Center for Fluid Mechanics, Division of Applied Mathematics
Fluids, Thermal and Chemical Processes Group, School of Engineering
Joint Seminar Series

Shravan Veerapaneni
Courant Institute
New York, NY

Large-scale Simulations of Vesicles Suspended in 3D Viscous Flows

Vesicles are locally-inextensible closed membranes that possess tension and bending energies. Vesicle flows model numerous biophysical phenomena that involve deforming particles interacting with a Stokesian fluid. We will present new schemes for simulating the three-dimensional hydrodynamic interactions of large number of vesicles. They incorporate (i) a stable time-stepping scheme that overcomes the high-order stiffness, (ii) spectral discretization of deforming surfaces in space, (iii) a new reparameterization scheme capable of resolving extreme mesh distortions in dynamic simulations, and (iv) a fast multipole method (FMM) acceleration for calculating the interaction forces. We will discuss some applications of the simulations in understanding the rheology and the mechanics of biomembranes.

TUESDAY, FEBRUARY 1, 2011

3:00 PM

Barus & Holley, Room 190