

CONTENTS

CHAPTER	TITLE	PAGE
	ABSTRACT	i
	ACKNOWLEDGEMENTS	ii
	CONTENTS	iii
	LIST OF TABLES	iv
	LIST OF FIGURES	v
	NOMENCLATURES	vii
1	INTRODUCTION	1
	1.1 Rational/Problem statement	1
	1.2 Literature reviews	2
	1.3 Research objectives	12
	1.4 Scopes of research work	12
2	THEORIES	13
	2.1 Tide	13
	2.2 River flow and its effect	17
3	METHODOOGY	21
	3.1 Study area	21
	3.2 Methodology approach	22
4	RESULTS AND DISCUSSION	29
	4.1 Analysis of observed data	29
	4.2 Drainage discharge	41
	4.3 Discharge estimation	42
	4.4 Application of the results	53
5	CONCLUSIONS	56
	REFERENCES	60
	APPENDIXES	64

LIST OF TABLES

TABLES	TITLE	PAGE
3.1	Time table of field measurement in 2012	24
4.1	The tidal rages of each station in 2012	32
4.2	Discharge of each station	41
4.3	The ratio of average discharge at each water level zone	42
4.4	The position of average Y-axis of each station	46
4.5	Accuracy and reliability of maximum velocity by ADCP and Y-axis	46
4.6	Accuracy and reliability of estimate mean velocity and observe mean velocity	48
4.7	Accuracy and reliability of estimated and observed cross-sectional areas	50
4.8	An accuracy and reliability of estimated discharge	53
5.1	Summary of results	57

LIST OF FIGURES

FIGURES	TITLE	PAGE
1.1	ADCP measurement (moving vessel)	6
1.2	Isovel contours at the observation section based on (a) field data; (b) Maghrebi's model (2006)	10
1.3	Areas for calculation of the error of average discharge estimation: (a) vertical groups (b)horizontal groups	10
2.1	Types of tides	13
2.2	Tidal patterns in Gulf of Thailand	14
2.3	Tidal patterns as a function of upland discharge	15
2.4	Typical tidal curves at any positions	16
2.5	Distributions of velocity over depth in typical stratified and well-mixed tidal rivers	19
2.6	Effect of entrainment on rates of flow in the stratified tidal river	20
3.1	Study area	21
3.2	Flow chart of research procedure	22
3.3	Time series of water level in 24 hours at any location	23
3.4	Staff gauge at Bang Sai Station	24
3.5	Acoustic Doppler Current Profiler (ADCP)	25
4.1	Cross-sectional shape at Fort Chula, Pakkred and Bang Sai Stations	30
4.2	Tidal range in spring tide and neap tide at Pakkred Station (September 2012)	31
4.3	Typical tidal curves at any station during the spring tide (July- October 2012)	32
4.4	Channel section, isovels velocity contour at spring tide at Fort Chula Station (October 2012)	34
4.5	Water level and time variation of velocity profiles in spring tide at Fort Chula station(October 2012)	35

LIST OF FIGURES (Cont')

FIGURES	TITLE	PAGE
4.6	Lag time between stage hydrograph and discharge hydrograph at Fort Chula Station at spring tide (October 2012)	36
4.7	Lag time of stage hydrograph and discharge hydrograph at spring tide at Fort Chula, Pakkred and Bang Sai Stations (August-October 2012)	37
4.8	Stage hydrograph and loop rating curve at Fort Chula Station at spring tide (October 2012).	39
4.9	Loop rating curve at Pakkred Station at spring and neap tides (September 2012)	39
4.10	Loop rating curve in spring tide at Fort Chula, Pakkred and Bang Sai Stations (August-October 2012)	40
4.11	Flow chart of discharge estimation	43
4.12	The Y-axis of Fort Chula Station	44
4.13	The Y-axis of Pakkred Station	45
4.14	The Y-axis of Bang Sai Station	45
4.15	The relation between mean velocity and maximum velocity	47
4.16	Area estimation	49
4.17	Accuracy of estimated discharge	51
4.18	Observed and estimated discharge hydrographs of the Lower Chao Phraya River	52
4.19	Step of discharge estimation	54
4.20	An application of discharge equation	55
4.21	Application of the lag time curve of the drainage system	55
5.1	Location of Y-axis at each water level	59
5.2	Location of maximum velocity	59
A.1	Water level and discharge hydrograph at Fort Chula Station	64

LIST OF FIGURES (Cont')

FIGURES	TITLE	PAGE
A.2	Water level and discharge hydrograph at Pakkred Station	65
A.3	Water level and discharge hydrograph at Bang Sai Station (Neap tide)	66
A.4	Water level and discharge hydrograph at Bang Sai Station (Spring tide)	67
A.5	Loop rating curve at Fort Chula Station	68
A.6	Loop rating curve at Pakkred Station	69
A.7	Loop rating curve at Bang Sai Station (Neap tide)	70
A.8	Loop rating curve at Bang Sai Station (Spring tide)	71
A.9	Velocity contour at Fort Chula Station (Neap tide, 8-9/9/2012)	72
A.10	Velocity contour at Fort Chula Station (Spring tide, 13-14/9/2012)	73
A.11	Velocity contour at Pakkred Station (Neap tide, 15-16/9/2012)	74
A.12	Velocity contour at Pakkred Station (Neap tide, 29-30/9/2012)	75
A.13	Velocity contour at Pakkred Station (Spring tide, 22-23/9/2012)	76
A.14	Velocity contour at Bang Sai Station (Neap tide, 25-26/7/2012)	77
A.15	Velocity contour at Bang Sai Station (Neap tide, 27-28/6/2012)	78
A.16	Velocity contour at Bang Sai Station (Neap tide, 1-2/8/2012)	79
A.17	Velocity contour at Bang Sai Station (Neap tide, 18-19/7/2012)	80

NOMENCLATURES

<i>a</i>	coefficient of cross-sectional area
ADCP	Acoustic Doppler Current Profiler
<i>b</i>	water level of effective zero area
<i>c</i>	coefficient of cross-sectional area
F_0	Froude number
<i>g</i>	acceleration due to gravity (m/s^2)
<i>h</i>	water depth (m)
P_t	the volume of tidal prism
<i>Q</i>	discharge (m^3/s)
<i>T</i>	the tidal period
WL	water level above mean sea level (m)
R^2	coefficient of determination
RMSE	root mean square error (m^3/s)
<i>U</i>	the maximum flood tide velocity average across the mouth (m/s)
ϕ	constant ratio of cross section