CALIFORNIA STATE UNIVERSITY, LONG BEACH

THE MATHEMATICS COLLOQUIUM

presents

Dr. Suncica Canic

University of Houston

speaking on

Modeling, analysis and experimental validation of blood flow in compliant arteries

Friday, May 13, 2005 **12:00PM-1:00PM**

LA5-267

Abstract: As you are reading this abstract your arteries are pulsating in response to the pressure waves caused by the contractions and relaxations of the heart muscle. In fact, your abdominal aorta, whose average radius is around 1.2 cm, might be experiencing a change in the radius of up to 10 percent during each cardiac cycle. Mathematically, this interaction between blood flow and "compliant" vessel wall can be modeled by a free-boundary problem describing the coupling between the incompressible Navier-Stokes equations modeling blood flow and a set of "structure" equations describing the behavior of vessel walls. Even when the simplest structure models are considered such as, for example, the Navier equations for a linearly elastic membrane, this fluid-structure interaction problem is so complex, that not only is the existence theory out of reach at the moment, but the numerical simulations of the 3D problem are exceedingly difficult. This is why simplified, effective equations are called for. The speaker with talk about a recently developed Biot model that is in the form of a hyperbolic-parabolic system of equations with memory. The memory term explicitly captures the viscoelastic behavior of the coupling between the fluid and the sturucture. Numerical simulations and experiemental results related to different cardiovascular applications will be discussed.