

数学与系统科学研究院

计算数学所学术报告

报告人: **Associate Prof. Cheng Wang**

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报告题目:

**Preconditioned Steepest Descent
(PSD) solver for the Cahn-Hilliard
equation coupled with fluid flow**

邀请人: 谢和虎 研究员

报告时间: **2017 年 7 月 25 日 (周二)**

上午 9:30-10:30

报告地点: 科技综合楼三层

311 报告厅

Abstract:

The preconditioned steepest descent (PSD) solvers are applied to Cahn-Hilliard equation, coupled with certain fluid flow, such as the Hele-Shaw or Stokes equation. With a careful temporal discretization, the numerical scheme corresponds to a generalized gradient flow, and the numerical solution is equivalent to a minimization of a purely convex energy. In particular, due to the semi-implicit treatment of the nonlinear convection term, a linear energy functional is involved associated with the convection part, and this subtle fact greatly simplifies the numerical effort. By using the energy dissipation property, we derive a discrete bound for the solution, as well as an upper-bound for the second derivative of the energy. Furthermore, a geometric convergence rate is shown for the nonlinear PSD iteration applied to the Cahn-Hilliard-Flow models, which turns out to be a very sharp theoretical result. Some numerical results are also presented in the talk.

欢迎大家参加！