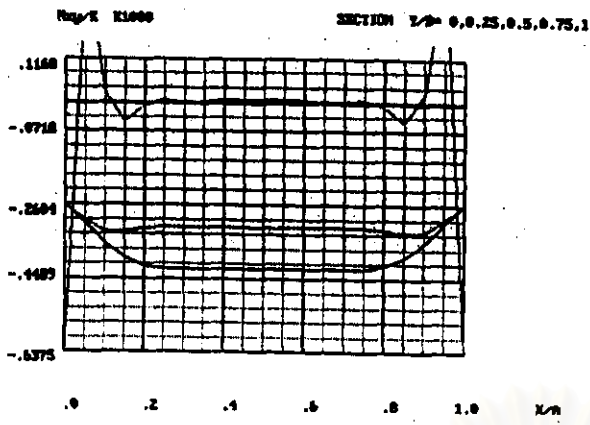
SECTION $X/A = 0, 0.25, 0.5, 0.75, 1$



$\theta_{yy}/K \times 10000$

SECTION $X/A = 0, 0.25, 0.5, 0.75, 1$





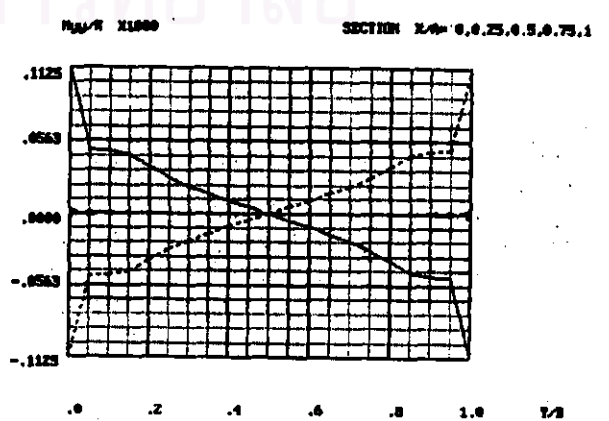
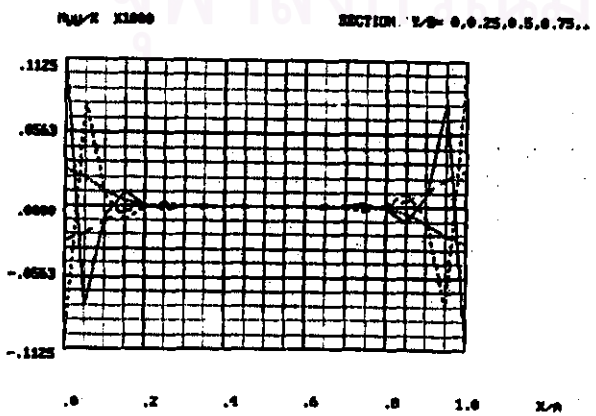
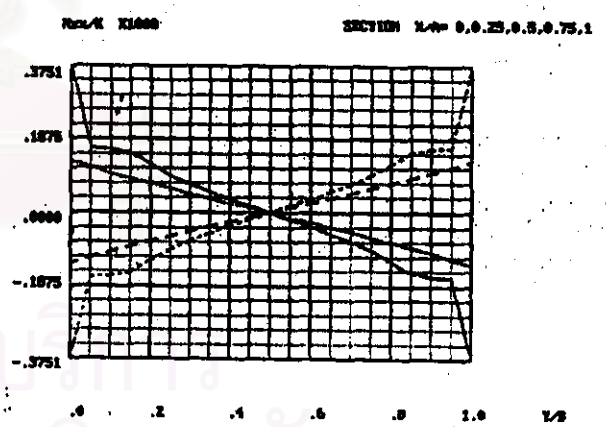
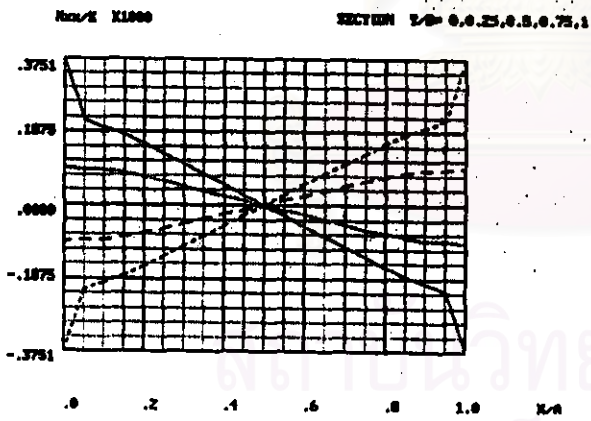
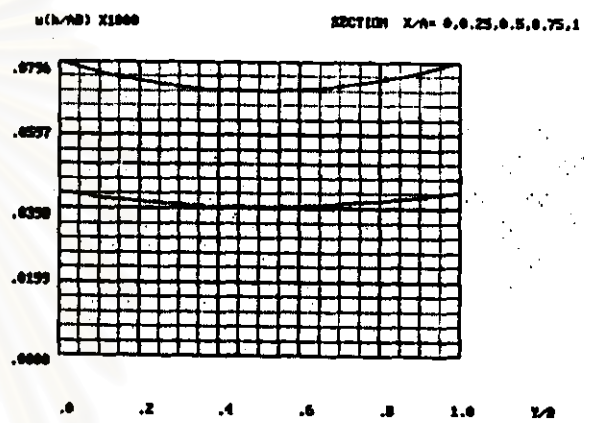
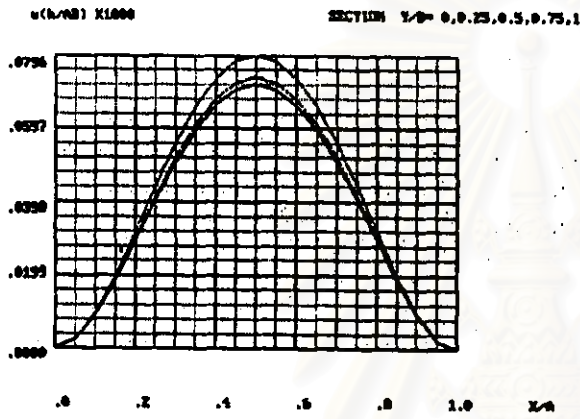
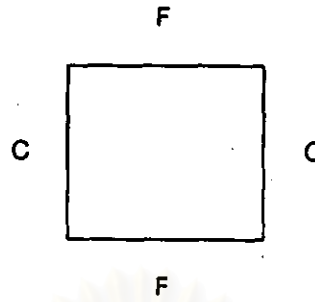
ผลของกรณีที่ 4 :

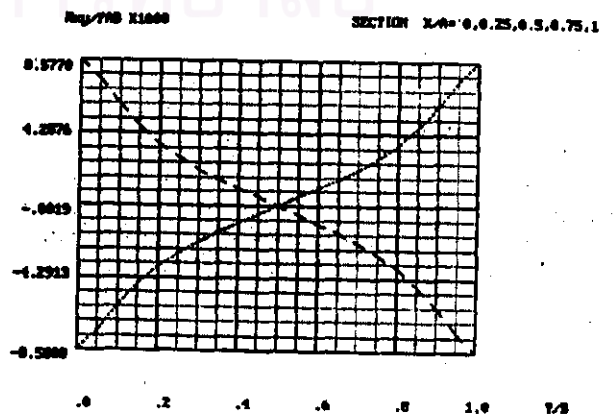
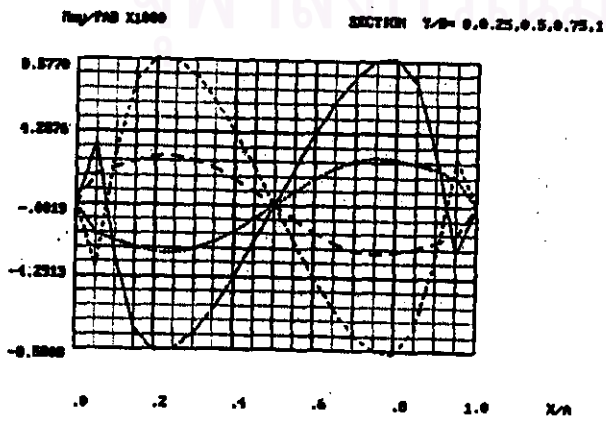
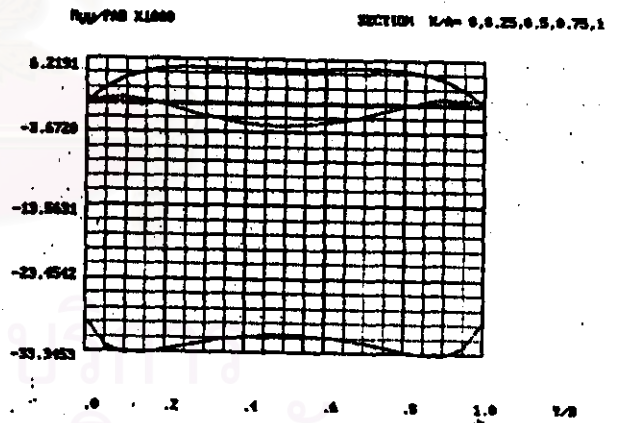
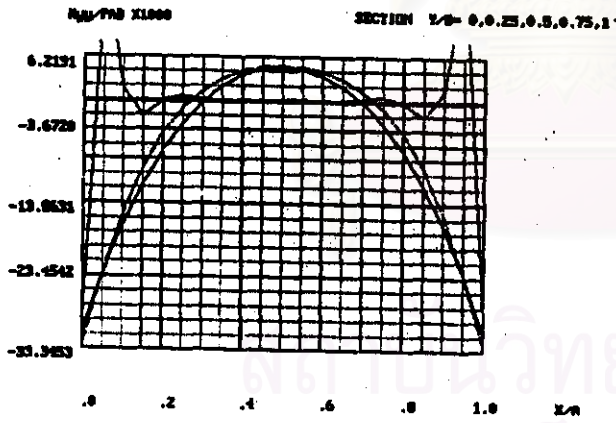
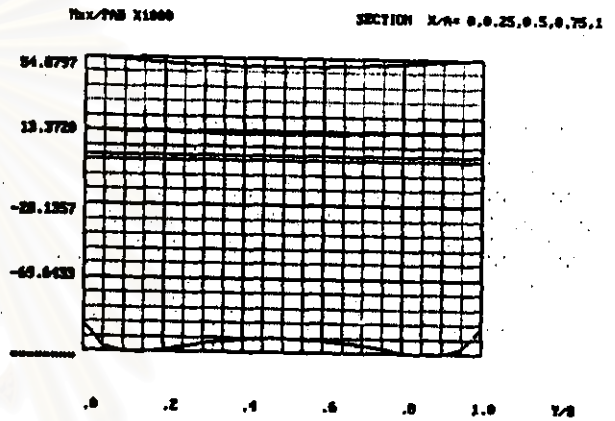
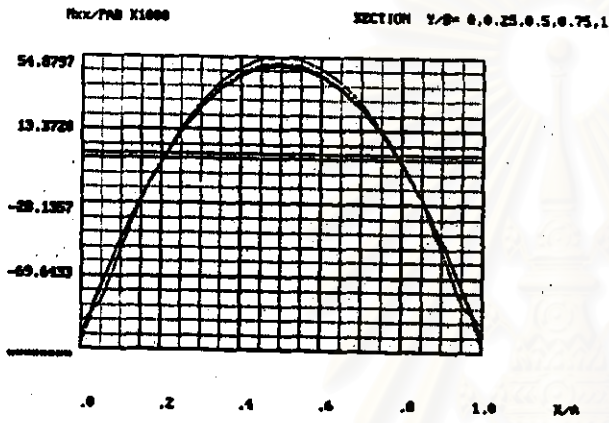
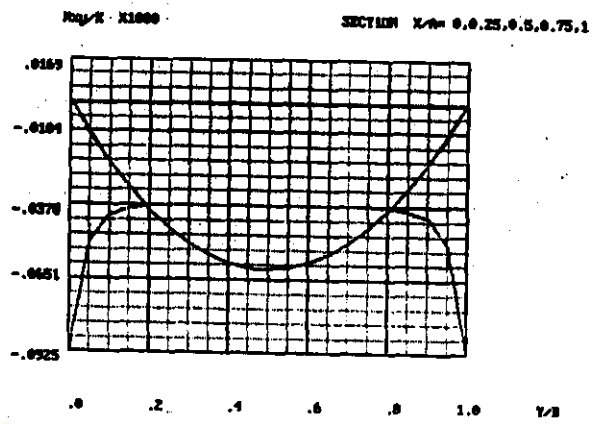
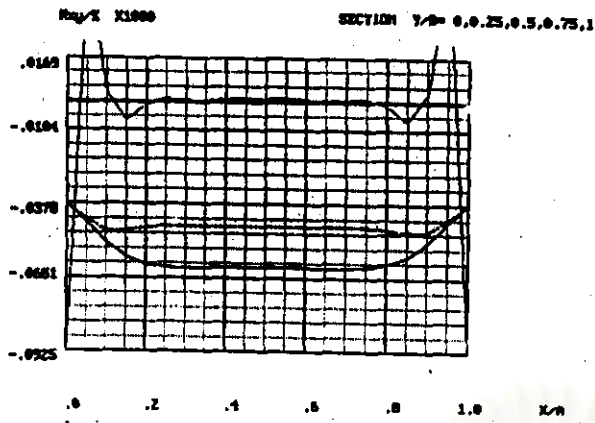
$$\frac{A}{B} = 2.0$$

$$\frac{f}{h} = 4.0$$

$$\frac{P_3 AB}{Eh^2} = 0.001$$

$$\nu = 0.3$$





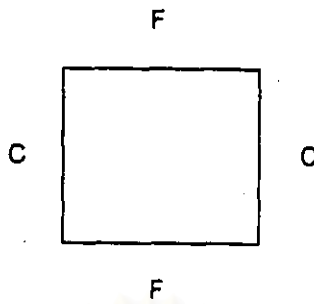
ผลของกรณีที่ 4 :

$$\frac{A}{B} = 2.0$$

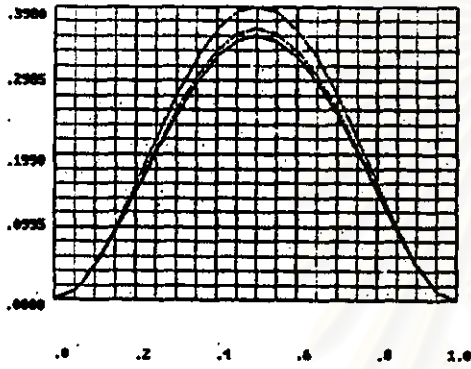
$$\frac{f}{h} = 4.0$$

$$\frac{P_3 AB}{Eh^2} = 0.005$$

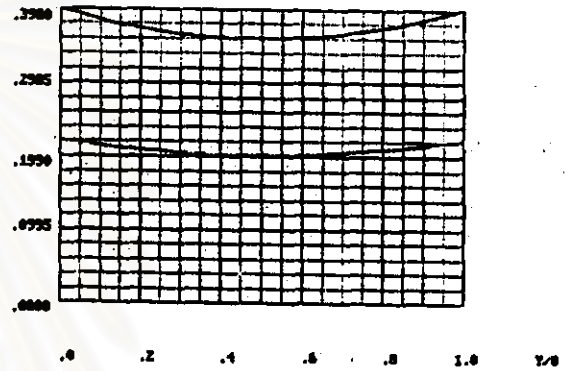
$$\nu = 0.3$$



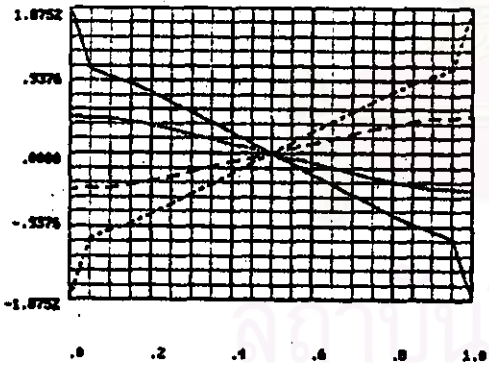
$w(L/AB) \times 1000$ SECTION $Y/h = 0.0, 0.25, 0.5, 0.75, 1$



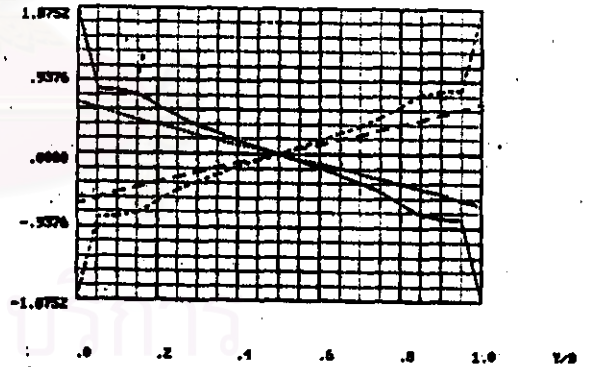
$w(L/AB) \times 1000$ SECTION $X/h = 0.0, 0.25, 0.5, 0.75, 1$



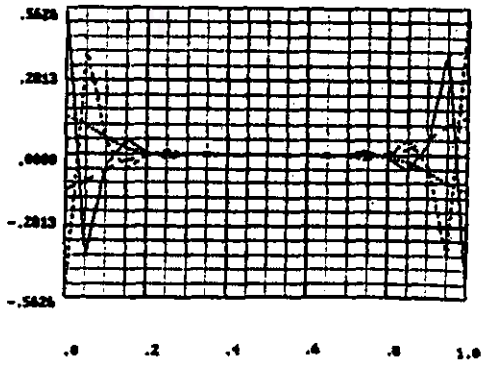
$M_{xx}/K \times 1000$ SECTION $Y/h = 0.0, 0.25, 0.5, 0.75, 1$



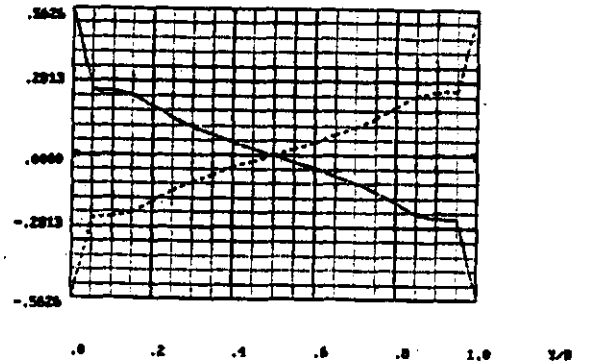
$M_{xx}/K \times 1000$ SECTION $X/h = 0.0, 0.25, 0.5, 0.75, 1$

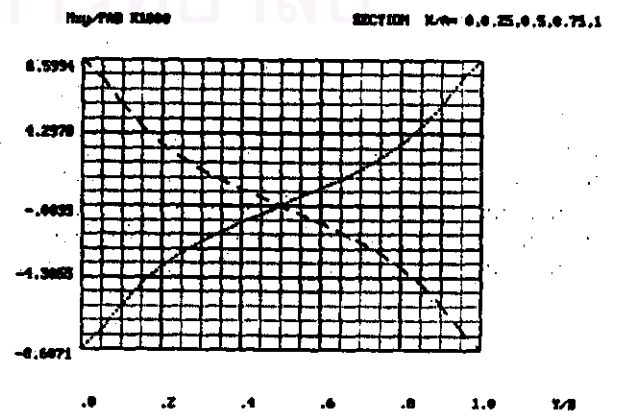
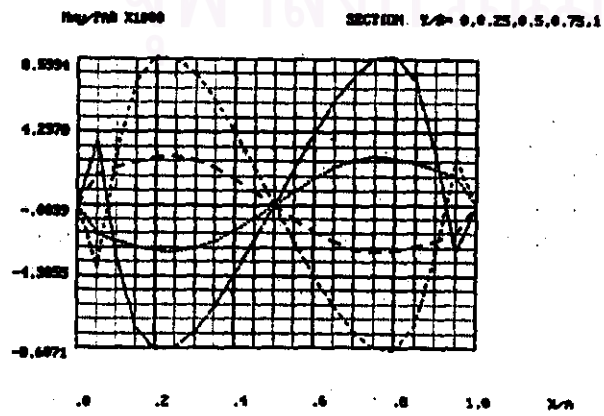
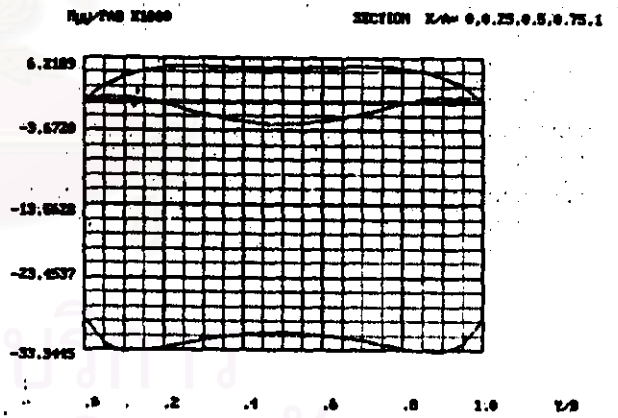
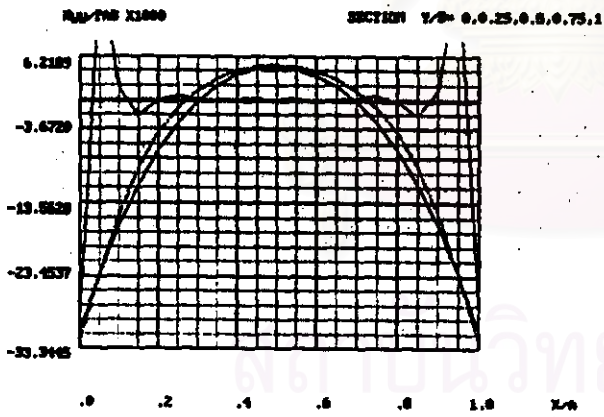
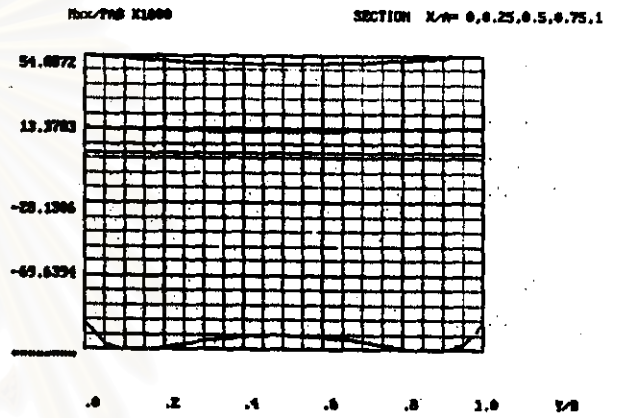
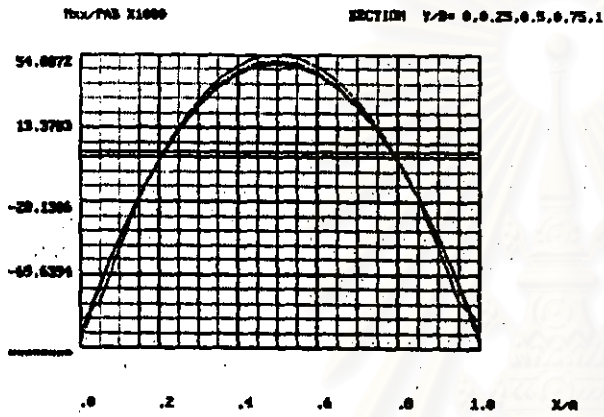
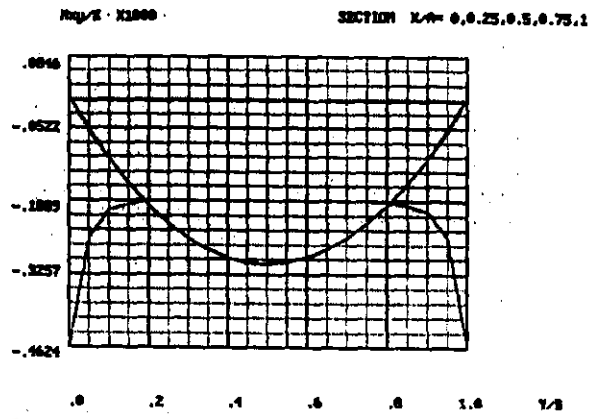
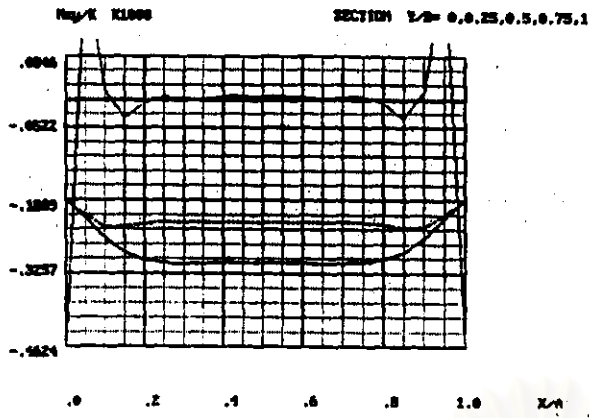


$M_{yy}/K \times 1000$ SECTION $Y/h = 0.0, 0.25, 0.5, 0.75, 1$



$M_{yy}/K \times 1000$ SECTION $X/h = 0.0, 0.25, 0.5, 0.75, 1$





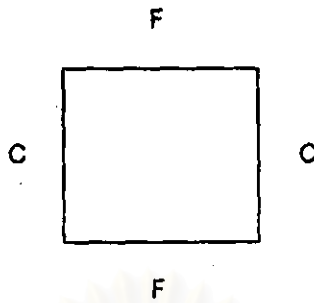
ผลของกรณีที่ 4 :

$$\frac{A}{B} = 2.0$$

$$\frac{f}{h} = 4.0$$

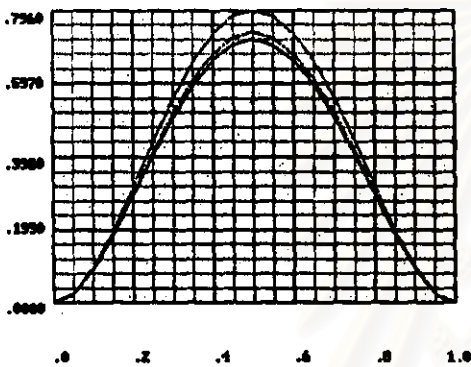
$$\frac{P_3 AB}{Eh^2} = 0.01$$

$$\nu = 0.3$$



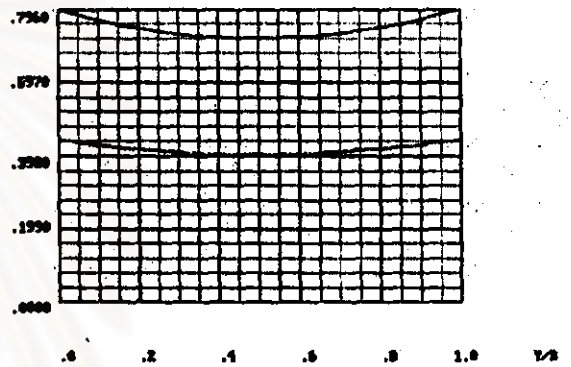
$u(h/AB) \times 1000$

SECTION $Y/B = 0.0, 0.25, 0.5, 0.75, 1$



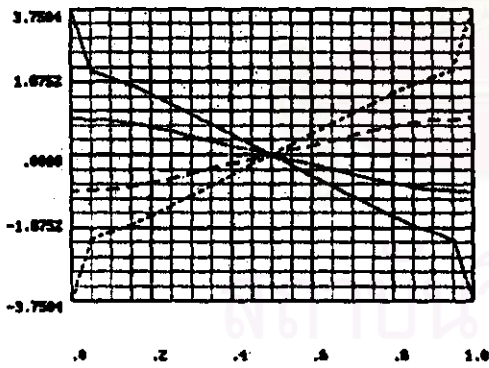
$u(h/AB) \times 1000$

SECTION $X/A = 0.0, 0.25, 0.5, 0.75, 1$



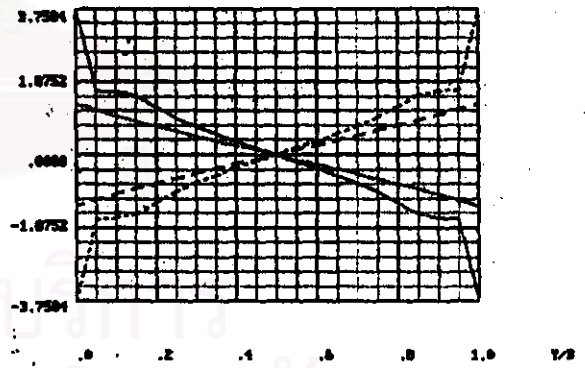
$M_{xx}/K \times 1000$

SECTION $Y/B = 0.0, 0.25, 0.5, 0.75, 1$



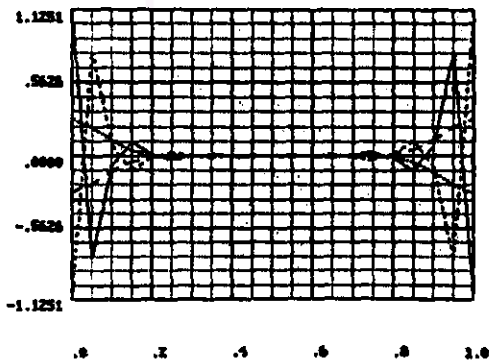
$M_{xx}/K \times 1000$

SECTION $X/A = 0.0, 0.25, 0.5, 0.75, 1$



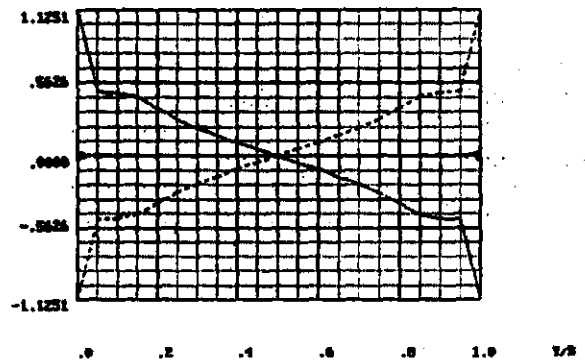
$M_{yy}/K \times 1000$

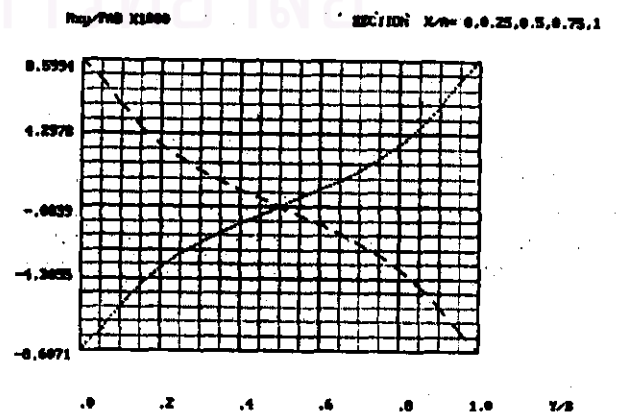
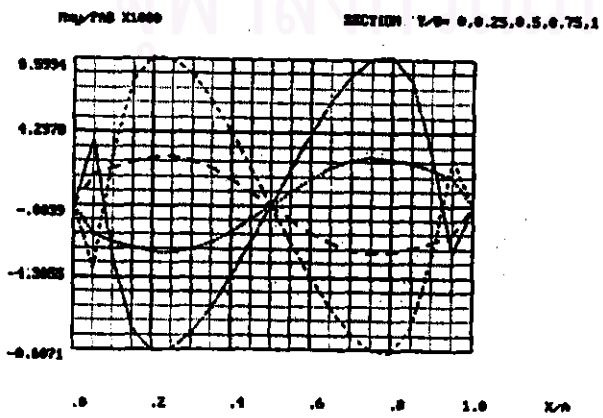
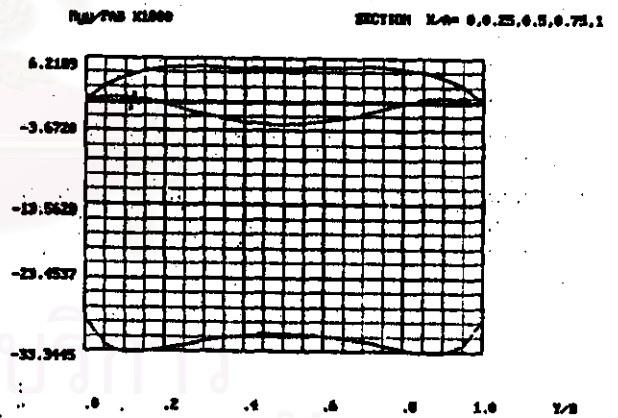
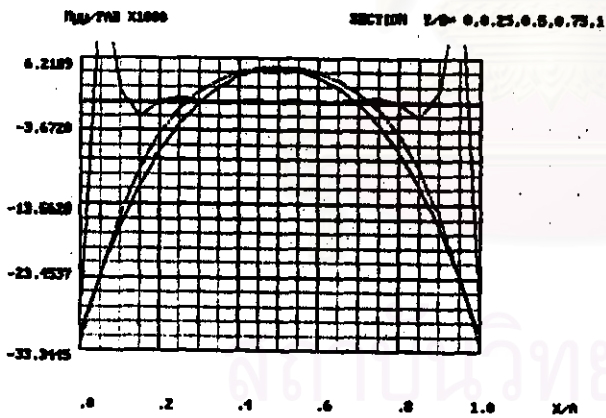
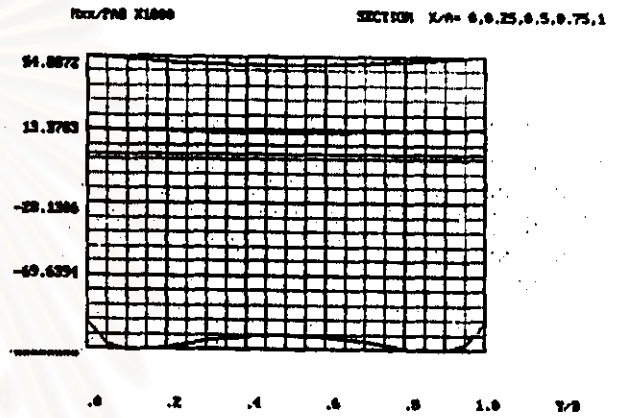
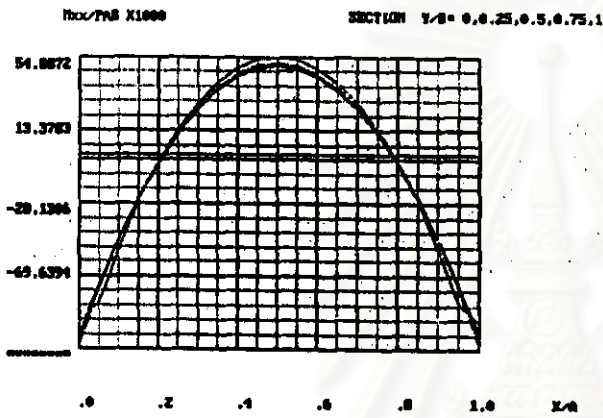
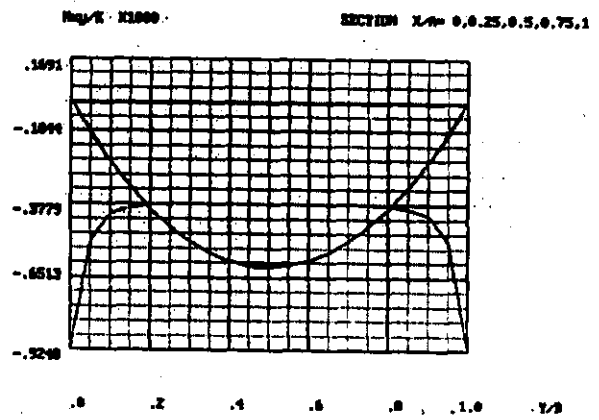
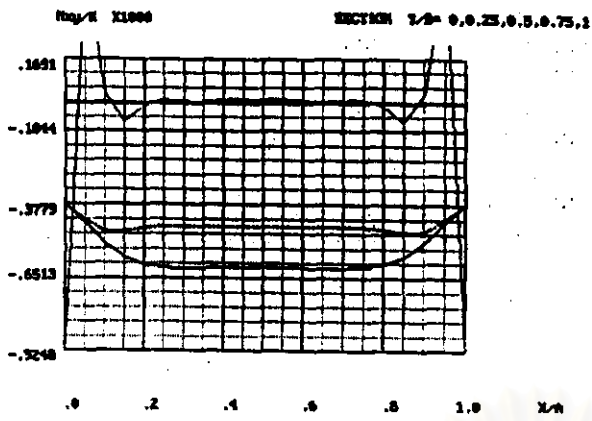
SECTION $Y/B = 0.0, 0.25, 0.5, 0.75, 1$



$M_{yy}/K \times 1000$

SECTION $X/A = 0.0, 0.25, 0.5, 0.75, 1$





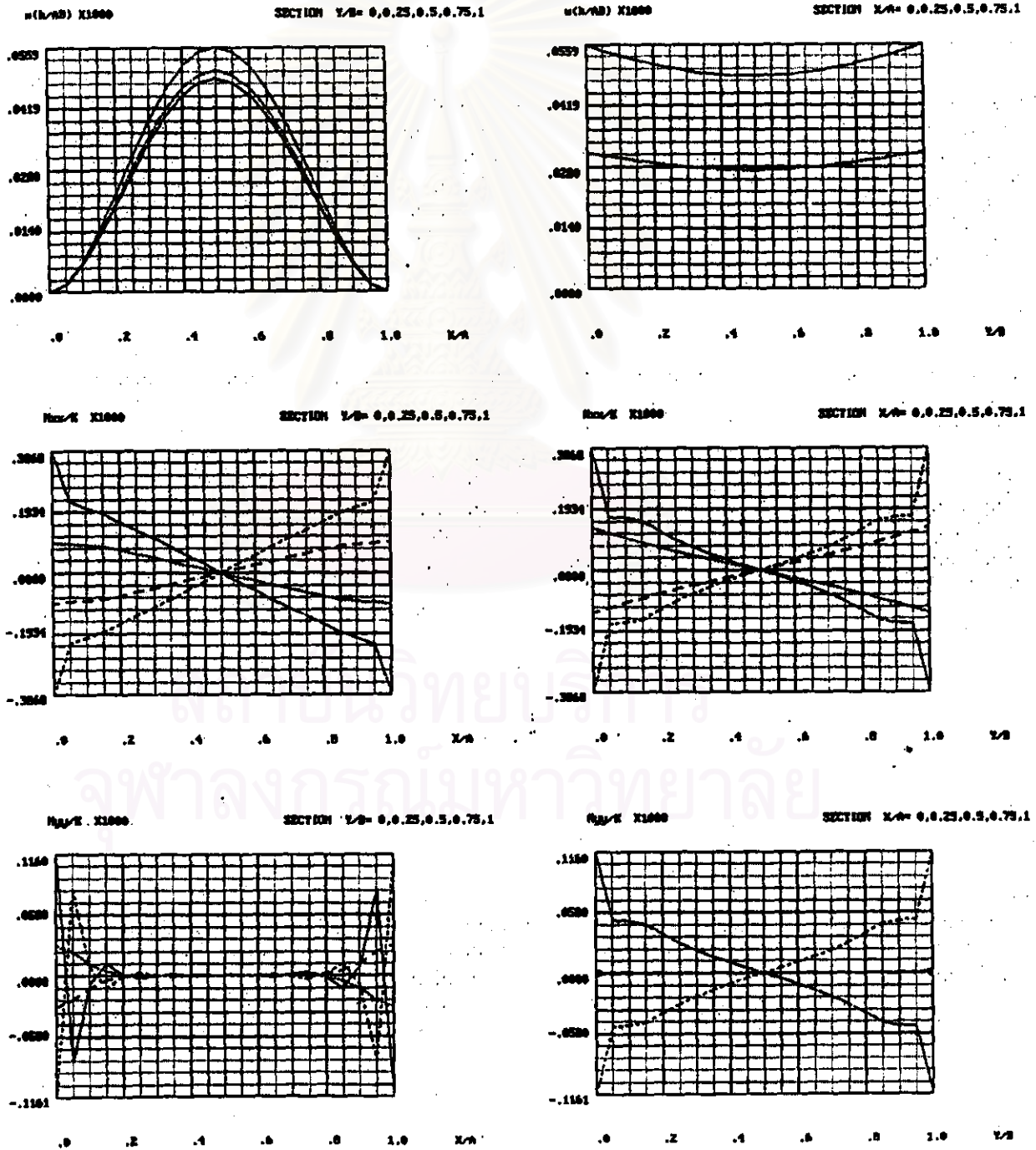
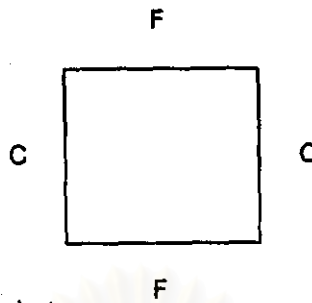
ผลของกรณีที่ 4 :

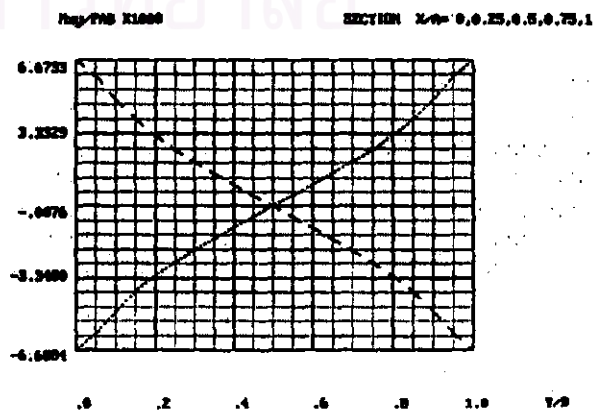
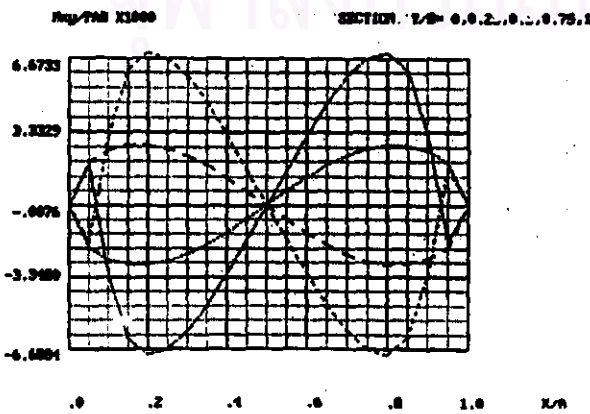
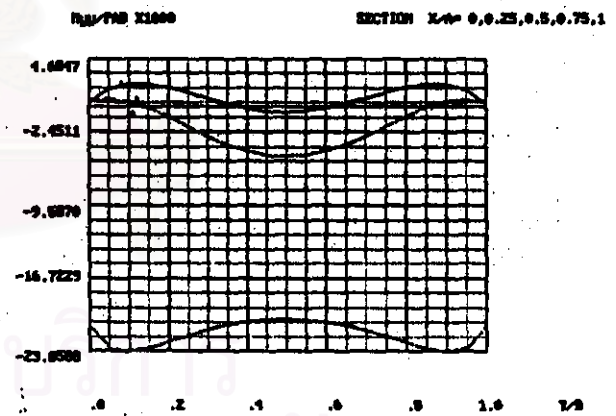
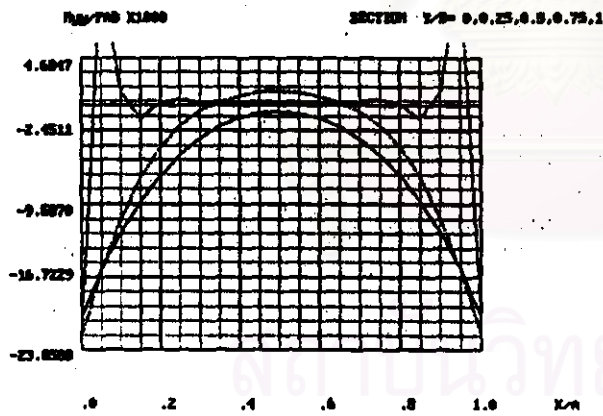
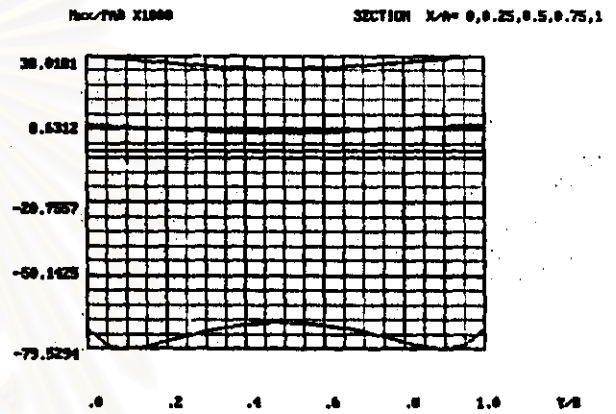
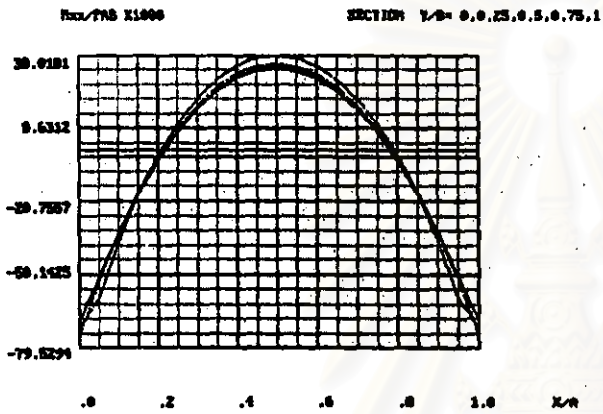
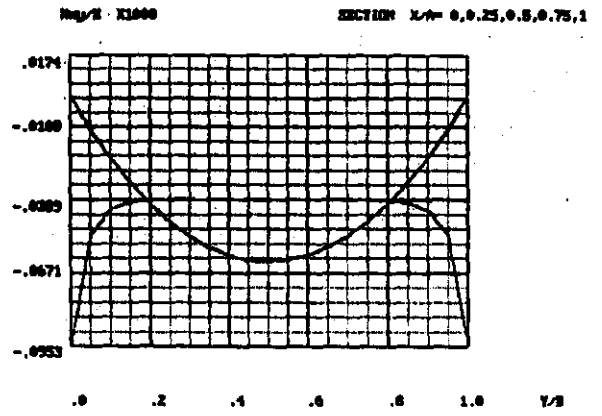
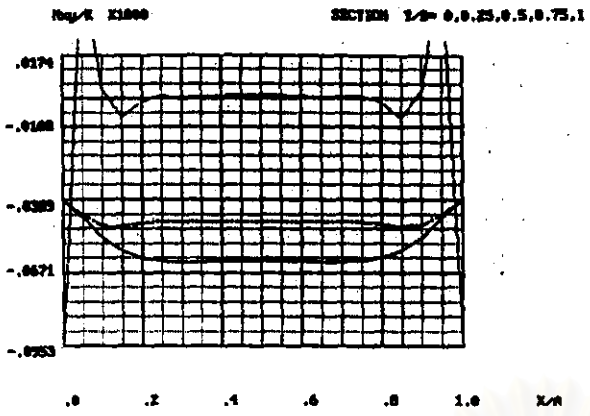
$$\frac{A}{B} = 2.0$$

$$\frac{f}{h} = 6.0$$

$$\frac{P_3 AB}{Eh^2} = 0.001$$

$$\nu = 0.3$$





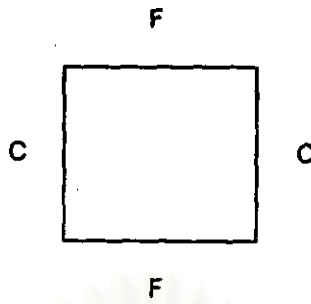
ผลของกรณีที่ 4 :

$$\frac{A}{B} = 2.0$$

$$\frac{f}{h} = 6.0$$

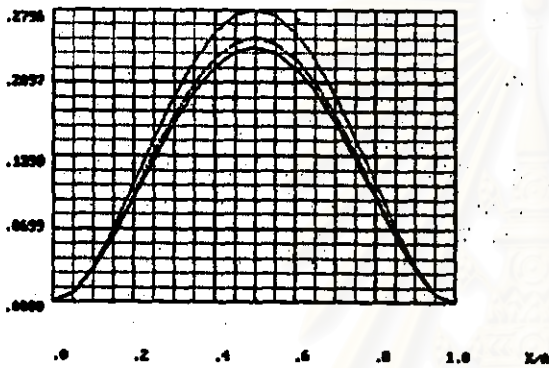
$$\frac{P_3 AB}{Eh^2} = 0.005$$

$$\nu = 0.3$$



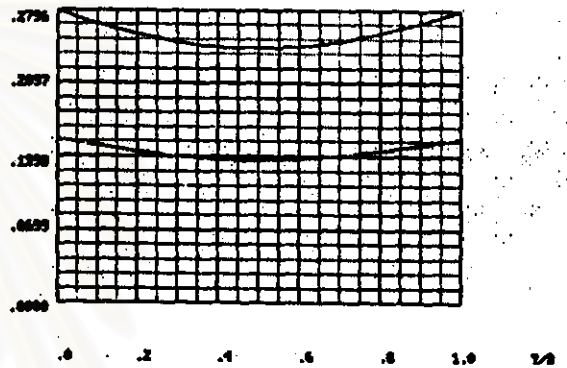
$u(L/4B) \times 1000$

SECTION $x/a = 0.0, 0.25, 0.5, 0.75, 1$



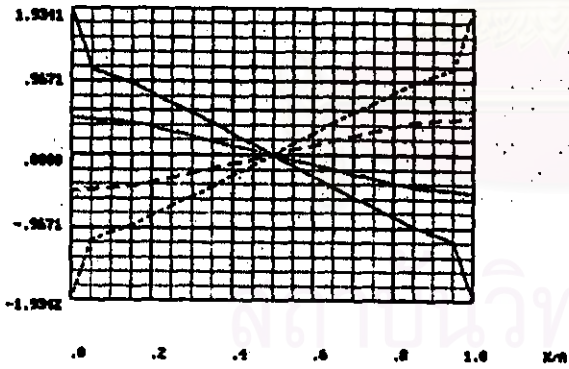
$u(L/4B) \times 1000$

SECTION $x/a = 0.0, 0.25, 0.5, 0.75, 1$



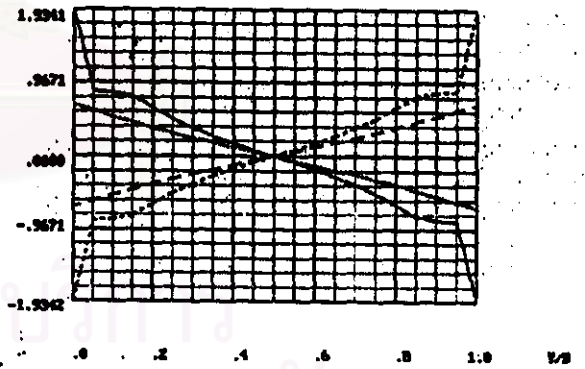
$M_{xx}/E \times 1000$

SECTION $x/a = 0.0, 0.25, 0.5, 0.75, 1$



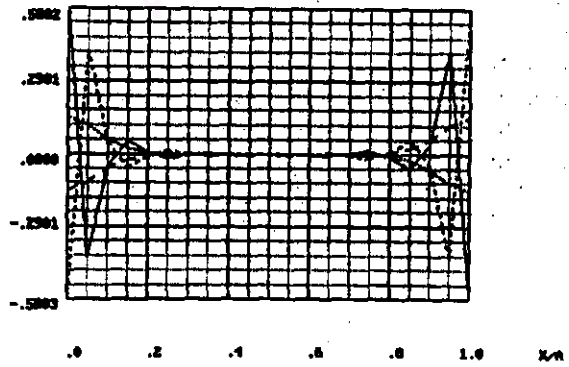
$M_{xx}/E \times 1000$

SECTION $x/a = 0.0, 0.25, 0.5, 0.75, 1$



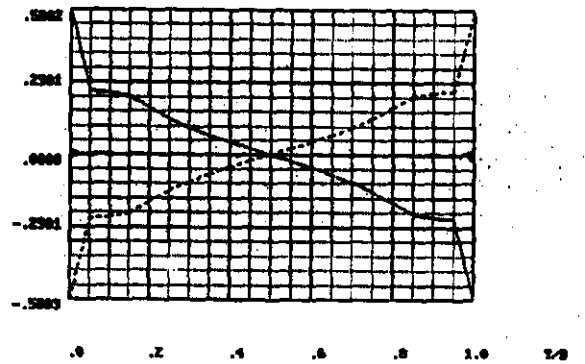
$M_{yy}/E \times 1000$

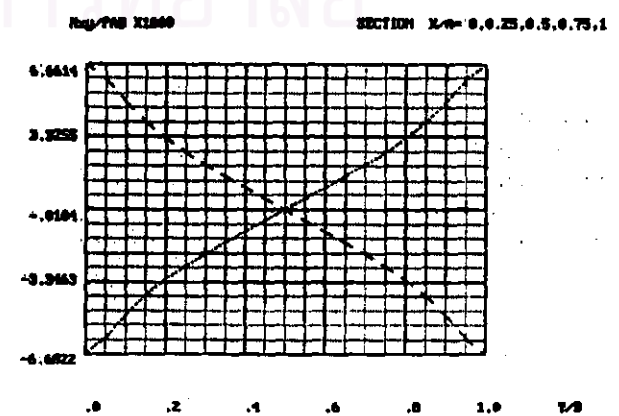
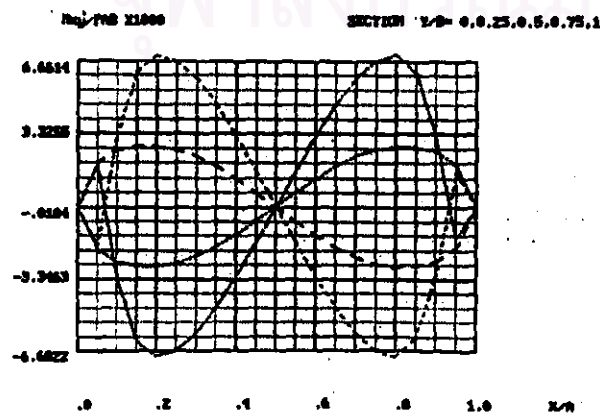
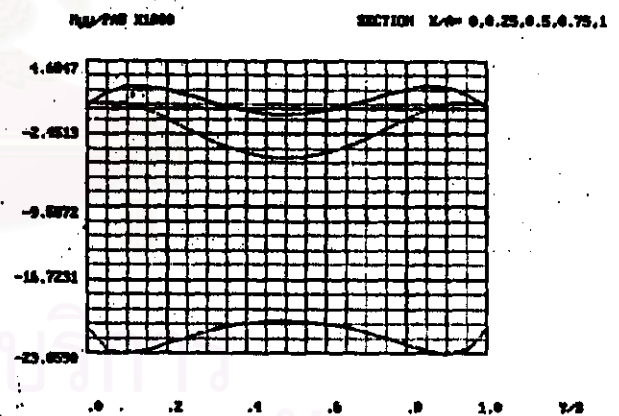
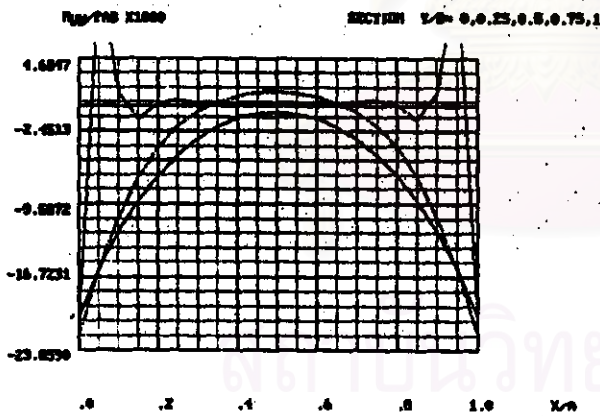
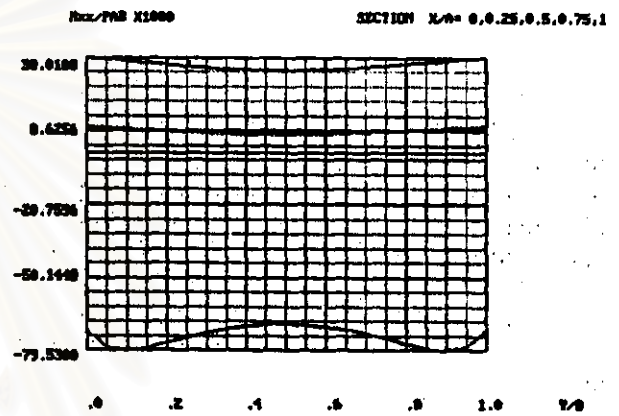
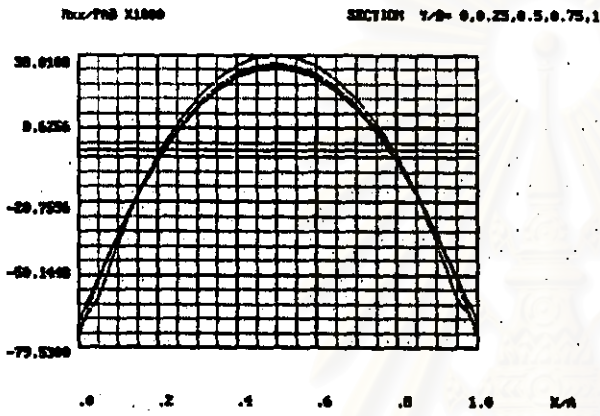
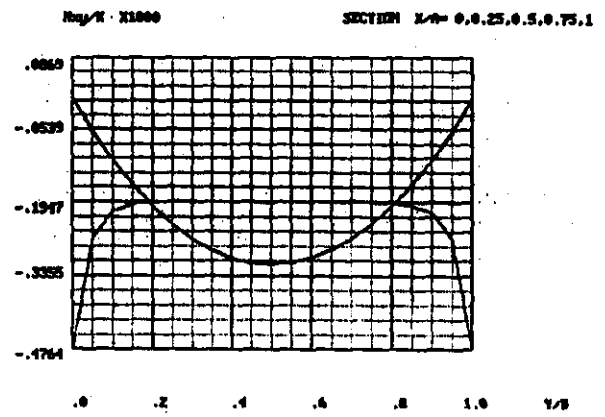
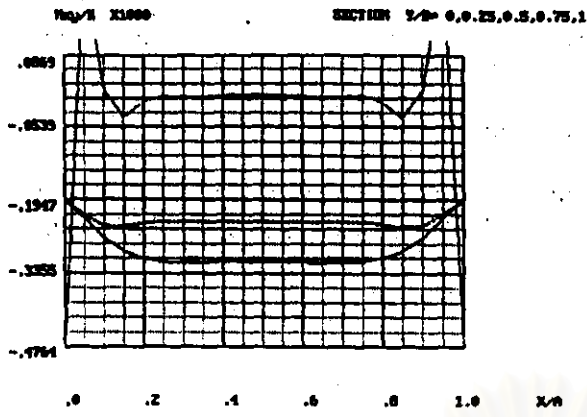
SECTION $x/a = 0.0, 0.25, 0.5, 0.75, 1$



$M_{yy}/E \times 1000$

SECTION $x/a = 0.0, 0.25, 0.5, 0.75, 1$





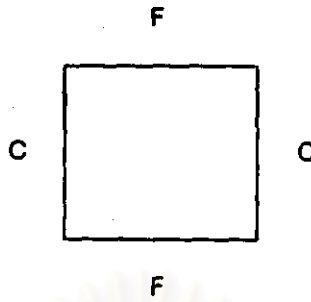
ผลของกรณีที่ 4 :

$$\frac{A}{B} = 2.0$$

$$\frac{f}{h} = 6.0$$

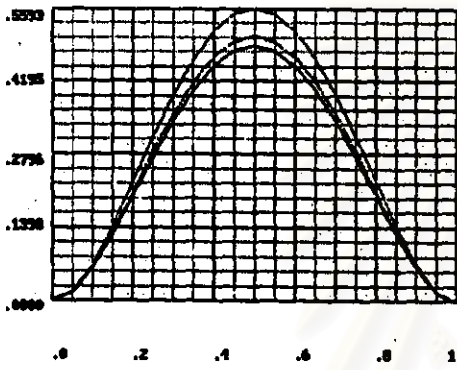
$$\frac{P_{3,AB}}{Eh^2} = 0.01$$

$$\nu = 0.3$$



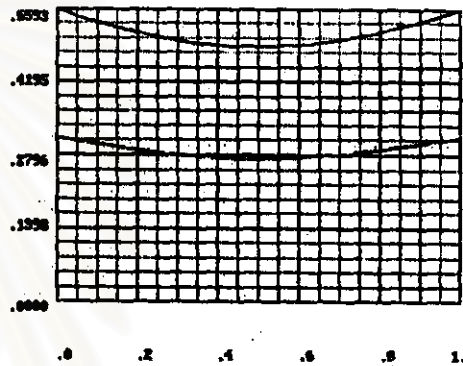
$v(h/\delta) \times 1000$

SECTION $\gamma/\delta = 0, 0.25, 0.5, 0.75, 1$



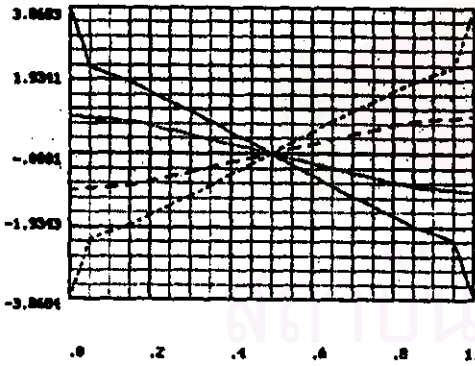
$v(h/\delta) \times 1000$

SECTION $\gamma/\delta = 0, 0.25, 0.5, 0.75, 1$



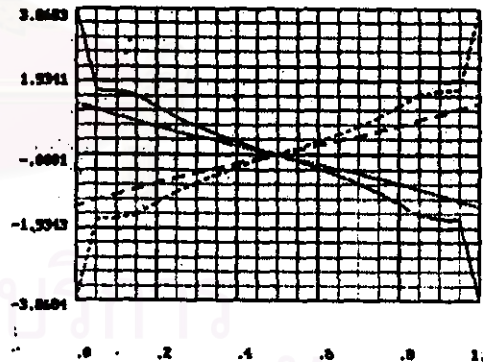
$w_0(X) \times 1000$

SECTION $\gamma/\delta = 0, 0.25, 0.5, 0.75, 1$



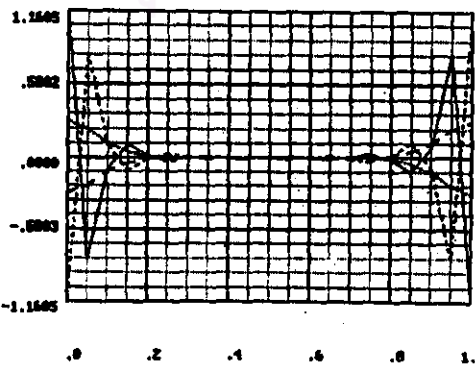
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SECTION $\gamma/\delta = 0, 0.25, 0.5, 0.75, 1$



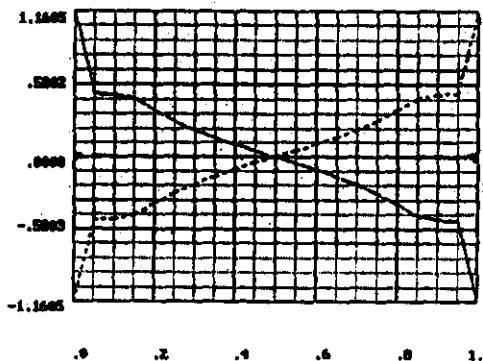
$w_{10}(X) \times 1000$

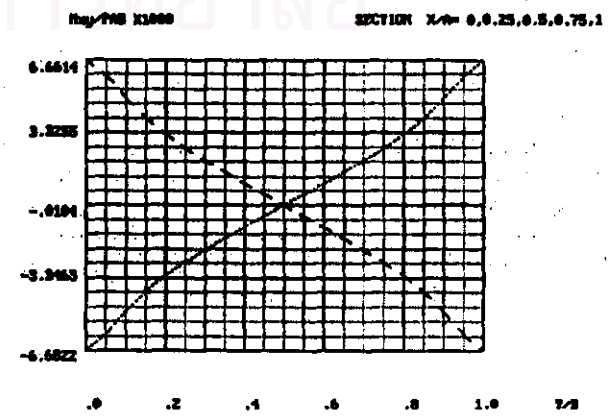
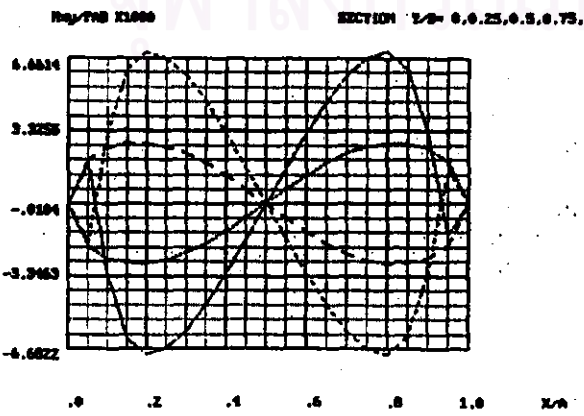
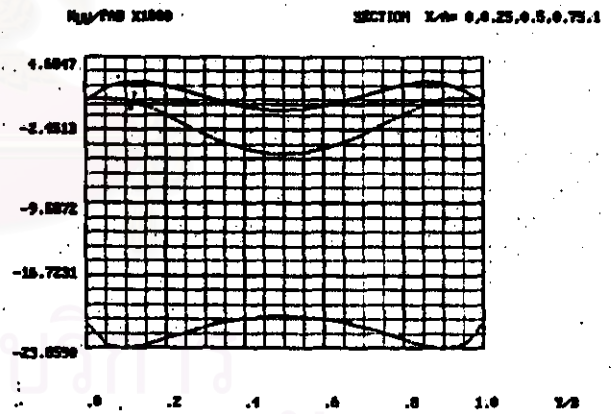
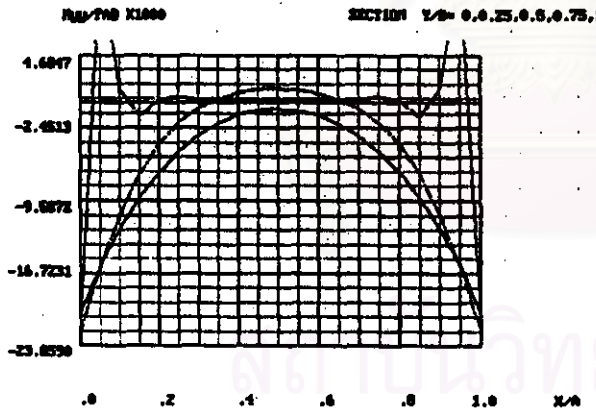
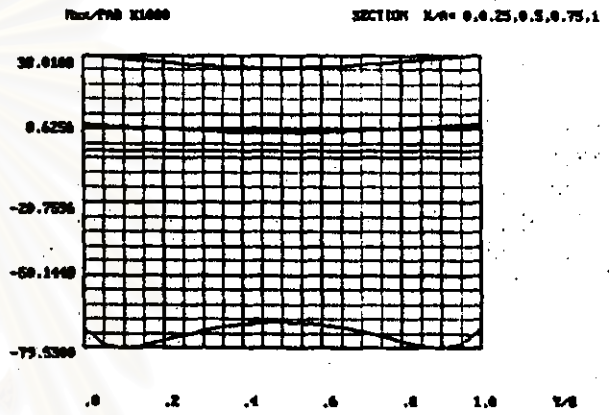
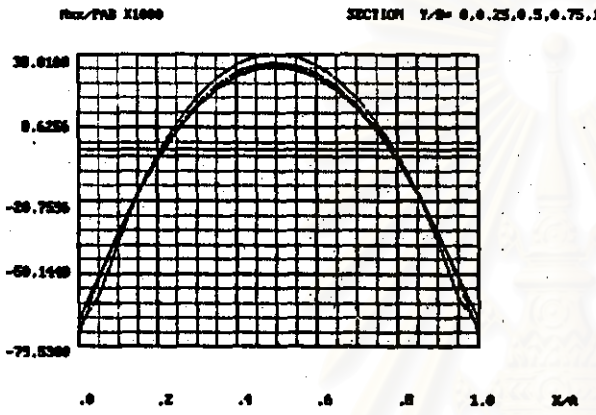
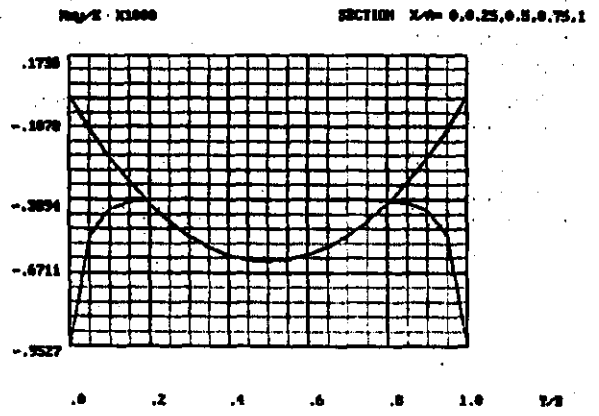
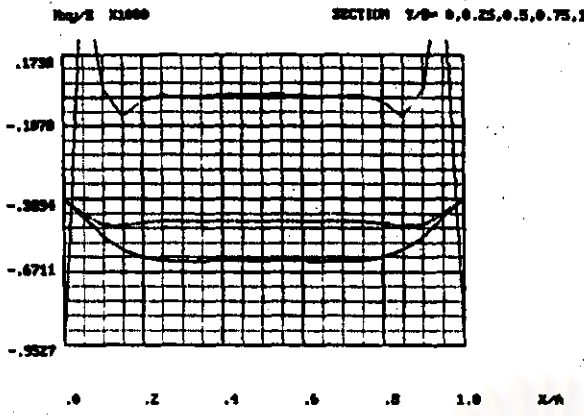
SECTION $\gamma/\delta = 0, 0.25, 0.5, 0.75, 1$



$w_{10}(X) \times 1000$

SECTION $\gamma/\delta = 0, 0.25, 0.5, 0.75, 1$





ประวัติผู้วิจัย

นายมนต์ชัย พงษ์วีไลเลิศ เกิดเมื่อวันที่ 9 มิถุนายน พุทธศักราช 2518 ที่จังหวัด กรุงเทพมหานคร สำเร็จการศึกษาปริญญาตรี วิศวกรรมศาสตรบัณฑิต สาขาวิศวกรรมเครื่องกล คณะวิศวกรรมศาสตร์ จุฬาลงกรณ์มหาวิทยาลัย เมื่อปีการศึกษา 2538 เข้าศึกษาต่อในหลักสูตรวิศวกรรมศาสตรมหาบัณฑิต ภาควิชาวิศวกรรมเครื่องกล คณะวิศวกรรมศาสตร์ จุฬาลงกรณ์มหาวิทยาลัย เมื่อปีการศึกษา 2539



สถาบันวิทยบริการ
จุฬาลงกรณ์มหาวิทยาลัย