



Distinguished Lecture Series

Bound-Preserving High Order Schemes for Hyperbolic Equations: Survey and Recent Developments



Professor Chi-Wang Shu

Theodore B. Stowell University Professor of Applied Mathematics NASA Public Service Group Achievement Award (1992) Feng Kang Prize (1995) ISI Highly Cited Author in Mathematics (2004) SIAM/ACM Prize in Computational Science and Engineering (2007) SIAM Fellow (2009) AMS Fellow (2012) ICM Invited Speaker (2014)

- Date: 6 February 2017 (Monday)
- Time: 5:00 pm 6:00 pm (Preceded by Reception at 4:30 pm)

Venue: SCT909 Science Tower, Ho Sin Hang Campus, Hong Kong Baptist University

Abstract

Solutions to many hyperbolic equations have convex invariant regions, for example solutions to scalar conservation laws satisfy maximum principle, solutions to compressible Euler equations satisfy positivity-preserving property for density and internal energy, etc. It is however a challenge to design schemes whose solutions also honor such invariant regions. This is especially the case for high order accurate schemes. In this talk we will first survey strategies in the literature to design high order bound-preserving schemes, including the general framework in constructing high order bound-preserving finite volume and discontinuous Galerkin schemes for scalar and systems of hyperbolic equations through a simple scaling limiter and a convex combination argument based on first order bound-preserving building blocks, and various flux limiters to design high order bound-preserving finite difference schemes. We will then discuss a few recent developments, including high order bound-preserving schemes for relativistic hydrodynamics, high order discontinuous Galerkin Lagrangian schemes, and high order discontinuous Galerkin methods for radiative transfer equations. Numerical tests demonstrating the good performance of these schemes will be reported.

 \Rightarrow \Rightarrow \Rightarrow All are welcome \Rightarrow \Rightarrow \Rightarrow

For enquires please contact Ms. Claudia Chui, 3411 2348. http://www.math.hkbu.edu.hk/