TEMPLE UNIVERSITY
Department of Mathematics

Applied Mathematics and Scientific Computing Seminar

Wednesday, 25 March 2015, 4:00 p.m.
Room 617 Wachman Hall

(refreshments and social at 3:45 p.m)

A Computational Model for Atherosclerotic Plaque Growth Simulations

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Abstract. Atherosclerosis is a chronic inflammatory process in which the arterial wall develops a plaque as a result of the build up of cholesterol and other fatty materials in the interior surface of the wall, and is the most common disease of the arterial system. This study focuses on the implementation of a coupled reaction-diffusion model in two dimensions with a cross-sectional geometry of the artery which reveals the interaction between various factors that affect the growth of the plaque. The Darcy equations are implemented to model the intramural flow through the arterial wall. The interaction between the macrophages and the oxidized LDLs are modeled by a system of coupled reaction-diffusion equations. A pseudo-Stokes equation is used to compute the long-term growth velocity field of the wall, which is then used for the evolution of the geometry of the plaque.