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Experimental Flow Characterization of a Flow Diverting Device
EPH SPARROW, RICKY CHOW, U. of Minn., GARY CAMPBELL, Lake Region Medical, AFSHIN DIVANI, U. of Minn., JIAN SHENG, Texas Tech U. — Flow diverters, such as the Pipeline Embolization Device, are a new class of endovascular devices for the treatment of intracranial aneurysms. While clinical studies have demonstrated safety and efficacy, their impact on intra-aneurysmal flow is not confirmed experimentally. As such, optimization of the flow diversion behavior is not currently possible. A quasi-3D PIV technique was developed and applied in various glass models at Re = 275 and 550 to determine the changes to flow characteristics due to the deployment of a flow diverter across the aneurysm neck. Outcomes such as mean velocity, wall shear stress, and others metrics will be presented. Glass models with varying radii of curvature and aneurysm locations will be examined. Experiments were performed in a fully index-matched flow facility using $\sim$10μm diameter polystyrene particles doped with Rhodium 6G dye. The particles were illuminated with a 532nm laser sheet and observed with a CCD camera and a 592nm +/- 43nm bandpass filter. A quasi 3D flow field was reconstructed from multiple orthogonal planes (spaced 0.4mm apart) encompassing the entire glass model. Wall stresses were evaluated from the near-wall flow viscous stresses.

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