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Application of Dynamic Mode Decomposition: Temporal Evolution of Flow Structures in an Aneurysm WILLIAM CONLIN, PAULO YU, VIBHAV DURGESH, California State University, Northridge — An aneurysm is an enlargement of a weakened arterial wall that can be fatal or debilitating on rupture. Aneurysm hemodynamics is integral to developing an understanding of aneurysm formation, growth, and rupture. The flow in an aneurysm exhibits complex fluid dynamics behavior due to an inherent unsteady inflow condition and its interactions with large-scale flow structures present in the aneurysm. The objective of this study is to identify the large-scale structures in the aneurysm, study temporal behavior, and quantify their interaction with the inflow condition. For this purpose, detailed Particle Image Velocimetry (PIV) measurements were performed at the center plane of an idealized aneurysm model for a range of inflow conditions. Inflow conditions were precisely controlled using a ViVitro SuperPump system. Dynamic Modal Decomposition (DMD) of the velocity field was used to identify coherent structures and their temporal behavior. DMD was successful in capturing the large-scale flow structures and their temporal behavior. A low dimensional approximation to the flow field was obtained with the most relevant dynamic modes and was used to obtain temporal information about the coherent structures and their interaction with the inflow, formation, evolution, and growth.

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