Some recent advances in high-order discontinuous Galerkin methods for environmental fluid mechanics

Ethan J. Kubatko*

* The Computational Hydrodynamics and Informatics Laboratory (The CHIL)
The Ohio State University
2070 Neil Avenue, Columbus, OH 43210, USA
e-mail: kubatko.3@osu.edu

ABSTRACT

In this talk, I will highlight several recent advances in the development and application of high-order discontinuous Galerkin (DG) computational models and supporting computational tools/techniques for the solution of a wide range of environmental fluid dynamics problems. The developed models include components for simulating one-, two- and three-dimensional shallow water flow, overland flow due to rainfall and spectral wave modeling. Supporting computational tools/techniques that are used within the context of these models include an advanced unstructured mesh generator that we have developed called ADMESH+ and new time stepping methods and quadrature rules that have been specifically designed for efficient calculation when used with high-order DG spatial discretizations. Numerical results from several applications will be presented that demonstrate the accuracy, efficiency and robustness of the developed modeling framework.