

# 国际暑期班课程介绍

## 智能材料的细观理论 ( Micromechanics of Active Materials )

**Jiangyu Li      Assistant Professor**

### 课程简介:

本课程主要讲授智能材料的细观理论和方法。课程主要分为四个部分:

- (1) 细观力学的基本方法和观点;
- (2) 铁电材料和压电材料的细观力学;
- (3) 铁磁材料的微磁理论;
- (4) 多重铁性材料的细观理论。

通过本课程的学习, 学生将对细观力学的主要模型有所了解, 并能将之运用到智能材料的理论研究中去。所涉及智能材料, 将包括铁电晶体、陶瓷及薄膜, 压电复合材料, 硬磁、软磁及磁记录材料, 以及单相多重铁性磁电耦合材料和多相多重铁性复合材料。课程将以教师讲授为主, 辅以小学生的课题设计。

### 教师简介:

Jiangyu Li is an Assistant Professor and Bryan T. McMinn Endowed Professor in Mechanical Engineering at University of Washington, U.S.A. He is also a Furong Scholar of Hunan Province, China. Having over 13 years of research experience in active materials and structures, he has published over 40 research papers, and has been cited over 300 times by other authors according to SCI. His paper on giant electrostriction in an all-organic nanocomposite published in Physical Review Letters has won him a Best Paper Award in Adaptive Structures and Materials Systems from ASME. He also published an article in Nature Materials that resolved a long-standing problem related to domain switching in ferroelectric ceramics. His research interests include active materials and structures, nanotechnology, and micromechanics. He is currently looking for bright Ph.D. students to fill two immediate open positions in his Multifunctional Materials Laboratory at University of Washington.

## 纳米与细观力学 ( Nano/Micromechanics )

**Jackie Li      Associate Professor**

### 课程简介:

本课程主要讲授纳米材料和细观材料的结构与力学特性。课程主要分为五个部分:

- (1) 纳米与细观力学的简介;
- (2) 纳米和细观材料的分类与结构;
- (3) 分子力学在纳米力学中的应用;
- (4) 细观力学理论;
- (5) 细观力学在纳米材料方面的可行性。

通过本课程的学习, 学生将对纳米与细观力学的主要模型有所了解, 并能将之运用到纳米和细观材料的理论研究中去。所涉及的纳米材料, 将包括碳纳米管、纳米晶体、碳纳米管复合材料。课程将以教师讲授为主。

### 教师简介:

Jackie Li (Li, Jie) is an Associate Professor in the Department of Mechanical Engineering at the City College of New York (CCNY). She is an alumna of Peking University. She received her Ph.D. degree in Mechanical and Aerospace Engineering from Rutgers University in 1995. Prior to her appointment at CCNY in 2002, she was an Assistant Professor at The Cooper Union (a prestigious undergraduate institute in New York City) for four years. Her research interests include micromechanics, nano-mechanics, nonlinear and time-dependent mechanical properties of composites, nonlinear electro-mechanical coupling behavior of ferroelectrics, mechanical properties of nanotubes and nanotube-reinforced composites, nanocrystalline materials, and self-sensing of carbon-reinforced composites. She is a recipient of NSF Career award for her research and education on ferroelectric materials. She was also one of invited participants in *the National Academy of Engineering's annual Symposium on Frontiers of Engineering*, which brings together outstanding leaders and top-notch people from disparate fields in engineering and challenges them to think about the developments at the frontiers of areas different from their own. Her current research activities are on elastic properties of nanotubes and nanotube-reinforced composites, viscoplastic behavior of nano-crystalline materials, electro-mechanical coupling behavior of ferroelectrics, and self-sensing technology of carbon-fiber composites.

**多孔介质多相流数值模拟基础**  
**(Computational Methods for Multiphase Flow in Porous Media)**

**Zhangxin Chen      Professor**

**课程简介:**

This course offers a fundamental and practical introduction to the use of computational methods, particularly finite element methods, in the simulation of fluid flows in porous media. It will cover a wide variety of flows, including single-phase, two-phase, black oil, volatile, compositional, nonisothermal, and chemical compositional flows in both ordinary porous and fractured porous media. In addition, a range of computational methods will be covered. A thorough discussion of practical aspects of the subjects is presented in a consistent manner, and the level of treatment is rigorous without being unnecessarily abstract.

**教师简介:**

The Summer Course will be given by Dr. Zhangxin Chen, a Tepin Professor in College of Engineering, Peking University. He is also a Chaired Professor at the University of Calgary, Canada, and the CMG Foundation Chair. CMG (Computer Modeling Group Ltd.) is the world's largest independent developer of reservoir simulation software and advanced processes modeling.

**燃烧化学热力学**  
**( Combustion Aerothermochemistry )**  
**Toshi Fujiwara      Professor**

**课程简介:**

Fundamental combustion gasdynamics and chemical kinetics are delivered at the level of senior undergraduate/graduate students, requiring thermodynamics, fluid mechanics and gaseous chemical reactions as background. Some emphasis is placed on combustion in engines (reciprocating, gas turbine, rocket).

Aerothermochemistry of combustion is handled theoretically, using a famous textbook “Principles of Combustion” by K. K. Kuo. Since the available time is only 16 hours, important subjects are picked up; premixed laminar flames, detonation waves, pulse detonation engines, diffusion flames, droplet burning, and chemical kinetics.

**教师简介:**

Bachelor, Master, PhD: Department of Aeronautics, University of Tokyo  
1939 Born in Himeji-city, Japan  
1939-1946 Stayed in 黑河, 瓦房店, 大石桥 in Manchuria  
1961 Bachelor, University of Tokyo  
1966 PhD, University of Tokyo  
1966 Research Associate, University of Tokyo  
1968 Lecturer, Nagoya University  
1971 Associate Professor, Nagoya University  
1981 Professor, Nagoya University  
2002 Emeritus Professor, Nagoya University  
2004-Present, Director, FF Laboratory, Nagoya

**Overseas Research Experiences:**

1974-1976 Senior NRC Associate, NASA Ames Research Center

1978-1979 Senior NRC Associate, Argonne National Laboratory, Chicago University

**Member of Societies:**

AIAA, JSASS, Combustion Institute, IDERS (Board Member)

## 课程时间安排

暑期班课程从7月9日起开课，共五周。

《智能材料的细观理论》2学分 共36学时 每周12学时

1-3周，周一、周三上午9:00-12:00，周二、周四下午2:00-5:00；

地点：北大力学楼434

《纳米与细观力学》3学分 共48学时 每周12学时

2-5周，周一、周三下午2:00-5:00；周二、周四上午9:00-12:00；

地点：北大力学楼434

《多孔介质多相流数值模拟基础》3学分 共50学时 每周10学时

1-5周，周一、周三、周五上午8:00-12:00；

地点：北大电教114

《燃烧化学热力学》1学分 共16学时 每周2学时

1-5周，周三、周四上午10:00-12:00；

地点：北大理教109

## 选课说明

请将“姓名—学校院系—所选课程—是否要求修学分—联系方式（电话、email）”发送至 [liuyang@cstam.org.cn](mailto:liuyang@cstam.org.cn)

- 1、如果只听课程不修学分，课程是免费的，您只需要在开课领取听课证即可。
- 2、如果需要修学分，按照北京大学接受外单位人员选课标准，300元/学分，选课申请表见下页。
- 3、报名截止日期：2007年6月28日

