Abstract Submitted
for the DFD17 Meeting of
The American Physical Society

Impact of Inflow Conditions on Coherent Structures in an Aneurysm PAULO YU, VIBHAV DURGESH, HAMID JOHARI, California State University Northridge — An aneurysm is an enlargement of a weakened arterial wall that can be debilitating or fatal on rupture. Studies have shown that hemodynamics is integral to developing an understanding of aneurysm formation, growth, and rupture. This investigation focuses on a comprehensive study of the impact of varying inflow conditions and aneurysm shapes on spatial and temporal behavior of flow parameters and structures in an aneurysm. Two different shapes of an idealized rigid aneurysm model were studied and the non-dimensional frequency and Reynolds number were varied between 2-5 and 50-250, respectively. A ViVitro Labs SuperPump system was used to precisely control inflow conditions. Particle Image Velocimetry (PIV) measurements were performed at three different locations inside the aneurysm sac to obtain detailed velocity flow field information. The results of this study showed that aneurysm morphology significantly impacts spatial and temporal behavior of large-scale flow structures as well as wall shear stress distribution. The flow behavior and structures showed a significant difference with change in inflow conditions. A primary fluctuating flow structure was observed for Reynolds number of 50, while for higher Reynolds numbers, primary and secondary flow structures were observed. Furthermore, the paths of these coherent structures were dependent on aneurysm shape and inflow parameters.

Paulo Yu
California State University Northridge

Date submitted: 01 Aug 2017 Electronic form version 1.4