

数学与系统科学研究院

计算数学所学术报告

报告人: **Dr. Young Ju Lee**

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报告题目:

**Self-Sustaining Oscillations of the  
Falling Sphere Through the  
Johnson-Segalman Fluids**

邀请人: 张硕博士

报告时间: **2011 年 8 月 26 日 (周五)**

**下午 15: 00-16: 00**

报告地点: **科技综合楼三层 301**  
**计算数学所小报告厅**

## **Abstract:**

**In this talk, we review a novel numerical method that can handle the rate-type non-Newtonian equations in a unified fashion and validate the methods in terms of various benchmark solutions as well as theoretical results. We then apply it to the real physical problems. In particular, we present our investigations and attempts to identify a mathematical model for the unusual phenomenon observed in motion of the sphere falling through the wormlike micellar fluids by Jayaraman and Belmonte; a sphere falling in a wormlike micellar fluids undergoes nontransient and continual oscillations. We tackle the Johnson-Segalman models in the parameter regimes that have been unexplored previously for the flow past a sphere and reproduce the self-sustaining, continual, (ir)regular and periodic oscillations. Our results show that the flow instability can be correlated with the critical value of the velocity gradient, as observed in experiments by Jayaraman and Belmonte in 2003. If time permits, we also present recent works on the boundary conditions for the diffusive complex fluids models as well as the fast stokes solvers implemented in a full parallel fashion. Some of results in this talk is in collaborations with W. Leng, C. Zhang and L. Zhang at the Chinese Academy of Science.**

**欢迎大家参加!**