



UNIVERSITY OF CALIFORNIA RIVERSIDE

DEPARTMENT OF MATHEMATICS

COLLOQUIUM

JianZhong Wu

(UCR Dept. of Chemical & Environmental Engineering)

"On the regularity of solutions to the stationary
Navier-Stokes equations"

Abstract: Statistical mechanics plays a central role in predicting the microscopic structure and thermophysical properties of condensed matter and has widespread applications not only in physical sciences but also in computational biology and engineering. In this talk, I will discuss a unified density functional theory (DFT) for complex fluids that aims to account for thermodynamic nonideality due to inter- and intra- molecular interactions in a non-mean-field fashion. The novel free-energy functionals are developed on the basis of a fundamental measure theory for molecular excluded volume effects and recent advancements in liquid-state theories for long-range interactions. In comparison with simulation results, the DFT provides accurate representations of both microscopic structure and thermodynamic properties for a wide variety of complex molecular systems in bulk or at inhomogeneous conditions. Unlike molecular simulations, DFT provides direct information on the free energy from which all thermodynamic properties can be derived. In this talk, I will also discuss the connections of the density functional theory with conventional phenomenological methods in statistical mechanics. Illustrative examples will be given on applications of the DFT to colloids, polymer mixtures and biological systems.

Wednesday, November 18, 2009

Surge 284

4:10-5:00pm

Tea Time at 3:40pm