

Computer Simulations of Blood Flows in Atherosclerotic Arteries

Biyue Liu
Department of Mathematics
Monmouth University
West Long Branch, NJ 07764

Atherosclerosis is a disease of large- and medium-size arteries, which involves complex interactions between the artery wall and the blood flow. Both clinical reports and experiment results show that haemodynamics plays an important role in the pathogenesis of atherosclerosis. The objectives of this research are to study local flow characteristics in order to understand the role of arterial fluid dynamics in the genesis of atherosclerosis and to investigate how the geometrical adaptation of atherosclerotic plaques is related to the wall shear stress. In this talk, I will present computer simulation results on the investigation of blood flow in atherosclerotic arteries. A three dimensional mathematical model with a moving boundary is developed. The simplified geometry of the artery is constructed based on the pictures of diseased arteries. The model is numerically solved using the finite element method. Computations are carried out with various values of physiological parameters to study the flow patterns in atherosclerotic arteries and the correlation between the development of the plaque and the flow parameters, including blood viscosity, inlet flow profile, flow rate and flow waveform.