

数学与系统科学研究院

计算数学所学术报告

报告人: 曹外香 副教授

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报告题目:

**A class of efficient spectral  
methods and error analysis for  
nonlinear Hamiltonian systems**

邀请人: 洪佳林 研究员

报告时间: 2018 年 8 月 31 日 (周五)

下午 14:30-15:30

报告地点: 数学院南楼二层

222 教室

## **Abstract:**

In this talk, we will present and study efficient numerical methods for nonlinear Hamiltonian systems, where three kinds of spectral methods (including spectral Petrov-Galerkin, spectral collocation and spectral Galerkin methods) are presented and analyzed. Our main results include the energy and symplectic structure preserving properties and error estimates of the three spectral methods. We prove that the Petrov-Galerkin method preserves the energy exactly while both Gauss collocation and spectral Galerkin methods are energy conserving up to a spectral accuracy. By the investigation of the difference among the three numerical methods, we also prove that the Petrov Galerkin method and the spectral Galerkin method separately preserves the symplectic structure up to a Gauss numerical quadrature error and a spectral accuracy error. Finally, we show that all the three spectral methods converge exponentially, which makes it possible to simulate the long time behavior.

Numerical experiments indicate that our algorithms are efficient.

**欢迎大家参加！**