

数学与系统科学研究院

计算数学所学术报告

报告人: **Prof. Qi Wang**

(*Beijing Computational Science Research Center*)

报告题目:

**Numerical methods for
nonequilibrium models derived from
the generalized Onsager principle**

邀请人: 明平兵 研究员

报告时间: 2016 年 9 月 28 日 (周三)

下午 16:00-17:00

报告地点: 科技综合楼三层

301 小报告厅

Abstract:

Equilibrium thermodynamics is a well-established discipline. However, theories for nonequilibrium phenomena are far from settled. There have not been well-established physical laws like the three fundamental thermodynamical laws for nonequilibrium phenomena. To establish baseline principles for developing theories for nonequilibrium phenomena, one has resorted to extend the equilibrium thermodynamic laws, especially, the second law to near equilibrium phenomena or tried to set up prototypical mathematical structures for admissible nonequilibrium thermodynamic theories. These include the GENERIC and Poisson Bracket formulation of nonequilibrium theories or the generalized Onsager principle. In this talk, I will first discuss briefly what is the generalized Onsager principle and its applicability to developing nonequilibrium theories for physical systems. Then, I will discuss how numerical analysts can exploit the mathematical structure in the models derived using the generalized Onsager principle systematically. A new technique termed the energy quadratization (EQ) will be introduced. I will illustrate the idea using a few well-known models for multi-phase materials and generalized hydrodynamics for complex fluid flows.

欢迎大家参加！