

# 数学与系统科学研究院

## 计算数学所学术报告

报告人: **Assistant Prof. Ruili Zhang**

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报告题目:

**Explicit symplectic algorithms based on generating functions for non-relativistic and relativistic charged particle dynamics**

邀请人: 唐贻发研究员

报告时间: **2017 年 12 月 5 日 (周二)**

**下午 13:30-14:30**

报告地点: **数学院南楼 702 教室**

报告摘要:

**Dynamics of a non-relativistic and relativistic charged particle in the canonical coordinates is a Hamiltonian system,**

and the well-known symplectic algorithm has been regarded as the de facto method for numerical integration of Hamiltonian systems due to its long-term accuracy and fidelity. For long-term simulations with high efficiency, explicit symplectic algorithms are desirable. However, it is generally believed that explicit symplectic algorithms are only available for sum-separable Hamiltonians, and this restriction limits the application of explicit symplectic algorithms to charged particle dynamics. To overcome this difficulty, we combine the familiar sum-split method and a generating function method to construct second- and third-order explicit symplectic algorithms for dynamics of charged particle. The generating function method is designed to generate explicit symplectic algorithms for product-separable Hamiltonian with form of  $H(p,x) = p f(x)$  or  $H(p,x) = x f(p)$ . Applied to the simulations of charged particle dynamics, the explicit symplectic algorithms based on generating functions demonstrate superiorities in conservation and efficiency. (受交叉课题资助)

**欢迎大家参加！**