# Special Program in Applied Mathematics and Applied Mechanics

*A computational determination of Leukocyte adhesion*

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308, Mathematics Research Center Building (ori. New Math. Bldg.)

In literature, there are a number of competing hypotheses for site specific atherosclerosis formation. One is the upregulation of Leukocyte intake by the endothelium due to dysfunction, which leads to over-expression of vascular adhesion molecules that bind leukocytes and mononuclear cells to the surface and sub-endothelial space. This adhesion to the surface is thought to be one of the initiating events in the formation of atherosclerosis.
On the other hand, as mentioned by Berger and Jou (2000), it is now well accepted that sites where the wall shear stress is low, or change rapidly in time or space, are most vulnerable to atherosclerosis development.
In the present talk, a Direct Numerical Simulation (DNS) of a Pulsatile Flow of Blood inside a cylindrical stenotic vessel will be discussed. Special emphasis is given to the computation of the wall shear stress and its relationship with the rate of Leukocyte adhesion to the vessel wall, through the Correlations of Bhui and Hayenga (2017). Other flow features of interest like the wall normal stress (pressure) and the velocity fields were studied under the tri-phasic flow rate input of He and Ku (1996). Stenosis is modeled using the Immersed Boundary Method and Skewed Gaussian functions. Results for the Adhesion Rate of Neutrophil are presented.