

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:

**Unconditional and optimal  $H^2$ -error estimates of finite difference methods for the Klein-Gordon-Schrödinger equation in high dimensions**

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报告时间: 2017 年 8 月 17 日 (周四)

下午 14:30-15:30

报告地点: 数学院南楼七层

702 报告厅

## **Abstract:**

The focus of this talk is on the optimal error bounds of finite difference methods for solving the  $d$ -dimensional ( $d=2,3$ ) nonlinear Klein-Gordon-Schrödinger (KGS) equations. The proposed finite difference schemes not only conserve the mass and energy in the discrete level but also are efficient in practical computation because only two linear systems need to be solved at each time step. Besides the standard energy method, an induction argument as well as a 'lifting' technique are introduced to establish rigorously the optimal  $H^2$ -error estimates without any restrictions on the grid ratios, while the previous works either are not rigorous enough or often require certain restriction on the grid ratios. The convergence rates of the proposed schemes are proved to be second order in both space and time in the discrete  $H^2$ -norm. The analysis method can be directly extended to other finite difference schemes for solving the KGS equations in high dimensions. Numerical results are reported to confirm the theoretical analysis for the proposed finite difference schemes.

**欢迎大家参加！**