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：

Oscillations and Dissipations for Accurate Approximations to Hyperbolic Problems

邀请人：　张硕 博士

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报告地点：　数学院南楼九层

902 会议室

Abstract:

The Gibbs phenomenon is well---known when discontinuous functions are approximated by sections of Fourier series. Analogous oscillations occur ubiquitously when hyperbolic problems are approximated accurately since the solutions contain discontinuities (e.g. shocks, vortices) in general; the oscillations are produced due to large phase errors and insufficient numerical dissipations, as commonly understood. Hence artificial numerical viscosity has to be added in order to suppress the superfluous oscillations, thanks to von Neumann, and this approach guides the development of CFD more than half a century. However, recent studies show that the dissipation mechanisms of numerical schemes are quite subtle and depend on the range of frequency modes quantitatively: The traditional artificial viscosity approach just works well for small phase errors. In order to suppress large phase errors due to high frequency modes (e.g chequerboard modes), a more dissipative *numerical damping* is introduced. Using the language of modified equations of numerical schemes , numerical dissipations are now distinguished *as numerical damping* and *numerical viscosity*, which Corresponds to the effects governed by ODEs and second order diffusion equations, respectively, to regularize numerical solutions. This distinction can effectively help to understand the dissipation properties of a numerical scheme when it accurately solves hyperbolic problems.

In this talk, I will report some recent results and describe some possible applications.

欢迎大家参加！