Department of Mathematics

University of Houston

Scientific Computing Seminar

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Entropy stable schemes for nonlinear conservation laws: high order discontinuous Galerkin methods and reduced order models

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1:30 PM- 2:30 PM
Room 646 PGH

Abstract: High order methods are known to be unstable when applied to nonlinear conservation laws with shocks and turbulence, and traditionally require additional filtering, limiting, or artificial viscosity to avoid solution blow up. Entropy stable schemes address this instability by ensuring that physically relevant solutions satisfy a semi-discrete entropy inequality even in the presence of under-resolved solution features and inexact quadrature. The construction of entropy stable methods has traditionally relied on equivalences between "collocation" discontinuous Galerkin (DG) methods and summation-by-parts (SBP) finite differences. We present a more general framework for constructing entropy stable schemes based instead on a "modal" finite element formulation and apply it towards the construction of stable high order DG methods and reduced order models for problems in compresssible fluid flow.