Mathematics, Statistics, and Computer Science   @ UIC

Analysis and Applied Mathematics Seminar

Asymptotic-preserving and postivitiy-preserving numerical methods for a class of stiff kinetic equations

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Abstract: Kinetic equations play an important role in multiscale modeling hierarchy. It serves as a basic building block that connects the microscopic particle models and macroscopic fluid models. Numerically approximating kinetic equations present several difficulties: 1) high-dimensionality (the equation is in phase space); 2) nonlinearity and stiffness of the collision/interaction terms; 3) positivity of the solution (the unknown is a probability density function); 4) consistency to the limiting models; etc. I will start with a brief overview of the kinetic equations including the Boltzmann equation and the Fokker-Planck equation, and then discuss in particular our recent effort of constructing efficient and robust numerical methods for these equations, overcoming some of the aforementioned difficulties. This is joint work with Ruiwen Shu (University of Maryland).

Monday, October 1 at 4:00 PM in 636 SEO