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Secondary flow structure from stent-induced perturbations in a bent pipe model for curved arteries[1] FANGJUN SHU, AUTUMN GLENN, KARTIK BULUSU, MICHAEL W. PLESNIAK, George Washington University — Secondary flow structures were investigated in a 180-degree circular bend under physiological (pulsatile) flow conditions with a stent model installed upstream of the bend. Upstream Reynolds number ranged from 200 to 1400 and the cardiac cycle period was scaled to match the physiological Womersley number, Wo=4.2. Experimental data were acquired using 2-D PIV at various cross-sectional planes along the bend. Similar to the results in absence of the stent model, symmetric counter-rotating vortex pairs were observed to develop during the cardiac cycle. In addition, transient unstable flow was initiated at the deceleration phase of the systolic peak (t/T=0.21). This complex flow is mainly attributable to perturbations induced by the stent model. It is characterized by breakdown of Dean- and Lyne-type vortices into various multiple-scale vortices. The phase-averaged flow fields were analyzed using the proper orthogonal decomposition (POD) method to gain further insight regarding the structural features of the flow.

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