



Interpreting lateral 2-D bank hyporheic flux based on GA-VS2DH

Xiaoru Su (1,2), Longcang Shu (1,2), Zhonghui Wen (1,2), Chengpeng Lu (1,2), Abunu Eshete (1,2)

(1) State Key Laboratory of Hydrology-Water Resources and Hydraulic Engineering, Hohai University, Nanjing, (2) Department of College of Hydrology and Water Resources, Hohai University, Nanjing, China

Hyporheic flux is of great significance for evaluating water resources and protecting ecosystem health. Heat as a tracer was widely used in recognizing the hyporheic flux with high precision, low cost and great convenience. The hyporheic flux in bank cross-section occurs in vertical and lateral directions. In order to depict the hyporheic flow path and its spatial distribution in bank area, a GA-VS2DH nested loop method was developed based on Microsoft Visual Basic 6.0. VS2DH was applied to model 2-D bank hyporheic flow and GA was used to calibrate the model automatically by minimizing the difference between observed and simulated temperatures of sediments in bank area. A hypothetical model was developed to assess the reliability of GA-VS2DH in simulating hyporheic flux and parameters estimation in river bank system. Some numerical experiments were conducted to recognize the capability of GA-VS2DH. Then the GA-VS2DH was applied in two field sites with river bank sediments made by sand and clay, respectively, to verify the reliability of the method. The results indicated that the simulated hyporheic flux and parameters of GA-VS2DH were reliable. GA-VS2DH could be applied in interpreting lateral 2-D bank hyporheic flux. Hydraulic conductivity (K) and dispersivity (D) are the two most sensitive parameters and the estimates of these two parameters have more reliability than the others. The estimates of hydraulic conductivity at Dawen River site and Qinhuai River site are 1.293 and 0.019 m/d, respectively, which corresponded to sand and clay sediment in the two sites.