数学与系统科学研究院

计算数学所学术报告

报告人：Dr. Tomasz Tyranowski

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报告题目：

Variational integrators for stochastic dissipative Hamiltonian systems

邀请人： 洪佳林 研究员

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下午 16:00-17:00

报告地点： 数学院南楼二层

202 教室

Abstract:

Variational integrators are derived for structure-preserving simulation of stochastic forced Hamiltonian systems. The derivation is based on a stochastic discrete Hamiltonian which approximates a type-II stochastic generating function for the stochastic flow of the Hamiltonian system. The generating function is obtained by introducing an appropriate stochastic action functional and considering a stochastic generalization of the deterministic Lagrange-d'Alembert principle. Our approach presents a general methodology to derive new structure-preserving numerical schemes. The resulting integrators satisfy a discrete version of the stochastic Lagrange-d'Alembert principle, and in the presence of symmetries, they also satisfy a discrete counterpart of Noether's theorem. Furthermore, mean-square and weak Lagrange-d'Alembert Runge-Kutta methods are proposed and tested numerically to demonstrate their superior long-time numerical stability and energy behavior compared to non-geometric methods. The Vlasov-Fokker-Planck equation is considered as one of the numerical test cases, and a new geometric approach to collisional kinetic plasmas is presented.

欢迎大家参加！