NAU

NORTHERN
ARIZONA
UNIVERSITY

Department of Mathematics and Statistics
Colloquium
Tuesday   November 6
AMB 164   4:00 pm

Mathematical Modeling of Blood Flow: Numerical Analysis and Dynamical Systems

Amirhossein Arzani

Mechanical Engineering Department, NAU

Abstract

Cardiovascular disease is the leading cause of death. Computer modeling and numerical analysis are powerful tools to study blood flow using patient-specific modeling. In this talk, I will discuss how we use computational fluid dynamics (CFD) to solve the equations that govern blood flow. Namely, stabilized finite element method (FEM) is used to solve the Navier-Stokes partial differential equations. I will discuss the challenges in such numerical modeling. I will also discuss how we extract useful information from the velocity vector fields we obtain from CFD. Blood flow in diseased arteries is often chaotic. We use dynamical systems principles to construct trajectories and compute stable and unstable manifolds in blood flow. I will show that how these manifolds can be used to extract useful information in complex (often chaotic) 3D blood flow.

Refreshments at 3:45