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Numerical Research of Fujiangsha Waterway Based on a Depth-integrated Hydro-sediment-morphodynamic Model

Mengzhe Sun¹, Peng Hu², and Youwei Li³

¹Institute of Port, Coastal and Nearshore Engineering, Zhejiang University, Zhoushan, China (21934099@zju.edu.cn)

²Institute of Port, Coastal and Nearshore Engineering, Zhejiang University, Zhoushan, China (pengphu@zju.edu.cn)

³Changjiang Waterway Planning, Design and Research Institute, Wuhan, China (9057784@qq.com)

Fujiangsha waterway is located in the tidal reach of Yangtze River, which is one of the key sections for channel regulation. The channel condition of the waterway is governed by the evolution of the channel bar and point bar. Groins are consequently set on both sides of the channel bar and the left edge of Fujiangsha island. To explore the impact of the regulation works on the evolution of bars and channels, a numerical research is carried out based on a depth-integrated hydro-sediment-morphodynamic model, using the method of nesting large-scale model with local model. The non-negligible impact on the quality and momentum of water flow caused by enormous sediment transport and drastic change of topography, as well as the complex flow condition in both tide and runoff working together, has been taken into account. The simulation successfully reproduces the hydrological process and changes of topography in Fujiangsha waterway. Results show that: 1) there is a silting trend at the head of the channel bar, and the effect of the regulation works in bar protection and sand stabilization is remarkable; 2) The erosion on both sides of the channel bar improves the channel condition, and the hydrodynamic performance of shallow area at the entrance of the south branch has been enhanced; 3) The control on the evolution of point bar is still weak, which will have an adverse effect on channel condition of north branch.