数学与系统科学研究院

计算数学所学术报告

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报告题目：

High order AP schemes for discrete-velocity kinetic equations in a diffusive scaling

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报告地点：　　科技综合楼三层 **311**

计算数学所报告厅

Abstract:

A family of high order asymptotic preserving (AP) schemes is proposed for several discrete-velocity kinetic models in a diffusive scaling. A numerical method is called AP if it is uniformly stable with respect to a parameter \epsilon (\epsilon can be regarded as the mean free path of particles) ranging from O(1) to 0; when \epsilon->0, the method is consistent for the limiting equation on fixed mesh size. Our proposed methods are based on the micro-macro decomposition of the equations, and they combine discontinuous Galerkin (DG) spatial discretizations and globally stiffly accurate implicit-explicit (IMEX) Runge-Kutta temporal discretizations. Formal asymptotic analysis shows that the proposed schemes in the limit of \epsilon->0 are explicit and consistent discretizations for the limiting equations. When a first order IMEX method is used, uniform stability with respect to \epsilon is established for the telegraph equation. Error estimates are also obtained for any given \epsilon. Numerical examples are presented to validate some theoretical results and to demonstrate the performance of the methods.

This is based on an ongoing collaboration with Juhi Jang (University of California, Riverside), Jingmei Qiu (Houston University), and Tao Xiong (Houston University).

欢迎大家参加！