Theerapong Tangtrongharutai 2006: Mathematical Model of Salinity Dispersion in the Mae Klong River. Master of Engineering (Environmental Engineering), Major Field: Environmental Engineering, Department of Environmental Engineering. Thesis Advisor: Miss. Narumol Vongthanasunthorn, D.Eng. 179 pages.

This thesis studies and develops the hydrodynamic model and dispersion model in one dimension to study salinity dispersion in the Mae Klong River. The finite element method with Galerkin's weighted residual technique is applied in the formulation of the model. The study area is station K.11A to the river mouth of Mae Klong River, total distance is120 km. The hydrodynamic model is developed under unsteady state while the dispersion model consists of steady state model and dynamic model. The dynamic model is used to compute hourly variation of the distribution pattern. The hydrodynamic model and dispersion model is verified in cases of a longitudinal channel with constant cross-sectional area and it is shown that the results obtained from the developed model are close to the analytical solution. From the calibration of hydrodynamic model and dispersion model using time increment (Δt) of 30 second, it is found that Chezy roughness coefficient (C_h) of the Mae Klong River is 14 and the dispersion coefficient (K_x) are 1,600 m^2/s and 130 m^2/s for 0-9 km. and 10-120 km. from the river mouth, respectively.

The developed model is applied to simulate salinity intrusion in the Mae Klong River on 14 December 2004 , represented dry season. Under the upstream flow of 106 m^3/s, the simulated results show that salinity dispersed into the Mae Klong River upto 25 km. from the river mouth and the difference of hourly salinity distribution was insignificant. Therefore, the mathematical model is applied to estimate the water discharge from the upstream boundary for controlling the salinity intrusion. It is found that when the flowrate of 200 m^3/s is discharged from the upstream boundary, the distance of salinity intrusion, where the salinity is higher than 2 ppt, is reduced obviously to14 km. from the river mouth. The distance of salinity intrusion will be completely controlled at 10-120 km. from the river mouth when the flowrate of 400 m^3/s is discharged from upstream. When the upstream discharge increases to 500 m^3/s the distance of salinity intrusion decreases insignificantly compared with the upstream discharge of 400 m^3/s.

Theerapong Tangtrongharutai	V.NARUMOL	Dec. / 19 / 2006
Student's signature	Thesis Advisor's signature	