

Department of Mathematics

University of Houston

Scientific Computing Seminar

Dr. Wei Guo

Department of Mathematics

Michigan State University

An adaptive multiresolution discontinuous Galerkin method for time-dependent transport equations in multi-dimensions

Thursday, Nov. 17, 2016

1:30 PM- 2:30PM

Room 646 PGH

Abstract:

In this talk, we will present an adaptive multiresolution discontinuous Galerkin (DG) scheme for time-dependent transport equations in multi-dimensions. The method is constructed using multiwavelets on tensorized nested grids. Adaptivity is realized by error thresholding based on the hierarchical surplus, and the Runge-Kutta DG (RKDG) scheme is employed as the reference time evolution algorithm. We further show that the scheme performs similarly to a sparse grid DG method when the solution is smooth, reducing computational cost in multi-dimensions. When the solution is no longer smooth, the adaptive algorithm can automatically capture fine local structures. The method is therefore very suitable for deterministic kinetic simulations. Numerical results including several benchmark tests, the Vlasov-Poisson (VP) and oscillatory VP systems are provided.