

Abstract Submitted
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Experimental Assessment of Flow Within a Pediatric Ventricular Assist Device K.T. CHRISTENSEN, Mechanical and Industrial Engineering Dept., Univ. of Illinois at Urbana-Champaign, E. FERRARA, M. MURAMATSU, Physics Institute, Univ. of Sao Paulo, Brazil, I.A. CESTARI, Heart Institute, Univ. of Sao Paulo, Brazil — Particle-image velocimetry is used to study the flow within a pediatric ventricular assist device (PVAD) operating in the range of 60–100 beats per minute, with particular interest in identifying flow patterns that may promote detrimental processes like hemolysis and/or thrombosis. To this end, phase-locked PIV measurements are made in planes parallel to a pneumatically-driven membrane that controls the flow into and out of the PVAD's blood chamber. Preliminary results show that velocities exceeding 1 m/s can exist in these relatively small devices and that the instantaneous flow patterns can be quite vigorous. In particular, while phase-averaged fields appear to represent the bulk, large-scale features of the flow within the blood chamber of the PVAD, small-scale cycle-to-cycle variability is also quite apparent, most notably during the diastole phase when the membrane is retracting from the blood chamber. This cycle-to-cycle variability is found to increase with beating frequency.

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