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Wall Shear Stress Distribution in a Patient-Specific Cerebral Aneurysm Model using Reduced Order Modeling. SUYUE HAN, GARY HAN CHANG, University of Massachusetts Amherst, CLEMENS SCHIRMER, Geisinger Health System, YAHYA MODARRES-SADEGHI, University of Massachusetts Amherst — We construct a reduced-order model (ROM) to study the Wall Shear Stress (WSS) distributions in image-based patient-specific aneurysms models. The magnitude of WSS has been shown to be a critical factor in growth and rupture of human aneurysms. We start the process by running a training case using Computational Fluid Dynamics (CFD) simulation with time-varying flow parameters, such that these parameters cover the range of parameters of interest. The method of snapshot Proper Orthogonal Decomposition (POD) is utilized to construct the reduced-order bases using the training CFD simulation. The resulting ROM enables us to study the flow patterns and the WSS distributions over a range of system parameters computationally very efficiently with a relatively small number of modes. This enables comprehensive analysis of the model system across a range of physiological conditions without the need to re-compute the simulation for small changes in the system parameters.

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