Mechanical Engineering
Fall 2007 Seminars

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4:00 PM – 5:00 PM

ROOM: 224 MEC

"Numerical Simulations of Dielectrophoretic Motion of Particles"

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ABSTRACT

Dielectrophoresis (or DEP) is a phenomenon in which a force is exerted on a dielectric particle when it is suspended in a non-uniform electric field. The strength of this force depends on the medium and particles' electrical properties, on the particles' shape and size, as well as on the Profile and frequency of the electric field. Consequently, particular electric fields can be designed to manipulate particles, for example, the separation of biological cells or the assembly of nanotubes. However, most suspensions in biological applications involve electrolyte where an ionic double layer may be formed next to particle surface due to the induced-charge on its surface when the frequency of the applied AC fields is not too high. This double layer affects the dielectrophoretic motion of the particle. It modifies the net dipole moment of the particle and at the same time produces slip velocity on the particle surface. In this presentation, I will describe a numerical method that simulates the motion of dielectric particles in an electrolyte. The effects of the double layer on the dielectrophoretic motion of particles will be discussed.

Biography

Howard H. Hu: Associate Professor of Mechanical Engineering and Applied Mechanics at University of Pennsylvania. He got his B.S. from Zhejiang University (China) in 1982, and his M.S. from Xian Jiaotong University in 1986. He joined UPenn after receiving his Ph.D. degree in Aerospace Engineering from University of Minnesota in 1992. One of his research interests is in simulation of motion of large numbers of particles in flows of solid-liquid mixtures. He is a recipient of the Young Scientist Multiphase Flow Breakthrough Award in 1998 for his pioneering contributions to direct numerical simulations of particulate flows in Newtonian and viscoelastic fluids.

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