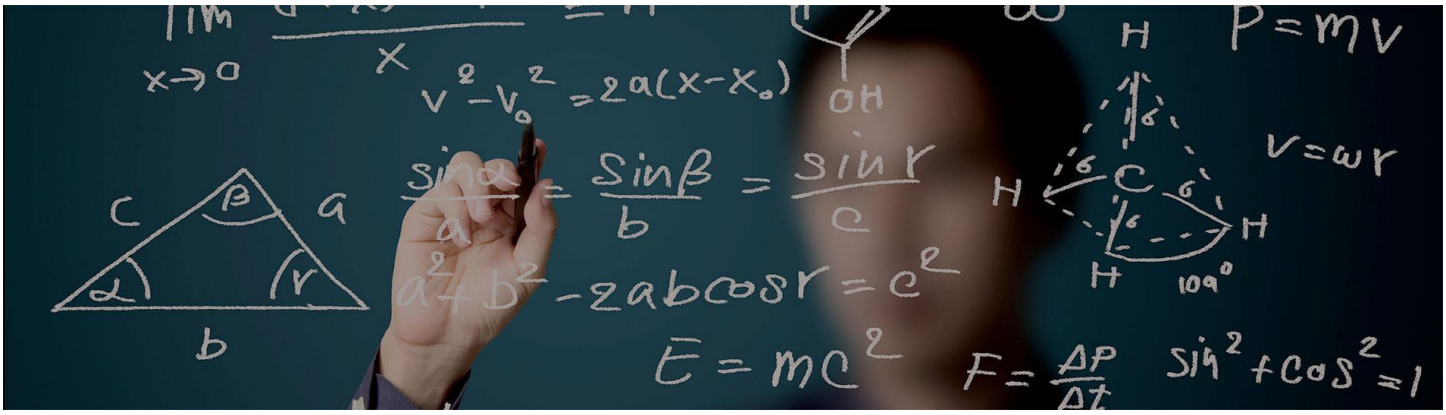

FALL 2018

RENSSELAER POLYTECHNIC INSTITUTE

DEPARTMENT OF MATHEMATICAL SCIENCES COLLOQUIUM

Entropy stable high order discontinuous Galerkin methods for nonlinear conservation laws

Abstract:

High order discontinuous Galerkin (DG) methods offer several advantages in the approximation of solutions of nonlinear conservation laws, such as geometric flexibility, improved accuracy, and low numerical dispersion/dissipation. However, these methods also tend to suffer from instability in practice, requiring filtering, limiting, or artificial dissipation to prevent solution blow up. Entropy stable schemes address one primary cause of this instability by utilizing summation-by-parts (SBP) finite difference operators and a "flux differencing" approach to ensure that the solution satisfies a semi-discrete entropy inequality. In this talk, we show that high order DG methods can be re-interpreted within an SBP framework using discrete projection and “decoupled” SBP operators, and utilize this equivalence to construct semi-discretely entropy stable schemes on meshes of simplicial and tensor product elements, as well as on mixed quadrilateral-triangular and non-conforming quadrilateral meshes.

Jesse Chan (Rice University)

Monday, October 22, 2018

4-5pm

Amos Eaton 214

Host: Jeffrey Banks

Refreshments served 3:30-4pm Amos Eaton 4th Floor Lounge