

**数学与系统科学研究院**

**计算数学所学术报告**

**(系列课程)**

**报告人: Prof. Joseph M. Powers**

**(Dept. of Aero. and Mech. Eng. & Dept.  
of Mathematics, University of Notre  
Dame, USA)**

**报告题目: Mathematical**

**Modeling of Combustion Problems**

**邀请人: 袁礼研究员**

**报告时间:**

- 1. 2009年6月3日(周三)  
上午8:30—11:20**
- 2. 2009年6月8日(周一)**

**上午 8:30—11:20**

**3. 2009 年 6 月 10 日(周三)**

**上午 8:30—11:20**

**4. 2009 年 6 月 17 日(周三)**

**上午 8:30—11:20**

**报告地点: 科技综合楼三层 311**

**计算数学所报告厅**

**Abstract:**

**Over the past years, revolutionary advances in computational modeling of multiscale physics have prompted numerous numerical simulations of combustion- and detonation-based devices.**

**However, key physical phenomena involving unsteady and multidimensional effects, such as ignition, stability, transverse wave dynamics, diffraction, detailed reaction zone structures, and diffusive structures, remain unresolved for most important engineering applications.**

**In this lecture series, a framework will be outlined to assist in simulation of complex multi-scale problems in reacting fluid mechanics; an emphasis will be placed on particular strategies which can be employed in a scientific computing environment. Among the topics which will be discussed are:**

- 1) general compressible reactive Navier–Stokes models for reactive mixtures of calorically imperfect ideal gases with detailed chemical kinetics and multi-component diffusion;**
- 2) strategies for diagnosing (eigenvalue analysis) and capturing (adaptive wavelet analysis) the multi-scale nature of the flow;**
- 3) strategies for stiffness reduction in chemical kinetics as embodied in the method of Intrinsic Low Dimensional Manifolds (ILDm) and Slow Invariant Manifolds (SIM);**
- 4) the non-linear dynamics and transition to chaos in detonations.**

**欢迎大家参加！**