

Numerical Study on the Spatial and Temporal Characteristics of Water Quality in the Taihu Lake of China

Liu Qingquan¹⁾, Xu Xufeng¹⁾, Yin Xiaoling²⁾

- 1) Laboratory of Environmental Fluid Mechanics, Institute of Mechanics, Chinese Academy of Sciences, Beijing 100190, China (Email: qqliu@imech.ac.cn)
- 2) School of Civil Engineering and Transportation, South China University of Technology, Guangzhou 510641, China

Abstract

Taihu Lake is the third largest fresh water lake in China. With the fast economic development, abundant industrial and agricultural waste water has been discharged into Taihu Lake, causing the eutrophication of the water quality, which greatly affected the water utility. In the past decades, the treatment of Taihu Lake has witnessed limited success. Therefore, it is practically and theoretically significant to study the eutrophication of Taihu Lake. This research has focused on the issue of water quality including the characteristics of spatial and temporal distributions, and the rules of nutrient diffusion in the Taihu lake area.

Based on the monitoring data, the basis distribution characteristics of water quality in Taihu Lake are analyzed. Comparing Taihu Lake with other Lakes shows that one important reason for Taihu eutrophication is the long period of water retention. A transporting and diffusing model of Taihu nutrient is developed by combining with the hydrodynamics model. Using the model, the concentration field of the total phosphorus (TP) and the influence of wind-driven current are numerically investigated, which leads to the conclusion that the flow field has a great influence on the spatial and temporal distributions of TP in Taihu Lake.

Furthermore, the effect for improving the water quality by the project of water diversion from the Yangtze River to Taihu Lake was analyzed by simulation. The results demonstrate that short-term water diversion cannot improve the water quality of the heavily-polluted Meiliang Bay and the western bank areas of Taihu Lake.

Key words: Taihu Lake, water quality, total phosphorus (TP), eutrophication, transporting and diffusing model,

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