Abstract Submitted
for the DFD14 Meeting of
The American Physical Society

Direct numerical simulation of a pulsatile flow in a coronary artery[1] JORGE BAILON-CUBA, HEATHER HAYENGA, STEFANO LEONARDI, University of Texas at Dallas — A direct numerical simulation of the blood flow in a coronary artery has been performed. A pulsatile, turbulent flow, inside a branchless, rigid cylindrical artery with non-slip conditions has been considered. The blood is assumed to be a Newtonian fluid. As a fundamental component of the coronary geometry, several cross-sectional shapes of the arterial lumen, as a function of the streamwise coordinate-z, are being included using the immersed boundary method, with a simple transversal wavy wall, as the most simple case. A preliminary set of simulations has being run, with two time varying flow rate functions. Results include flow velocities, pressure gradients and wall shear stress (WSS) distribution, and their comparison with other CFD and experimental results. In particular, WSS is important due to the significant role that it plays in the early formation of coronary artery disease (CAD). It has been found that waviness on the wall increases the instantaneous streamwise velocity, $w(y)$, and its fluctuations, $\langle w'^2 \rangle(y)$, and more drastically the WSS.

[1]The numerical simulations were performed on the Extreme Science and Engineering Discovery Environment (XSEDE) under Grant No. CTS070066.

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Date submitted: 01 Aug 2014 Electronic form version 1.4