数学与系统科学研究院

计算数学所学术报告

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报告题目：

Mass and energy conservative difference schemes for the space fractional coupled nonlinear Schrodinger equations

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报告时间：**2014** 年 **7** 月 **18** 日（周五）

下午 **16:00-17:00**

报告地点：　　科技综合楼三层 **311**

计算数学所报告厅

Abstract:

In this talk, two mass and energy conservative difference schemes, i.e., the Crank-Nicolson difference scheme and the linearly conservative difference scheme for the coupled nonlinear Schrodinger equations with the Riesz fractional derivatives (fractional Laplacian) are proposed. The existence and uniqueness of the difference solutions of the two schemes are proved. The convergence of the schemes is discussed and shown to be of order $O(\tau^2+h^2)$ in the l^2 norm with the time step τ and mesh size h. When the fractional order is two, all those results are in accord with the difference schemes for the classical non-fractional coupled nonlinear Schrodinger equations.

Due to the nonlocal nature of fractional Laplacian, it is difficult to obtain the error estimation in the l^∞ norm on the classic Sobolev space. To overcome this difficulty, the fractional Sobolev space $H^{\frac{\alpha}{2}}$ and a fractional norm equivalence in $H^{\frac{\alpha}{2}}$ are introduced. Then the Crank-Nicolson difference in time and the fractional centered difference for the pace fractional Laplacian are used. The convergence order $O(\tau^2+h^2)$ in the l^∞ norm is proved by the fractional Sobolev inequality. Numerical examples are given to illustrate the theoretical results at last.

欢迎大家参加！