数学与系统科学研究院

计算数学所学术报告

报告人：　　高华东　博士

（华中科技大学）

报告题目：

A linearized Galerkin-mixed FEM for Ginzburg--Landau equations

邀请人：　　戴小英　副研究员

报告时间：**2016** 年 **10** 月 **1** 日（周六）

上午 **10:00-11:00**

报告地点：　　数学院南楼七层

702 教室

Abstract:

We present an efficient and accurate numerical methods for approximations of the time-dependent Ginzburg--Landau equations (TDGL) under the Lorentz gauge. The new method is based on a fully linearized backward Euler scheme in temporal direction, and a mixed finite element method in spatial direction which introduces the magnetic induction $\bm{\sigma} = {\bf{curl}} \mathbf{A}$ as a new variable. The proposed linearized Galerkin-mixed finite element method offers many advantages over conventional Lagrange type Galerkin FEMs. It enjoys four important advantages: (1) the scheme is semiimplicit and at each time step one only need to solve a linear system; (2) the coefficient matrices for the FEM system remain unchanged at all time steps, which reduce computational costs greatly; (3) it solves for the magnetic induction $\bm{\sigma} = {\bf{curl}} \mathbf{A}$ directly,and thus numerical differentiation can be avoided; (4) as the conventional Lagrange FEM suffers from singularities at domain corners for computing $\bm{\sigma} = {\bf{curl}} \mathbf{A}$, our method successfully overcomes this numerical singularities. Extensive numerical experiments in both two and three dimensional spaces are presented to confirm the above properties of our numerical methods for the TDGL equations. Excellent accuracy and stability of the proposed method are shown through numerical examples. We also use the proposed method to investigate the vortex motion in superconductors.

欢迎大家参加！