

CHAPTER 5

CONCLUSIONS

The tide at the Chao Phraya River mouth is a mixed tide and tends to be predominantly semi-diurnal with a tidal range of 1.7 m at the spring tide and 2.0 m at the neap tide. At Bang Sai station, 112 km from the river mouth, the mixed tide tends to have a predominantly diurnal characteristic with a tidal range of 1.2 m in the spring tide and 0.8 m in the neap tide. The distance from the river mouth influences the duration of rising water level. At Fort Chula Station, the rising of the water level from low to maximum takes about 7 hours while at Pakkred and Bang Sai stations, 70 km and 112 km from the river mouth, the time is reduced to about 5 hours.

During the period of the falling water level, the roughness friction between the water and the river bed has a significant effect on the changing of the water level. The time lag of water level and discharge increased with distance from the river mouth. The maximum water level occurred about 4, 7 and 4 hours before the maximum discharge at Fort Chula, Pakkred, and Bang Sai stations, respectively. The relationship between stage and discharge is like a loop curve with a clockwise direction.

The net discharge of the spring tide at Fort Chula and Bang Sai Stations has higher drainage potential than those in the neap tide. The stage and discharge hydrographs can be applied to drainage system by using the lag time of curve of each station. The drainage discharge can be presented in form of the ratio of discharge average and maximum discharge average of each water level zone, the ebb tide especially falling water level has ability to drain the water.

The estimated discharge method in this study was based on the multiplication of mean velocities of cross-section and cross-sectional area. Mean velocities are computed by constant ratio of cross-section and maximum velocities of cross-section. The constant ratio is ratio of mean velocities and maximum velocities of each cross section. It is not depended on water level and discharge. While maximum velocities can be obtained by the location of average Y-axis. The Y-axis helping to reduce time and field measurement cost to get the maximum velocities of cross-section to computed the mean velocities. The cross-sectional areas can be estimated by the relationship between cross-sectional areas and water level in

form of power regression. The summary of the results can be shown in Table 5.1. The Bang Sai Station has the most accurate and reliable estimated discharge because the tide affects than it affects the other stations.

Table 5.1 Summary of results.

Duration of field measurements
at Fort Chula Station:

Aug-Oct 2012

Parameter	Fort Chula
Maximum flow rate (m ³ /s)	4,316.8
Minimum flow rate (m ³ /s)	-354.0
Maximum water level (m.MSL)	1.16
Minimum water level (m.MSL)	-0.04
Constant ratio of cross section (ϕ)	0.35
a is coefficient of cross-sectional area	22.52
b is water level of effective zero area	10.09
c is coefficient of cross-sectional area	2.30
R ²	0.72
RMSE (m ³ /s)	761.7

Duration of field measurements
at Pakkred Station:

Sep 2012

Parameter	Pakkred
Maximum flow rate (m ³ /s)	2,716.8
Minimum flow rate (m ³ /s)	1,020.5
Maximum water level (m.MSL)	1.80
Minimum water level (m.MSL)	0.98
Constant ratio of cross section (ϕ)	0.81
a is coefficient of cross-sectional area	82.06
b is water level of effective zero area	14.18
c is coefficient of cross-sectional area	1.35
R ²	0.76
RMSE (m ³ /s)	263.6

Duration of field measurements
at Bang Sai Station:

Jun-Aug 2012

Parameter	Bang Sai
Maximum flow rate (m ³ /s)	1,173.4
Minimum flow rate (m ³ /s)	-719.1
Maximum water level (m.MSL)	1.17
Minimum water level (m.MSL)	-0.15
Constant ratio of cross section (ϕ)	0.31
a is coefficient of cross-sectional area	0.015
b is water level of effective zero area	27.31
c is coefficient of cross-sectional area	3.85
R ²	0.93
RMSE (m ³ /s)	92.1

It should be noted that even though Chen and Chui (2002) proposed that the location of Y-axis is not variable with the water level and discharge variation. For the Chao Phraya River, the Y-axis is still affected by the water level and the discharge variable, as shown in Figure 5.1. In addition when the location of Y-axis changes, the maximum velocity of cross-section also will be changed. This effect on the estimation of velocity for compute the total discharge of cross-section is shown in Figure 5.2.

Recommendation

The duration of field measurements must be continuous at each tide at each station, because the river hydrodynamic will clearly show the characteristics for understanding the phenomena. In this research, the field data could not be measured for a long continuous period due to unavailability of the equipment.

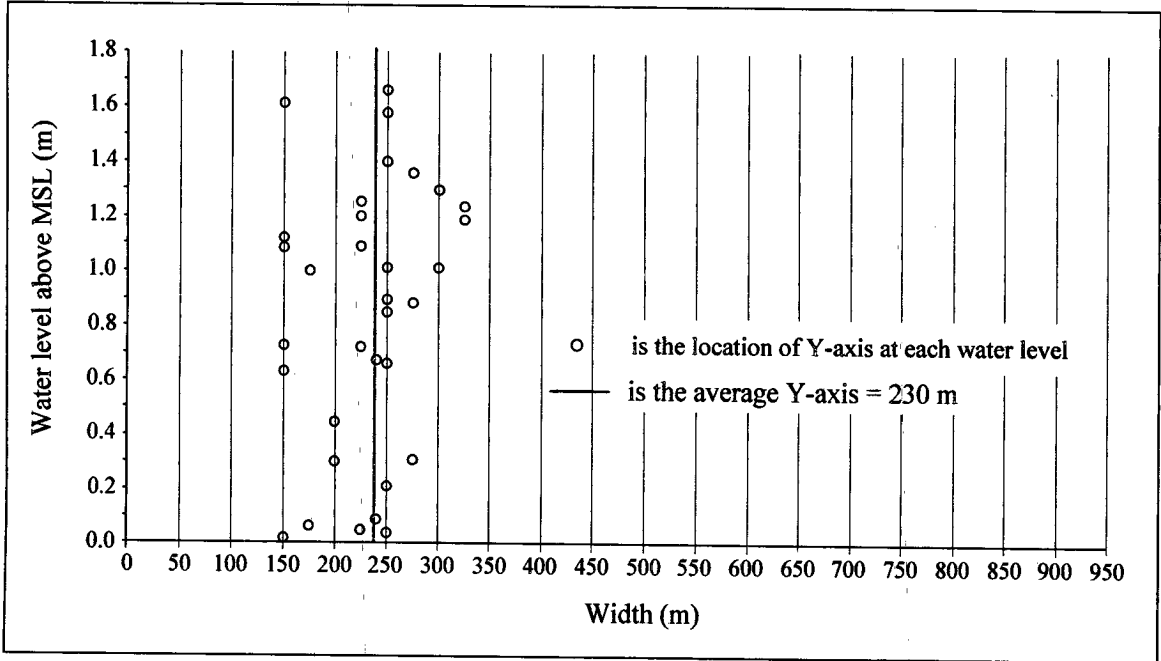


Figure 5.1 Location of Y-axis at each water level.

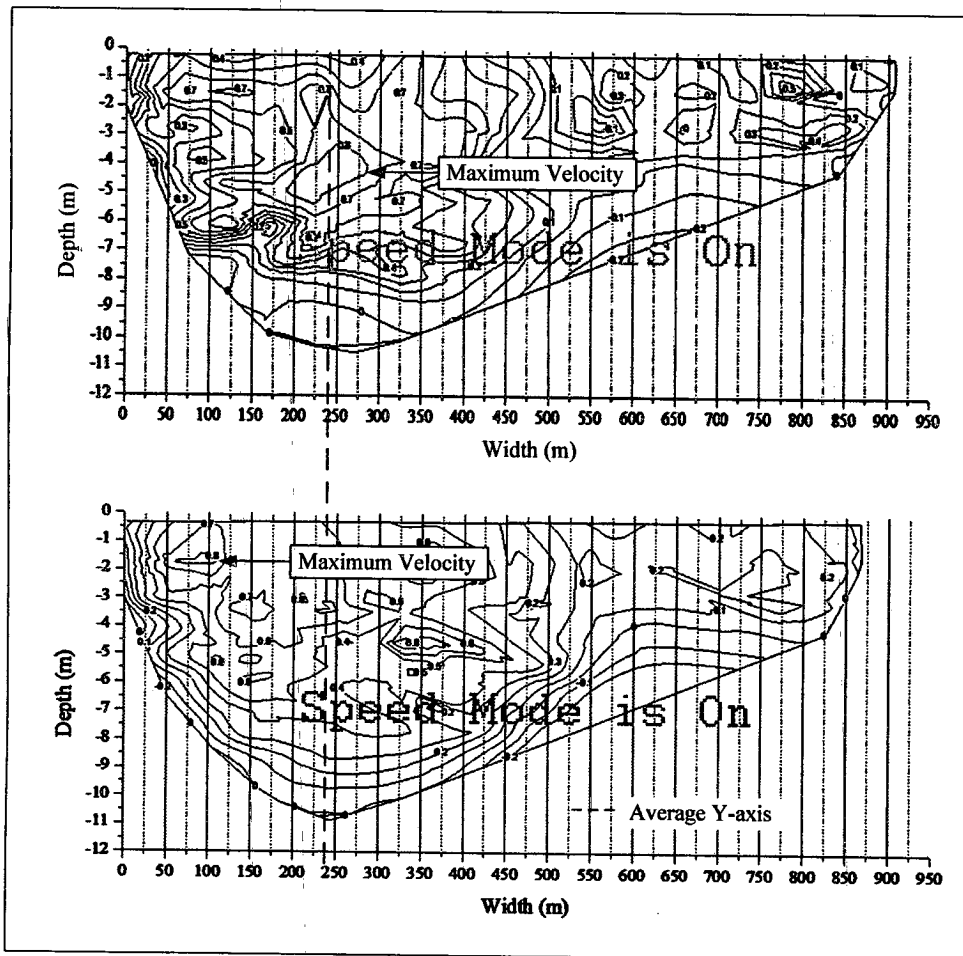


Figure 5.2 Location of maximum velocity.