

EXPERIMENTAL STUDY ON 12.5m DEEPWATER CHANNEL REGULATION SCHEME OF TONGZHOU SHOAL AND BAIMAO SHOAL

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Introduction

With the completion of Deepwater Channel Phase III Project in Yangtze Estuary, the 12.5m deepwater channel has extended upstream to Dangxikou of Taicang city. However, it is still difficult to reach Nanjing because of the six sand shoals need to be regulated in this reach. Among them, Tongzhou Shoal and Baimao Shoal in the lower reaches of Yangtze River are the two main navigation obstacles, and they are planned as the 12.5m Deepwater Channel Phase I Project Downstream Nanjing in Yangtze River. The Project is another major water transport project after the Yangtze Estuary Deepwater Channel Project. Based on the preliminary works, through physical model experiments, the regulation Scheme 1 and 2 of preliminary design are studied to afford technical support for engineering designs in view of Hydrodynamics, fluvial evolution characteristics, river regime stabilization etc.

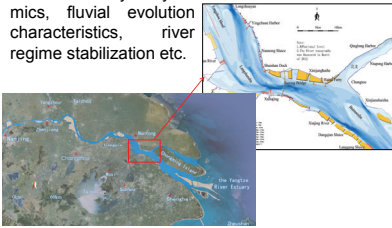


Fig.1 River Regime of Tongzhou Shoal and Baimao Shoal

Model Description

According to the riverbed evolution analyses, the key of channel regulation is to stop the left edge of Langshan Shoal and the head of Baimao Shoal from scouring and moving backward.

The physical model tests were proceeded depended on the existing large-scale and wide-range Yangtze River estuary model. According to the aim of the experiment, five fixed bed and three movable bed experimental hydrological conditions were selected based on the measured field hydrology data and riverbed evolution analysis.

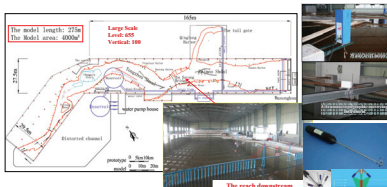


Fig.2 Layout of models in the Yangtze estuary section

Engineering schemes

Scheme 1: Tongzhou Shoal project, Submerged dike is 12.4km long with 7 tooth dikes at the left edge. Baimao Shoal project: Fishbone dam scheme, the length of the ridge dam is 7.5km.

Scheme 2: Tongzhou Shoal project, Submerged dike is 17km long. Baimao Shoal project: Submerged and loop dikes scheme, the total length of submerged breakwater is 13.5km.

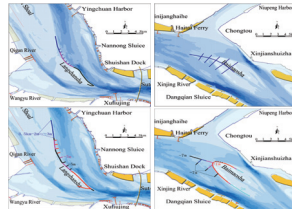
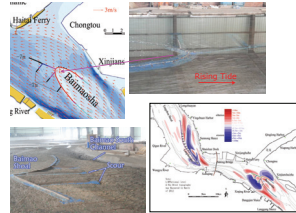


Fig.3 Engineering schemes

Model Experiments



Conclusions

(1) Experimental results indicate that river topography variations are in accordance by Scheme 1 and Scheme 2, siltation occurs afar Tongzhou Shoal, Langshan Shoal and Baimao Shoal flat regulations, which will intensify flat protection and stop backward trend, stabilize sand body. Scheme 2 is better in view of flat protections and channel regulation effects.

(2) For the time being, water depth in Tongzhou Shoal channel and Baimao Shoal channel is satisfactory except less than 12.5m near Nannong Sluice downstream of Tongzhou Shoal channel and Taihai Ferry of Baimao Shoal channel. Experimental results indicates after two normal year as 2005 or one rainy year as 2010, channel depth 12.5m is continuous in planned channel after Scheme 1 and Scheme 2 construction, but small amount of dredging is necessary since local navigation width is less than 500m, which will satisfy navigation requirement of 500m × 12.5m.