Department of Mathematics

University of Houston

Scientific Computing Seminar

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Discontinuous Galerkin Methods for Atmospheric Numerical Modeling

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10 AM- 11 AM
Room 646 PGH

Abstract: Recent paradigm shift in scientific computing triggered by the arrival of the petascale computing resources, with core counts in the range of tens to hundreds of thousands, necessitates highly scalable algorithms for atmospheric (weather and climate) model development. New generation global atmospheric models are based on grid systems and numerical algorithms which facilitate excellent scalability on modern highly parallel computer architecture. The element-based high-order Galerkin methods such as the discontinuous Galerkin (DG) methods offer several computationally desirable properties including conservation, geometric flexibility and excellent parallel efficiency for solving model equations.

The High-Order Method Modeling Environment (HOMME) developed by the National Center for Atmospheric Research (NCAR), is a framework for investigating element-based methods to build scalable and high-order accurate atmospheric models based on Navier-Stokes and Euler system of equations. HOMME employs both spectral-element and DG methods for spatial discretization on the cubed-sphere. A major focus of the talk will be application of DG method for various atmospheric modeling problems. This includes compressible Euler equations in 2D, shallow-water equations on the cubed-sphere to 3D model in the HOMME framework.