

Abstract Submitted
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Flow Instability and Wall Shear Stress Oscillation in Intracranial Aneurysms HYOUNGSU BAEK, Brown University, MAHESH JAYAMARAN, Warren Alpert School of Medicine, Brown University, PETER RICHARDSON, GEORGE KARNIADAKIS, Brown University — We investigate the flow dynamics and oscillatory behavior of wall shear stress (WSS) vectors in intracranial aneurysms using high-order spectral/hp simulations. We analyze four patient-specific internal carotid arteries laden with aneurysms of different characteristics : a wide-necked saccular aneurysm, a hemisphere-shaped aneurysm, a narrower-necked saccular aneurysm, and a case with two adjacent saccular aneurysms. Simulations show that the pulsatile flow in aneurysms may be subject to a hydrodynamic instability during the decelerating systolic phase resulting in a high-frequency oscillation in the range of 30-50 Hz. When the aneurysmal flow becomes unstable, both the magnitude and the directions of WSS vectors fluctuate. In particular, the WSS vectors around the flow impingement region exhibit significant spatial and temporal changes in direction as well as in magnitude.

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