CHAPTER 5

CONCLUSIONS AND RECOMMENDATIONS FOR FUTURE WORK

5.0 CONCLUSIONS

A two-dimensional transient model has been formulated for the Straits of Malacca. The numerical scheme is based on a leapfrog method with staggered grids in both space and time, and applied to a mesh of 152 x 72 grids. A systematic study was carried out to determine the model behaviour in the spin-up phase and its prediction results in the quasi-steady phase under different drag coefficients and open boundary conditions

The tests on the sensitivity of the prediction results by varying the drag coefficient and open boundary conditions reveal that the values of these input parameters do affect the accuracy of the prediction. There is however limited success in our one-by-one parameter adjustment approach in simultaneously minimising the errors in both the predicted amplitude and phase. Thus, better data assimilation where the model is occasionally or continuously updating with observational data to keep the model faithful to nature may be an inescapable component of tidal modelling. Anyhow, due to time constraint, we have not been able to incorporate data assimilation into the model.

The comparisons between the observed and computed results show very satisfactory agreement for the four main tidal components of M2, S2, K1 and O1.

The model is also able to predict the currents that match reasonably well with the observed currents and trends for spring and neap tides at the three current stations in the offshore water of the Straits. However, the computed results in the northern part of the Straits are unable to be verified because there is no field data available in the offshore region.

5.1 RECOMMENDATIONS FOR FUTURE WORK

Further study in the following areas are recommended:-

1) In the narrower part of the Straits, finer grid size may be needed in order to give better representation of the coastline and depth. A variable grid size or nested grid system may be attempted to resolve the details necessary for achieving good prediction results.

2) It is necessary to incorporate better data assimilation into the existing model using the variational approach where one seeks to minimise the mean-square discrepancies between observations and model predictions (the so-called cost function) by adjusting various control parameters of the model simultaneously. These parameters commonly involve the open boundary conditions, drag coefficients and bathymetric depth variation. Reference should be made to some successful development of computationally efficient large-scale optimisation routines in meteorology and oceanography as discussed in section 4.7.8.