Joint HKSTAM/CityU MBE Distinguished Seminar

Underwater Superhydrophobicity: Fundamentals and Applications

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Date: **27 January 2016 (Wednesday)**
Time: **11:00 am – 12:00 pm**
Venue: LT-9, Academic Building 1, Fourth floor (the level of University Concourse), City University of Hong Kong
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ABSTRACT

Gas cavities trapped on structured hydrophobic surfaces play important roles in realizing functionalities such as superhydrophobicity, drag reduction, and surface cleaning. The morphology of the cavities exhibits strong dependence on system parameters, which influences the performance of these surfaces. For example, air diffusion into the water around under pressurization leads to the loss of air cavities and the failure of superhydrophobicity. The current work examines *in situ* liquid-air interfaces on a submerged surface patterned with cylindrical micro-pores using confocal microscopy. The dynamic process of wetting transition, including various depinned metastable states, are directly observed and measured quantitatively, and the data are in good agreement with a diffusion-based model prediction. A similarity law along with a characteristic time scale is derived, which governs the lifetime of the air pockets. Moreover, a complete theoretical analysis is presented to predict cavity morphological change under reduced liquid pressure, on a submerged hydrophobic surface patterned with cylindrical pores. The theoretical model is supported by direct experimental measurements via confocal microscopy, and demonstrates good quantitative accuracy. This work provides a predictive tool for the design of functional structured hydrophobic surfaces.

Biography of Speaker

Dr. Huiling Duan is "Cheung Kong Scholar" Chair Professor, and the Chairman of Department of Mechanics and Engineering Science. Her research focuses on nanomechanics, micromechanics, and fluids/solids interaction. She got the National Excellent PhD Thesis Award of China (2007), The Sia Nemat-Nasser Award of American Society of Mechanical Engineering (ASME) in 2009. Mao Yisheng Outstanding Young Scholar Award of China in 2010, Outstanding Young Scholar Award of The Chinese Society of Theoretical and Applied Mechanics in 2011, National Outstanding Young Researcher Award of National Natural Science Foundation of China in 2012, National Outstanding Young Female Scientist in 2014. Huiling Duan has more than 100 publications in peer-reviewed journals including Nature

Communications, Proc. Nat. Acad. Sci., Phys. Rev. Lett., Advanced Materials, Nano Letters, etc. She has been invited to give more than 60 talks in IUTAM Symposia, Universities and Research Institutes. She is the Associate Editor of ASME (American Society of Mechanical Engineer) Journal of Engineering Materials and Technology, members of editorial boards of journals, "Scientific Reports", "Engineering Computations", "Acta Mechanica Sinica", "Acta Mechanica Solida Sinica" etc.

The seminar Hong Kong Society of Theoretical and Applied Mechanics and Department of Mechanical and Biomedical Engineering, City University of Hong Kong

======== All are welcome =========

Map of the venue

LT-9 (SAE Magnetics Lecture Theatre 新科實業演講廳) is located along the University Concourse (4th floor) of Academic Building 1 at the City University of Hong Kong. Map of the venue is shown below: