数学与系统科学研究院

计算数学所学术报告

报告人： **Prof. Hong Wang**

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报告题目：

Fractional partial differential equations: modeling, numerical method, and analysis

邀请人： 赵旭鹰 博士

报告时间：**2017** 年 **8** 月 **7** 日（周一）

上午 **10:00-11:00**

报告地点： 科技综合楼三层

311 报告厅

Abstract:

Fractional partial differential equations （FPDEs） provide an accurate description of transport processes from many applications, which exhibit anomalous diffusion and long-range spatial interaction and time memory. However, FPDEs raise mathematical and numerical difficulties that have not been encountered in the context of integer-order PDEs.

Computationally, because of the nonlocal property of fractional differential operators, the numerical methods for FPDEs often generate dense coefficient matrices for which traditional direct solvers were used that have a computational complexity of $O(N^3)$ per time step and memory requirement of $O(N^2)$ where N is the number of unknowns.
This makes numerical simulation of three-dimensional FPDE modeling computationally very expensive. Mathematically, FPDEs exhibit mathematical properties that have fundamental differences from those of integer-order PDEs.

We will go over the development of fast numerical methods for FPDEs, by exploring the structure of the coefficient matrices. These methods have approximately linear computational complexity per time step and optimal memory requirement.

We will discuss mathematical issues on FPDEs such as wellposedness and regularity of the problems and their impact on the convergence behavior of numerical methods.

欢迎大家参加！