

THE PETER WALL INSTITUTE PRESENTS: INTERNATIONAL VISITING RESEARCH SCHOLAR

# Experimental Studies on Self-Assembled Magnetic Microbeads and Ferrofluid Drops



**Dr. Ching-Yao Chen**

**Thursday  
November 13, 2014  
4:00 pm - 5:00 pm**

**Earth Sciences Building  
Room 2012  
2207 Main Mall  
Vancouver, BC**

Experiments of magnetic particles and ferrodrops are carried out to study their motion in a static or dynamical field. A particle chain or drop array is firstly self-assembled in a directional field, and then manipulated by either an oscillating field or rotational field. Distinct behaviors of the oscillating chain, from rigid body oscillations and bending distortions to rupture failures, are observed by increasing the amplitudes of oscillating fields or chains' lengths. The experimental results confirm a criterion to maintain a stable chain. In addition, an interesting phenomenon of trajectory shift is discovered and applied successfully to steer the moving orientations of microswimmers. On the other hand, driven by an external rotating field, a novel phenomenon of planetary motion, including double rotation of local self-spin of individual drops and the global orbital revolution of the drop array, is identified in arrayed ferrofluid drops. The global revolution of the drop array

is driven by the interactions between the magnetized drops, undergoes a wave-like forth and back movement. Such double rotations can be applied to enhance mixings of two fluids more effectively than a single self-spin drop.

**Dr. Ching-Yao Chen** is a full Professor at the Department of Mechanical Engineering, National Chiao Tung University (NCTU), one of the leading research universities in Taiwan. Professor Chen's research interests lie in fundamental fluid dynamics, with an emphasis on interfacial instability. Recently he has extended his research to dynamics of ferrofluids and magnetic-particles. He has extensive experience in research on the dynamics and interfacial morphologies both by simulations and experiments.



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