# CHAPTER 6

## CONCLUSIONS

The conclusion from this experimental study for ninety degree single mitered pipe bends may be summarized as follows.

The flexibility under in-plane bending of unreinforced ninety degree single mitered bend is the same as that of smooth bend of the same dimension having an equivalent radius of five times the pipe bore mean radius.

For reinforced ninety degree single mitered bend its flexibility under in-plane bending is the same as that of smooth bend of the same dimension having an equivalent radius of seven times the pipe bore mean radius.

The third approximation of Von Karman's analysis can then be used to determine the flexibility factor of unreinforced and reinforced ninety degree single mitered bend.

From the graph that plotted deflection against load it is seen that the unreinforced mitered bend is more flexible than the reinforced one with same dimension.

The Kellogg's formula for flexibility factor for the unreinforced mitered bend is not satisfactory, the flexibility factor value is much different from the calculated one and it varies from 0.56 to 0.67 of the value that is obtained from Von Karman's analysis with same equivalent radius, and at this equivalent radius for unreinforced mitered pipe bends the values of flexibility factor of Von Karman's analysis vary from $K = \frac{1.7353}{\lambda}$ to $\frac{1.7239}{\lambda}$

In the analysis for stresses on pipe legs of mitered bend, the practical value of longitudinal stress on pipe is approximately 1.4 time of the value from bending stress theory. But in practical design the minimum value of safety factor used should not be less than 1.8 based on longitudinal stress.

When the curves of longitudinal, circumferential and radial stresses versus angular positions are shifted to zero stress at zero degree position, these stresses will vary from +90 to -90 degree positions nearly in the form of sine curve, as shown in Fig. A14. to A16.

Shear stress on z-$\theta$ plane varies from +90 to -90 degree positions on pipe leg in the form of cosine square curve as shown in Fig. A17. and appendix II.

Shear stresses on $\theta$-r and r-z planes vary from +90 to -90 degree positions on pipe leg in the form of cosine curve as shown in Fig. A18.