

WICHITA STATE UNIVERSITY

Department of Mathematics and Statistics
& College of Engineering

Present a Jointly Sponsored Lecture by:

Prof. Costas Pozrikidis

University of California, San Diego

"Mathematical Modeling and Numerical Simulation of The Bio-Fluid-Dynamics of Red Blood Cells"

Abstract:

Red blood cells are liquid capsules containing a viscous fluid that is enclosed by a biological membrane consisting of a lipid bilayer and a supporting network of proteins. In the absence of flow, the cells assume the equilibrium shape of a biconcave disk. When subjected to flow, the cells deform in a way that is determined by the type and strength of the flow and by the mechanical properties of the membrane which is known to behave like a viscoelastic shell. In this seminar, an integrated mathematical framework of the equations governing the fluid dynamics and membrane mechanics is presented working under the auspices of low-Reynolds-number hydrodynamics coupled with the nonlinear theory of thin shells. The governing equations are solved using a novel implementation of the boundary element method that accounts for the membrane elasticity and bending stiffness. Parametric investigations demonstrate the significance of the membrane properties on the cell deformability and on the magnitude of the developing membrane tensions, and thereby establish a relationship between membrane structure and cell behavior in large-scale or capillary blood flow.

**Friday, November 8, 2002
3:00 PM in 372 Jabara Hall**

*Please come join us for refreshments before the lecture
at 2:30 p.m. in room 353 Jabara Hall.*