NUS National University of Singapore | Department of Mechanical Engineering
Faculty of Engineering

You are cordially invited to our:
**Department Seminar**

**Topic:** **Lattice Boltzmann modeling of droplet dynamics in microfluidic channels**

**Speaker:** **Dr Zhang Yonghao**
Department of Mechanical & Aerospace Engineering
University of Strathclyde, United Kingdom

**Date:** **Wednesday, 13 March 2013**

**Time:** **10.30am to 11.15am**

**Venue:** **EA-06-05** *(map of NUS can be found at http://map.nus.edu.sg/)*

## Abstract

Micro-droplet technology has recently become the research focus as it has potential to provide a flexible platform for microfluidic functions. It has many advantages over single-phase microfluidics. However, the currently dominant design methodology is trial-and-error that increasingly hinders the development of highly integrated microfluidic microdroplet systems. The insightful understanding of droplet dynamics is key to transforming the current trial-and-error design approach and enabling a step-change in our capability of delivering future droplet-based microfluidic devices.

The seminar will report recent work on developing lattice Boltzmann (LB) method for simulating droplet generation, transportation, coalescence in microfluidic channels. It will also discuss the phase-field LB model on simulating droplet motion with soluble surfactants. The model can determine the interfacial tension lowering scale according to the interface surfactant concentration. Simulations showed that the addition of surfactant can promote droplet breakup, and inhibit droplet coalescence. It was also demonstrated that the induced Marangoni stresses can prevent the droplet coalescence. Recent work on LB modeling of thermocapillary flows will also be presented. The model can describe how a focused laser beam can locally heat the interface thus block the droplet motion because of the induced thermocapillary forces.

## About the Speaker

Dr. Zhang Yonghao completed his PhD study at Aberdeen University UK in 2001, after which he worked as a Computational Engineer at Daresbury Laboratory. In 2007, he joined Strathclyde University as a John Anderson Research Lecturer. His research has been focused on non-equilibrium gas dynamics and microdroplet technology, which has been supported by UK funding councils EPSRC and STFC, EU Commission, The Leverhulme Trust and James Weir Foundation. He is a also Royal Academy of Engineering / The Leverhulme Trust Senior Research Fellow.

**** Admission is free. All are welcome to attend. ****

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You are cordially invited to our:
# Department Seminar

**Topic:** **Biomimetics Flow Modeling and Its Applications in Marine Renewable Energy Devices**

**Speaker:** **Dr XIAO Qing**
Department of Naval Architecture and Marine Engineering,
University of Strathclyde, Glasgow, UK

**Date:** **Wednesday, 13 March 2013**

**Time:** **11.15am to 12.00pm**

**Venue:** **EA-06-05** *(map of NUS can be found at http://map.nus.edu.sg/)*

## Abstract

Research on aero-/hydro-dynamics of biomimetics is a challenging problem with rapidly increasing demand from the aero/marine industry and the defence sector. A research group is being developed in the Department of Naval Architecture and Marine Engineering at Strathclyde University which pursues computational/experimental research work investigating the flow mechanism of bio-mimetic hydrodynamics. In this talk, the research work currently being performed at Strathclyde University will be introduced. Particular interests will focus on the investigation for bio-inspired swimming fish and flapping wing using a numerical modelling method. This will further extend to the recently developed industrial biomimetic applications in marine renewable energy devices.

## About the Speaker

Dr. XIAO Qing obtained her Ph. D degree in Mechanical Engineering from National University of Singapore in 2001. Then she worked at Institute of High Performance Computing on the research work of physiological flow modeling, and subsequently she joined Temasek Laboratories working on the area of CFD modeling for aerodynamics. In 2007, she joined faculty of Naval Architecture and Marine Engineering (NAME) in Strathclyde University. She is now lecturer of Marine Engineering, leading a biomimetic research group at NAME. Her major research interests are computational/experimental fluid dynamics with particular interests in biomimetics and renewable energy devices. She is a senior Member of the AIAA and a Member of ISOPE and BIOKON.

**** Admission is free. All are welcome to attend. ****