CHAPTER 6
MODEL VERIFICATION

This chapter presents some comparisons between results from the proposed model and results from other sources to shed some light on the suitability of this modeling system for performing dynamic simulation columns.

6.1 Property predictions

The first aspect which will be verified for accuracy is the property predictions. Table 6.1 shows the results of a simple thernodynamic properties on an hydrocarbon stream. This table compares the results from the proposed model and HYSIM. The HYSIM package used the Soave-Redlich-Kwong equation of state for predicting thermodynamic property.

Table 6.1 Thermodynamics comparison between the proposed model vs HYSIM (Isothermal flash at 46.15 °F and 24.33 psia.)

component	liquid composition (x)	vapor composition (y)		error (%)
		This Work	HYSIM	
i-Butane	.5	.589	.578	1.90%
n-Butane	.5	.411	.422	1.90%
density*(lb/ft^3)		37.44	36.59	2.32%

(density*: calculate at liquid composition of i-Butane and n-Butane = 0.9017 and .0983)

This table show an agreement between the proposed model and HYSIM for some properties associated with this system. This data verifies an accurate implementation of the property prediction discussed in chapter 2.

6.2 Steady state results

The next charecteristic of this model to be verified for accuracy is the prediction of the steady state performance of a distillation column given a set of column configuration and operating parameters. Table 6.2 presents a comparison of the results from the proposed model with the results from a rigorous tray-by-tray algorithm (HYSIM) for the particular case of a i-butane and n-butane splitter. Inspection of these data show the differences in the predicted product stream compositions is negligible. The predicted tray temperatures for this column are presented in Figure 17 and Table 6.3. The minimum error in the proposed model calculation occurs around the feed tray and amounts to about 0.5°F. However, toward the terminal ends of the column, where control points are typically located, the error is around 3°F or less. The accuracy is more than adequate for the intended purposes of this model.

Table 6.2 The propsed model vs HYSIM package comparison i-butane/n-butane splitter

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Configuration and Operating Data:

Total trays = 15

Feed tray = 8

Component	Feed Mole fraction
i-Butane	.5
n-Butane	.5

Feed rate = 405 lbmole/h

Bottom pressure(pb) = 24.7 psia.

Overhead pressure(pd)= 19.7 psia.

Reflux ratio = 9.5

Rating Results compared:

	Distillate		Bottom	
Component	This Work	HYSIM	This Work	HYSIM
i-Butane	0.90	0.9017	0.47	0.466
n-Butane	0.10	0.0983	0.53	0.534
Flow (lbmole/hr)	31.30	31.3	373.7	373.7
Temperature (°F)	29.4	26.6	48.0	46.5

Table 6.3 The proposed model vs HYSIM package comparison i-butane/n-butane splitter-Tray Temperature Profile

Tray No.	Temperature (°F)	
	This Work	HYSIM
Reboiler	48.0	46.5
1	46.5	45.4
2	45.5	44.7
3	44.7	44.0
4	44.0	43.3
5	43.1	42.6
6	42.4	41.9
7	41.7	41.2
8 (Feed)	41.0	40.5
9	40.4	39.8
10	39.7	37.7
11	37.8	35.6
12	35.8	33.6
13	34.1	31.6

14	32.3	29.8
15	30.8	28.1
Condenser	29.4	26.6

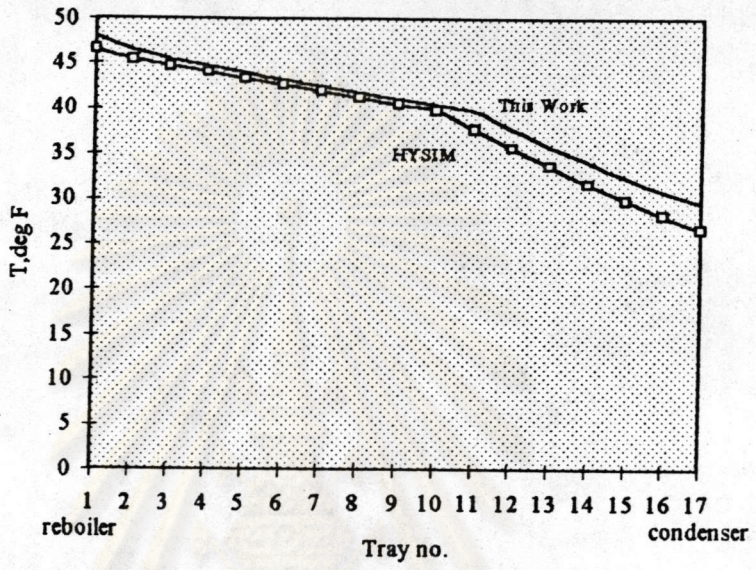

Fig.6.1 Temperature Profile comparison between the proposed model vs HYSIM