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Evolution of streamwise vortices in a 180° circular bend under physiological flow conditions[1] FANGJUN SHU, MICHAEL PLESNIAK, George Washington University, CHEKEMA PRINCE, SEAN PETERSON, University of Waterloo — Due to the complex geometry of the vasculature and the pulsatile nature of blood flow, secondary flows are common in blood vessels. Secondary flow vortices within a 180 ° circular bend, under physiological flow conditions, with perturbations introduced by model stents were investigated. Reynolds numbers ranged from 200 to 1400 and the cardiac cycle period was scaled to match the physiological Womersley number, Wo=3.6. LDV and PIV were used to measure the flow fields at different locations in the bend. Companion computations were performed using commercial CFD software. The streamwise velocity profile was skewed toward the inner wall at the entrance of the bend and to shift progressively toward the outer wall further downstream. Counter-rotating Dean vortices were observed during the majority of the cardiac cycle. Even though Wo is relatively low, Lyne vortices were observed to develop after 90 ° of bend, following the systolic peak in the waveform. Because of the strong accelerations, higher frequency harmonic waves are present, which are associated with locally high Wo.

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