

Department of Mathematics

University of Houston

Scientific Computing Seminar

Prof. Jianxian Qiu
School of Mathematical Sciences
Xiamen University

Hermite WENO schemes for hyperbolic conservation laws

Thursday, Jan. 22, 2015

1:30 PM- 2:30 PM

Room 646 PGH

Abstract: In this presentation, a class of high-order weighted essentially non-oscillatory (WENO) schemes based on Hermite polynomials, termed HWENO (Hermite WENO) schemes, for solving nonlinear hyperbolic conservation law systems is presented. The construction of HWENO schemes is based on a finite volume formulation, Hermite interpolation, and nonlinearly stable Runge-Kutta methods. The idea of the reconstruction in the HWENO schemes comes from the original WENO schemes, however both the function and its first derivative values are evolved in time and used in the reconstruction, while only the function values are evolved and used in the original WENO schemes. Comparing with the original WENO schemes of Liu et al. [J. Comput. Phys. 115 (1994) 200] and Jiang and Shu [J. Comput. Phys. 126 (1996) 202], one major advantage of HWENO schemes is its compactness in the reconstruction. For example, five points are needed in the stencil for a fifth-order WENO (WENO5) reconstruction, while only three points are needed for a fifth-order HWENO (HWENO5) reconstruction in one dimensional case. Numerical results are presented for both one and two dimensional cases to show the efficiency of the schemes.

This seminar is easily accessible to persons with disabilities. For more information or for assistance, please contact the Mathematics Department at 743-3500.