

数学与系统科学研究院

计算数学所学术报告

报告人: **Prof. Tang Min**

( *Shanghai Jiaotong University* )

报告题目:

**An Asymptotic Preserving method  
for strongly anisotropic diffusion  
equations based on field line  
integration**

邀请人: 许现民 副研究员

报告时间: 2016 年 8 月 18 日 (周四)

上午 10:00-11:00

报告地点: 科技综合楼三层

311 报告厅

## **Abstract:**

In magnetized plasma, the magnetic field confines the particles around the field lines. The anisotropy intensity in the viscosity and heat conduction may reach the order of  $10^{12}$ . When the boundary conditions are periodic or Neumann, the strong diffusion leads to an ill-posed limiting problem. To remove the ill-conditionedness in the highly anisotropic diffusion equations, we introduce a simple but very efficient asymptotic preserving reformulation. The key idea is that, instead of discretizing the Neumann boundary conditions locally, we replace one of the Neumann boundary condition by the integration of the original problem along the field line, the singular  $1/\varepsilon$  terms can be replaced by  $O(1)$  terms after the integration, so that yields a well-posed problem. Small modifications to the original code are required and no change of coordinates nor mesh adaptation are needed. Uniform convergence with respect to the anisotropy strength  $1/\varepsilon$  can be observed numerically and the condition number does not scale with the anisotropy.

**欢迎大家参加！**