

CHAPTER VI

SIMULATION RESULTS AND DISCUSSION

6.1 Simulation Study

Values of Input Data and Model Parameters:

Input data and model parameters used in modelling are summarized in Table 6.1

Table 6.1 Values of input data and model parameters used in modelling

Input Data and Model Parameters	Symbol	Value	Dimension	Note
Inclination angle of heat pipe	ϕ	20	Degree	antigravity
Heat input	Q	7.605	Watt	-
Water flow rate	G	0.05	kg/hr	-
Heat capacitance of water	CW	1.16	Whr/kg K	-
View factor	FE1, FE2	1	-	-
Radiated area	AE	0.02	m ²	-
System initial temperature	T	300	Kelvin	-
Total heat capacitance	C	See note	Whr/ K	See Table 5.1
Thermal conductance	σ	See note	W/ K	See Table 5.2

6.2 Simulation Results

The simulation results are shown graphically in Fig. 6.3. From this graph the average surface temperature on the heat pipe surfaces are as follows:

$$T_C < T_A < T_E$$

where

T_E is the average temperature on the evaporator section

T_A is the average temperature on the adiabatic section

T_C is the average temperature on the cooling section

Thus the temperatures show qualitative agreement with our experimental results.

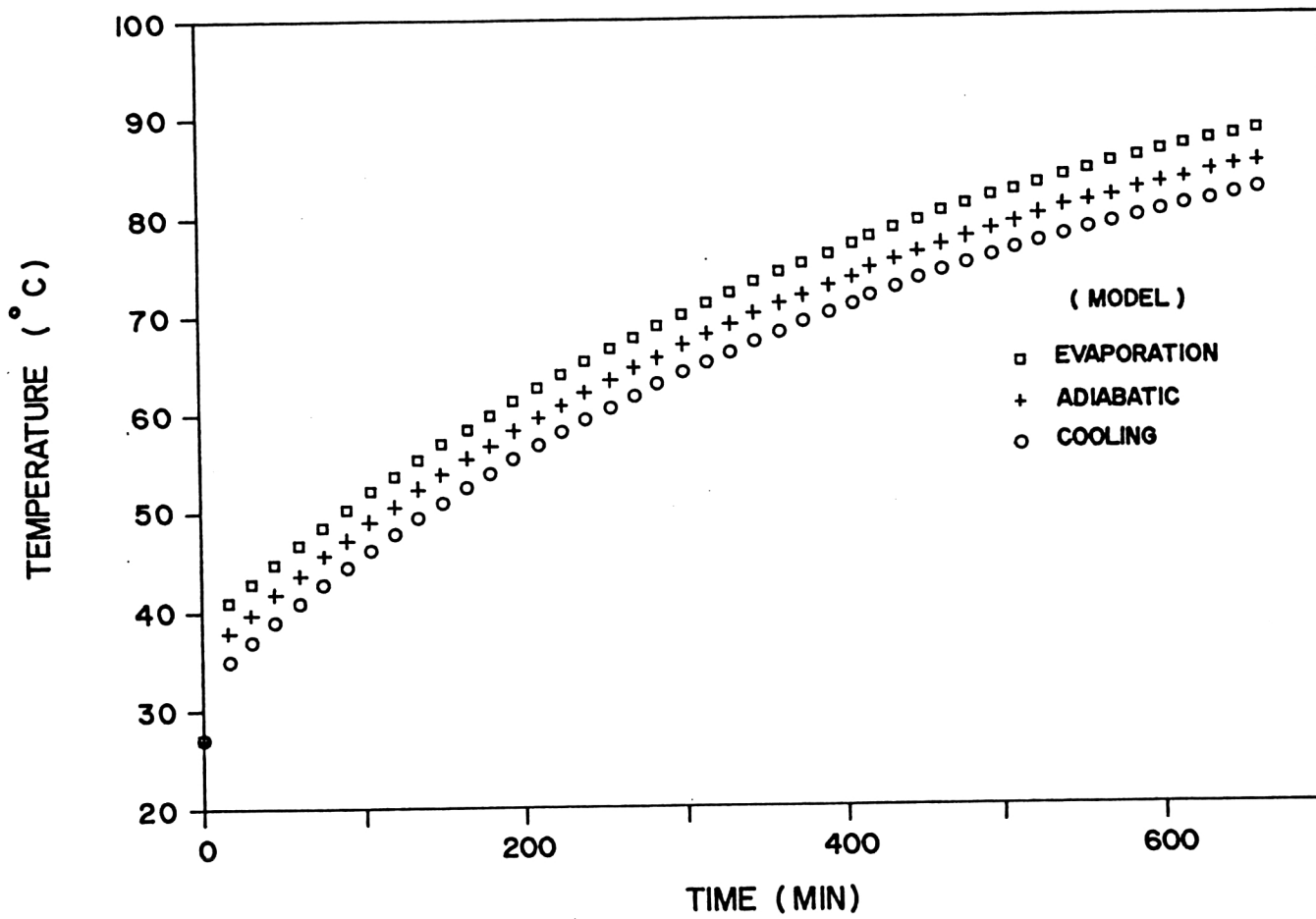


Fig. 6.3 Simulated Data Versus Time.

6.3 Comparison of Simulation and Experimental Results

Figs. 6.2, 6.4 and 6.5 compare the simulation and experimental results for the temperature of the adiabatic, cooling and evaporation sections, respectively. All of these data have been plotted collectively in Fig 6.1. From these curves we see that the simulated data agree only qualitatively with the experimental data. The reason for the wide discrepancy is thought to be the large uncertainty in the theoretical determination of some model parameters, especially the effective view factors and effective thermal conductance of the heat pipe wall plus liquid-filled wick.

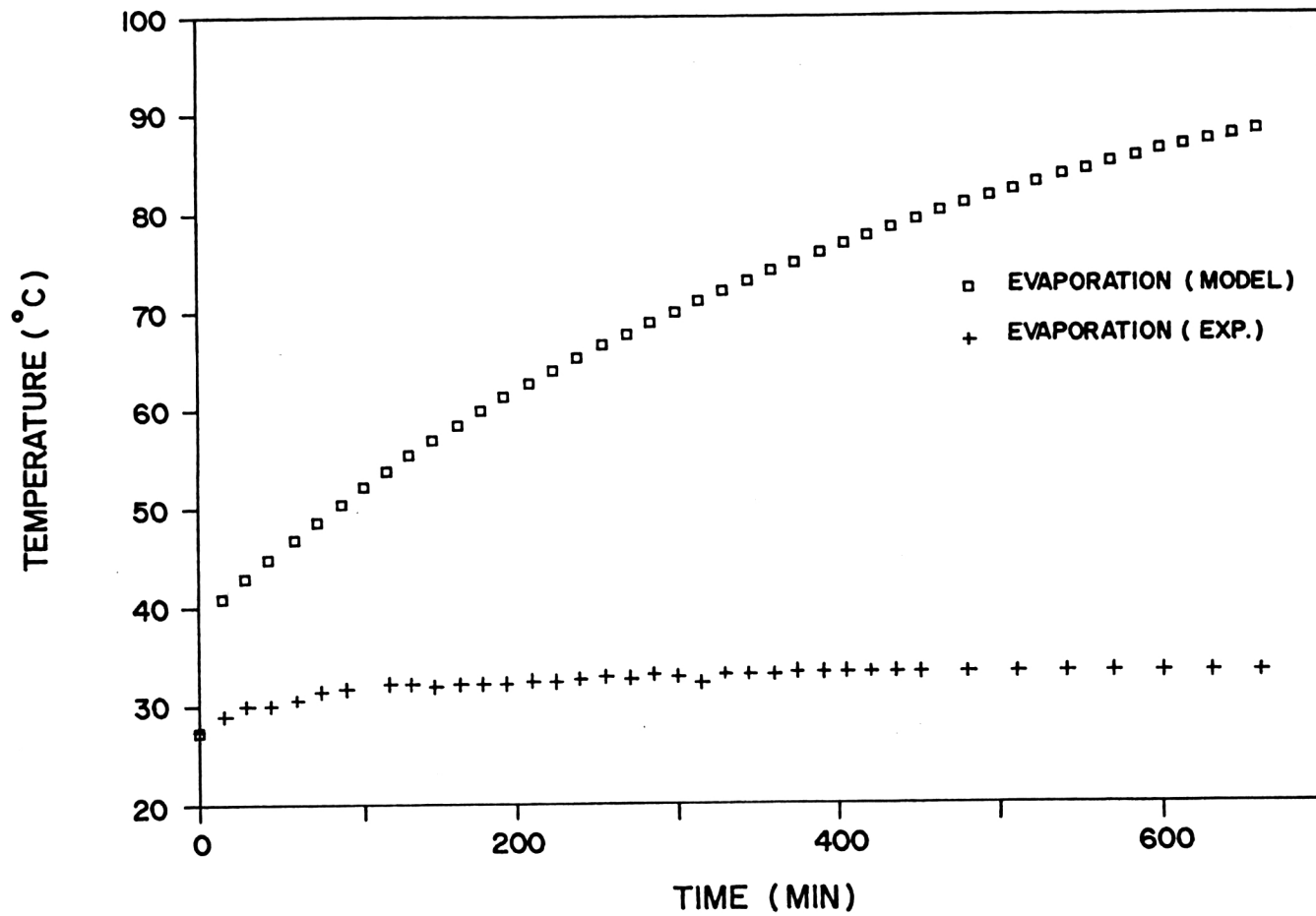


Fig. 6.5 Comparison Between Experimental Data and Modelling.

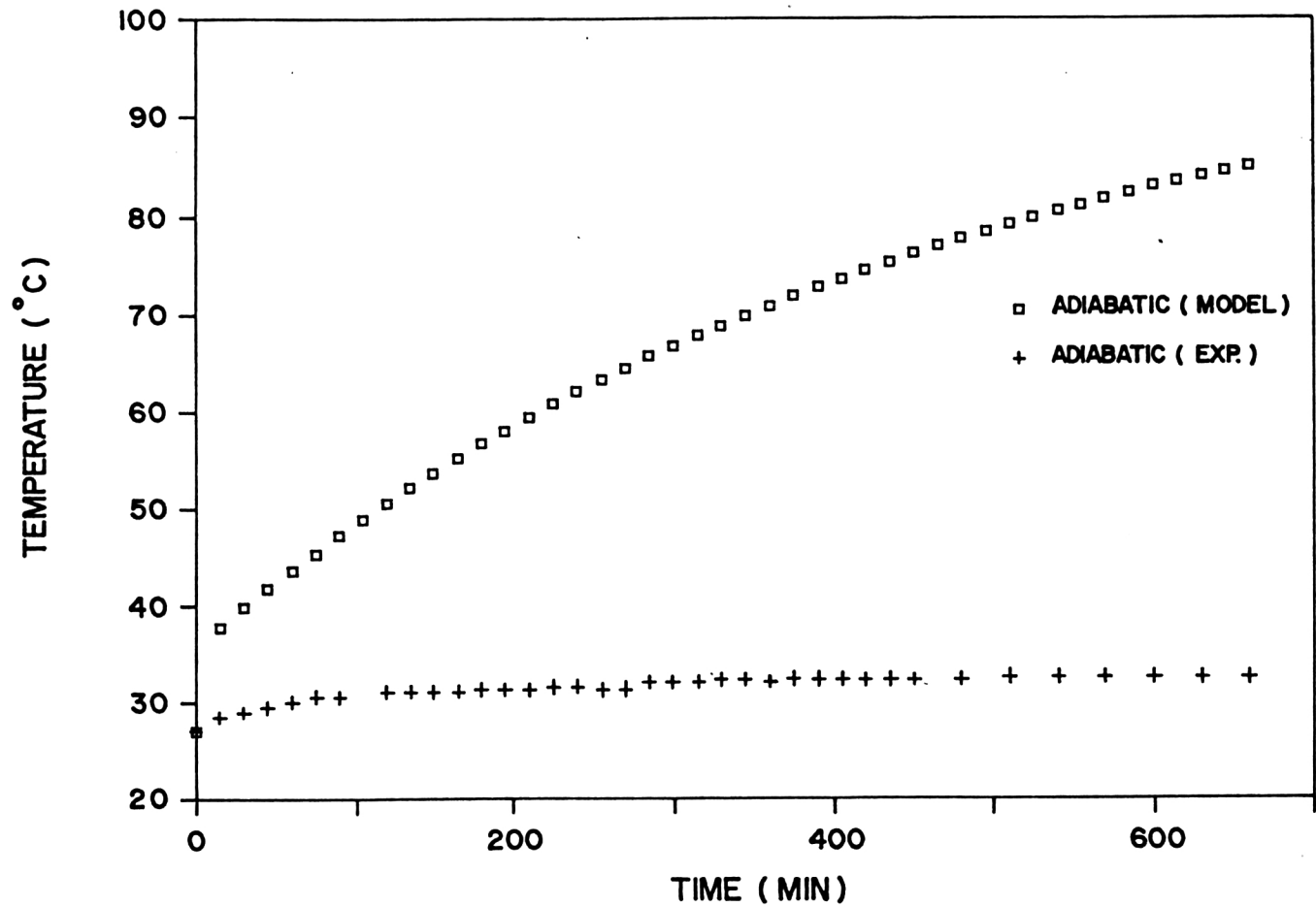


Fig. 6.2 Comparison Between Experimental Data and Modelling

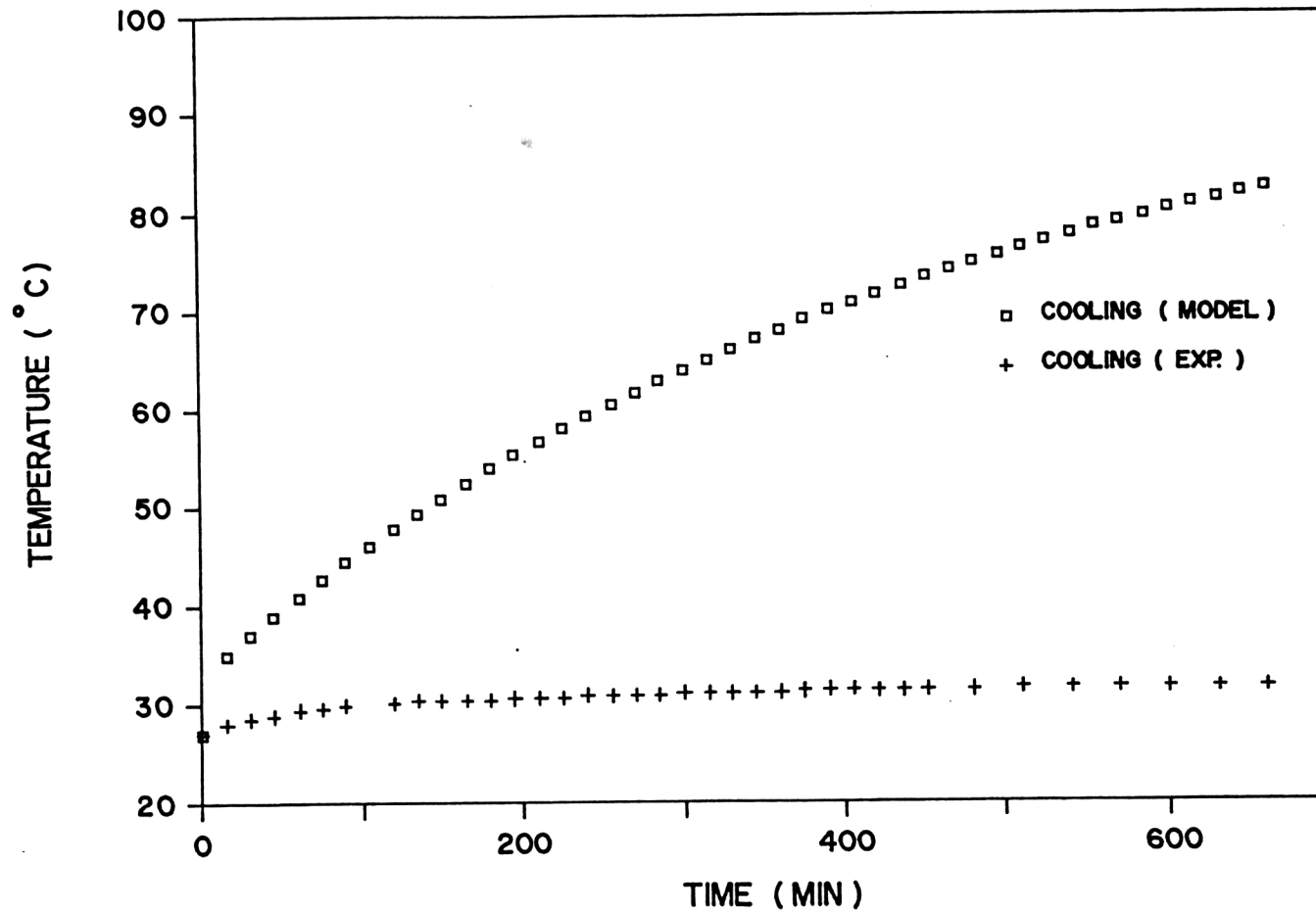


Fig. 6.4 Comparison Between Experimental Data and Modelling.

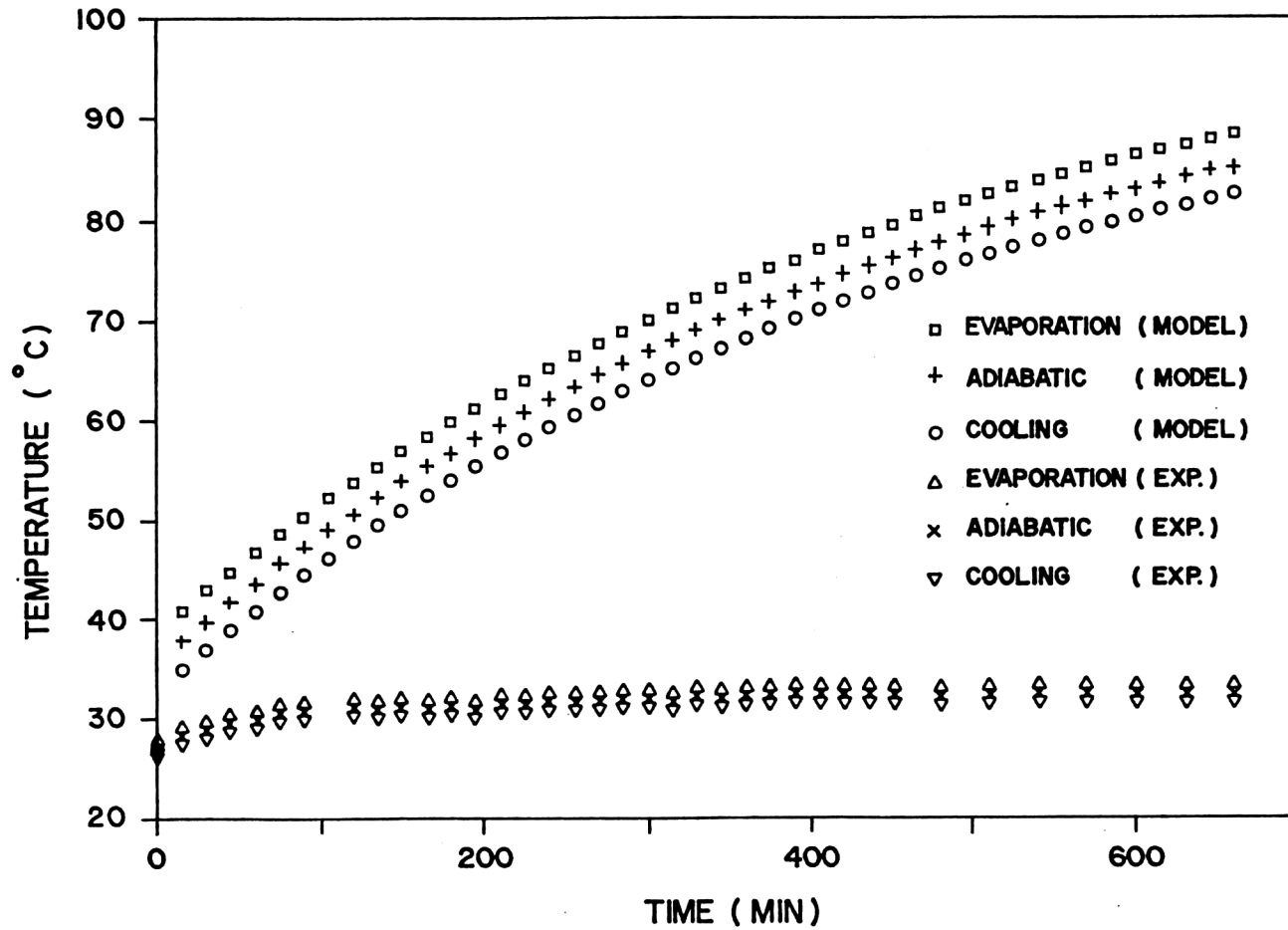


Fig. 6.1 Comparison Between Experimental Data and Modelling.