



THESIS

APPLICATION OF NUMERICAL MODEL ON THE WATER CIRCULATION AND SUSPENDED SOLID DISPERSION IN THE UPPER GULF OF THAILAND

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**GRADUATE SCHOOL, KASETSART UNIVERSITY
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APPLICATION OF NUMERICAL MODEL ON
THE WATER CIRCULATION AND SUSPENDED SOLID
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In the numerical modeling of dispersion process caused by total suspended solid, the diffusion coefficient plays an important role. In this study, the diffusion coefficient was calculated by using the statistical procedure of periodicity of the tidal current data. When the autocorrelation coefficient became insignificantly different from zero after some time lag, the estimating of diffusion coefficient was straightforward. In the Upper Gulf of Thailand, the diffusion coefficient along the north-south direction was higher than in the east-west direction which agreed well with the stronger tidal current condition in the north-south direction.

The seawater level was calculated by using phase lag and amplitude of 25 tidal constituents as follow: S_a , S_{sa} , M_m , M_{sf} , M_f , Q_1 , O_1 , M_1 , P_1 , S_1 , K_1 , OO_1 , $2N_2$, μ_2 , N_2 , v_2 , M_2 , λ_2 , L_2 , T_2 , S_2 , K_2 , M_3 , M_4 and M_6 . The predicted seawater level matched nicely to the observed data especially during spring tide. Each tidal constituent had the same phase lag and tidal range for the whole Upper Gulf of Thailand. Sea levels rose from the eastern part to the western part.

The Hydrodynamic and TSS dispersion model was based on Finite difference methods were used to study the variations of flow pattern and distribution of TSS pattern in the Upper Gulf of Thailand. The Hydrodynamic model was based on the conservation of water mass and momentum equations. The depth averaged two dimensional model was used to study the tidal circulation in a discrete representation of continuum problem with a variety of computational procedures and boundary condition. By using POM (Princeton Ocean Model), the numerical model was developed to achieve the proposed solutions. Calibration of the results showed satisfactory comparison of observed and computed current speed and direction.

The TSS dispersion model was based on the principle of conservation of mass. The model was used to study the TSS concentration fields in the immediate vicinity of the rivers mouth and in the Upper Gulf of Thailand. The verification had been done by comparing the predicted diffusion patterns with the satellite image. The comparison of the TSS dispersion pattern between the observed TSS dispersion and the simulated result was quite similar. It appeared that it might be possible to obtain TSS information in the Upper Gulf of Thailand by using the TSS dispersion model.

Student's signature

Thesis Advisor's signature

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TABLE OF CONTENTS

	Page
TABLE OF CONTENTS	i
LIST OF TABLES	ii
LIST OF FIGURES	iii
INTRODUCTION	1
OBJECTIVES	2
LITERATURE REVIEW	3
MATERIALS AND METHODS	16
Materials	16
Methods	18
RESULTS AND DISCUSSION	32
CONCLUSION AND RECOMMENDATION	92
Conclusion	92
Recommendation	93
LITERATURE CITED	94

LIST OF TABLES

Table		Page
1	Constituents of tide and orbit relation	6
2	The parameters of POM model	23
3	Annual month recorded discharge (m ³ /sec) and TSS (mg/l) in Maeklong, Thachin, Chao Phraya and Bangpaklong River	25
4	The parameters of TSS dispersion model	29
5	Image Characteristics of LANDSAT 5	31
6	Radiometric characteristics of the TM Sensors	31
7	Computed diffusion coefficients in N-S and E-W direction in Ao Si Racha ($\beta=1.0$)	32
8	Constituents of tide in the Upper Gulf of Thailand	48
9	The observed velocity in the Upper Gulf of Thailand in 1995-1996 by Royal Thai Navy	51
10	Position, distance and speed of buoys on January 18 th , 2005	61
11	Position, distance and speed of buoys on January 26 th , 2005	62
12	Position, distance and speed of buoys on January 27 th , 2005	63
13	Position, distance and speed of buoys on January 28 th , 2005	64
14	Position, distance and speed of buoys on March 15 th , 2005	65
15	Position, distance and speed of buoys on March 16 th , 2005	66
16	Position, distance and speed of buoys on May 19 th , 2005	66
17	Position, distance and speed of buoys on May 20 th , 2005	67

LIST OF FIGURES

Figure		Page
1	Study site and sampling stations	3
2	A current mooring design used for observing tidal current	16
3	Observing seawater level design by using Global water WL 15 Water Logger	17
4	A drogue design used for tracking flow behavior	17
5	Plot of the adjusted bathymetry	22
6	Flow diagram of the Hydrodynamic model	23
7	Flow diagram of the TSS dispersion model	28
8	Measured values of eddy diffusivity in the horizontal direction in the ocean, showing increasing with scale	33
9	Autocorrelation coefficient curves of velocity in east-west direction and north-south direction at Si Racha fisheries research station in October 2004, May 2005 and September 2005	35
10	Comparative variation of predicted water level at tide prediction stations with computed water level during 20 th May -19 th June 2005	36
11	Co-range line of Constituents of tide (cm.) in the Upper Gulf of Thailand	38
12	Co-tidal line of constituents of tide (°) in the Upper Gulf of Thailand	43
13	Progressive vector plots (km) in the Upper Gulf of Thailand	52
14	Distribution diagram of mean velocity (cm/sec) per 15 degree sector in Ao Si Racha	53
15	Comparison of polar scatter plot of predicted velocity at grid point 35,35 and 35,15 of large grid model with observed velocity at Ko Phai and Chao Phraya River mouth on 26 th -28 th January 2005, respectively	54
16	Comparison of polar scatter plot of predicted velocity at grid point 21,13 of small grid model with observed velocity at Ao Si Racha in May - June 2005 and August 2005, respectively	55

LIST OF FIGURES (Continued)

Figure		Page
17	Comparison of predicted stick plots at grid point 35,35 and 35,15 of large grid model with observed velocity near Ko Phai and Chao Phraya River mouth on 26 th -28 th January 2005, respectively	56
18	Comparison of predicted stick plots at grid point 21,13 of small grid model with observed velocity at Ao Si Racha in May and August 2005, respectively	57
19	Map of drogue tracking at Ao Si Racha	58
20	Distribution patterns of tidal stream 24 hours in the Upper Gulf of Thailand	68
21	Distribution patterns of tidal stream 24 hours in Ao Si Racha	72
22	The relation of TSS and ratio of reflectance band 1, 2 and 3, respectively	78
23	The comparatives of the TSS distribution of band 1/band(1+2+3) with LANDSAT image figures	79
24	The variations of TSS (mg/l) near Ko Phai and Chao Phraya River mouth by on 26 th -27 th January and 27 th -28 th January 2005, respectively	81
25	The variation of TSS at 35,15 (near Chao Phraya River mouth) for 200 days by TSS dispersion model.	82
26	The predicted diffusion patterns in the Upper Gulf of Thailand	84

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