

数学与系统科学研究院

计算数学所学术报告

报告人: Associate Prof. Zhonghua Qiao

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报告题目:

**Stabilized Linear Semi-implicit
Schemes for the Nonlocal
Cahn-Hilliard Equation**

邀请人: 郑伟英 研究员

报告时间: 2019 年 5 月 28 日 (周二)

下午 16:00-17:00

报告地点: 数学院南楼二层

202 教室

Abstract:

Comparing with the well-known classic Cahn–Hilliard equation, the nonlocal Cahn–Hilliard equation is equipped with a nonlocal diffusion operator and can describe more practical phenomena for modeling phase transitions of microstructures in materials. On the other hand, it evidently brings more computational costs in numerical simulations, thus efficient and accurate time integration schemes are highly desired. In this paper, we propose two energy-stable linear semi-implicit methods with first and second order temporal accuracies respectively for solving the nonlocal Cahn–Hilliard equation. The temporal discretization is done by using the stabilization technique with the nonlocal diffusion term treated implicitly, while the spatial discretization is carried out by the Fourier collocation method with FFT-based fast implementations. The energy stabilities are rigorously established for both methods in the fully discrete sense. Numerical experiments are conducted for a typical case involving Gaussian kernels. We test the temporal convergence rates of the proposed schemes and make a comparison of the nonlocal phase transition process with the corresponding local one. In addition, long-time simulations of the coarsening dynamics are also performed to predict the power law of the energy decay.

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