

## **The Local Radial Basis Function Differential Quadrature Method for 1D Shallow Water Equations**

**Tzu-Fan Chen, Li-Hsuan Shen, Chia-Peng Sun, Der-Liang Young\***

Department of Civil Engineering, National Taiwan University  
No. 1, Sec. 4, Roosevelt Rd., Taipei  
Taiwan  
[dlyoung@ntu.edu.tw](mailto:dlyoung@ntu.edu.tw)

In this paper, the local radial basis function differential quadrature (LRBFDQ) method is applied to solve the shallow water equations. Meshless methods have been suggested to solve hydraulic problems. The LRBFDQ method is one of the new developed meshless methods. This localized approach is developed from the differential quadrature (DQ) method by employing the radial basis function (RBF) for the test function. Two hydraulic engineering cases are demonstrated for numerical analyses. First, a dam break problem is adopted to verify the accuracy of this procedure. There is consistency between the numerical results and the analytical solutions. And the other case is the simulation of the inflow of the Yuanshantze Flood Diversion. The solutions by LRBFDQ are well corresponded with the HEC-RAS model. According to the numerical results it indicates that the LRBFDQ method is stable, accurate and robust for solving the shallow water equation problems.

**Keywords:** shallow water equations, LRBFDQ, DQ, RBF, meshless.