

Abstract Submitted
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Flow Structure Downstream of a Mechanical Heart Valve during Systole: Investigation Using High-Speed Particle Image Velocimetry PETER OSHKAI, FARIDA HAJI-ESMAEILI, University of Victoria — High speed digital particle image velocimetry is employed to study turbulent flow through a bileaflet mechanical heart valve during systolic and diastolic phases of a cardiac cycle. Unsteady vortex shedding from the valve's leaflets displays distinct characteristic frequencies, depending on the opening angle of each leaflet. Small- and large-scale transverse oscillations of the separated shear layers are studied using global quantitative flow imaging approach. Implementation of high-speed digital particle image velocimetry technique yields quantitative information about vortex shedding frequencies and trajectories of the shed vortices downstream of the valve. Turbulent flow structures including jet-like regions and shed vortices are characterized in terms of patterns of instantaneous and time-averaged velocity, vorticity, and streamline topology.

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