

Abstract Submitted
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Measurements of flow past a bileaflet mechanical heart valve¹

LAURA HAYA, STAVROS TAVOULARIS, University of Ottawa — A bileaflet mechanical heart valve has been inserted in an axisymmetric model of the aorta within a mock circulation apparatus with physiological pressure and flow variations. The velocity field behind the valve has been measured with laser Doppler velocimetry and particle image velocimetry. The results closely match those reported by similar studies. A triple jet emanated from the valve's orifices and regions of reverse flow formed in the sinus region. Velocity fluctuations were greatest in the shear layers of the jets. The average r.m.s. streamwise velocity fluctuation over the turbulent period was 0.22 m/s; its maximum value was 0.53 m/s and occurred at the onset of deceleration. Measurements with the valve inserted in an anatomical model of the aorta are planned for the near future. The present and future measurements will be compared to determine the effects of the aorta anatomy on the characteristics of flow through bileaflet valves. In particular, measurements of the viscous and turbulent shear stresses will be analyzed to identify possible locations of blood element damage, and regions of recirculation and stagnation will be identified as locations favourable to thrombus growth. The effects of flows in branching arteries and valve orientation will also be investigated.

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