CENTER FOR FLUID MECHANICS
AND
THE FLUIDS, THERMAL AND CHEMICAL PROCESSES GROUP
OF
THE DIVISION OF ENGINEERING
SEMINAR SERIES

Prosenjit Bagchi
Mechanical & Aerospace Engineering
Rutgers University
Piscataway, NJ

Computational Modeling and Simulation of Blood Flow in Microcirculation

Computational modeling and simulation of blood flow in small vessels of diameter 10--300 micron remain a major challenge. It is because blood in such vessels behaves as a multiphase suspension of deformable particles.

Individuality of blood cells, with diameter ranging from 5 to 15 micron, must be recognized in small vessels. At the same time, a large number of cells must be considered to realistically simulate the blood flow in such vessels.

Red blood cells (RBC) are highly deformable particles. Deformability of RBC, and cell-to-cell interaction give rise to many hydrodynamical phenomena, such as Fahraeus and Fahraeus-Lindqvist effects, that have immense biological significance.

Deformability of white blood cells (WBC) also plays a major role during adhesive rolling that these cells perform as a part of the body's immune response.

This talk will present 3D, multiscale computational modeling and simulation of deformable particles, with specific focus on the hemodynamics of blood cells in microvessels, typical of microcirculation and microfluidic devices. Rheology of blood in microcirculation, and hydrodynamics of cell-cell and cell-wall interaction will be presented.

Tuesday, March 6, 2006
Barus & Holley, Room 190
3:00pm