Development of a Coastal Inundation Model using a Triangular Discontinuous Galerkin Method

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The use of unstructured triangular meshes provides an opportunity to accurately model coastlines which will aid in the study of tsunamis and storm surges. Discontinuous Galerkin methods employing triangular elements applied to shallow water equations have been developed by Giraldo and co-workers [1,2]. The attractive features of the discontinuous Galerkin method over the finite element and finite volume methods are the higher order accuracies and the local conservation properties. The local nature of the discontinuous Galerkin method inherently lends itself to efficient parallelization on massively parallel processing computers. A coastal inundation model applied in the triangular discontinuous Galerkin framework will be discussed in this presentation.

Adaptive mesh techniques will enable the optimal use of computational resources while providing higher resolutions in regions of interest. A combination of proposed R-refinement and H-refinement schemes for triangular grids applied to the DG method will also be presented in the talk.

References

[1] F.X. Giraldo and T. Warburton, "A high-order triangular discontinuous Galerkin oceanic shallow water model",*International Journal for Numerical Methods in Fluids*,v. 56,p. 899-925, 2008

[2] F.X. Giraldo and M. Restelli, "High-order semi-implicit time-integrators for a triangular discontinuous Galerkin oceanic shallow water model",*International Journal for Numerical Methods in Fluids*,v. 63,p. 1077-1102, 2009