

# 数学与系统科学研究院

## 计算数学所定期学术报告

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报告题目:

**A preconditioned inexact Newton  
algorithm for steady state lattice  
Boltzmann equations**

报告时间:   **2015 年 4 月 9 日 (周四)**

**下午 16:00-17:00**

报告地点:     **数学院科技综合楼  
三层 311 报告厅**

## **Abstract:**

Most existing methods for calculating the steady state solution of the lattice Boltzmann equations are based on pseudo time stepping, which often takes a large number of time steps especially for high Reynolds number problems. To avoid the time integration, a preconditioned inexact Newton algorithm is developed to solve the steady state lattice Boltzmann equations directly. In this work, a second-order finite difference scheme is proposed and a two-level inexact Newton algorithm with a local nonlinear elimination preconditioner is employed to solve the nonlinear algebraic system. On the coarse level, an inexact Newton method with Reynolds number continuation is applied to generate the initial guess for the fine level inexact Newton solver. On the fine level, the local high nonlinearity of the system is eliminated by the nonlinear elimination preconditioner before the global Newton update. Two numerical experiments are presented to demonstrate the robustness and efficiency of the algorithm, especially for high Reynolds number.

**欢迎大家参加！**