— Thesis Defense Announcement —

1D Morphodynamic River Modeling with a Contraction Structure

Ruosen Qian

M.S. Candidate, Dept. Civil and Environmental Engineering, University of Houston, Houston, TX.

Date: Wednesday, July 27, 2011
Time: 10:00 am
Location: Civil Engineering Conference Room:
Thesis Committee: Kyle Strom (chair), K.H. Wang, Jerry Rogers

ABSTRACT

A 1D morphodynamic model capable of describing unsteady flow and bed evolution in a movable-boundary river of varying width was developed. The model couples the Saint-Venant equations with the Exner equation, and uses the finite difference McCormack scheme with an extra dissipation step (TVD) and special source term treatment to solve the system of equations. Inclusion of TVD and modifications to the source terms allow the model to capture sharp discontinuities in the water surface without generating spurious oscillation and also reduced artificial numerical oscillation due to irregular bed topography. To handle pressurized flow in a conduit, a Preissmann slot adaptation to the code using the McCormack scheme was also investigated. Inclusion of the Preissmann slot method was motivated by the desire to use the model to simulate flow, sediment transport, and bed evolution near and through a low-water-crossing system of culverts. Model performance for several cases are presented and compared with the analytic solutions and experimental data.