

Abstract Submitted
for the DFD11 Meeting of
The American Physical Society

Experimental investigation of the flow field past a bileaflet mechanical heart valve in pulsatile flow within an anatomical aorta model
LAURA BROWN, STAVROS TAVOULARIS, University of Ottawa — A bileaflet mechanical heart valve (BMHV) has been mounted at the inlet of an anatomical model of the human aorta, and placed within a mock circulation loop that simulates physiological flow conditions. The working fluid matches the refractive index of silicone, from which the aorta model and other parts of the test section are made, and the viscosity of blood. Flow characteristics past the BMHV are measured using stereoscopic and planar particle image velocimetry and laser Doppler velocimetry. In contrast to previous experiments, in which heart valves have been tested in simplified aortic geometries, this arrangement permits the study of the dependence of flow past the valve upon recirculation in the sinuses of Valsalva, the flow rate through the coronary arteries, and the aorta curvature. The effect of valve orientation will also be investigated with the objective to determine a hemodynamically optimal configuration with potential benefits to implantation procedures. The measured viscous shear stress distribution will be analyzed towards predicting the initiation of thrombosis in patients and identifying regions of stagnation, which could facilitate thrombus attachment.

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Date submitted: 18 Jul 2011

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