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**Fluid Structure Interaction Simulations of Pediatric Ventricular Assist Device Operation** CHRIS LONG, ALISON MARSDEN, YURI BAZILEVS, UCSD — Pediatric ventricular assist devices (PVADs) are used for mechanical circulatory support in children with failing hearts. They can be used to allow the heart to heal naturally or to extend the life of the patient until transplant. A PVAD has two chambers, blood and air, separated by a flexible membrane. The air chamber is pressurized, which drives the membrane and pumps the blood. The primary risk associated with these devices is stroke or embolism from thrombogenesis. Simulation of these devices is difficult due to a complex coupling of two fluid domains and a thin membrane, requiring fluid-structure interaction modeling. The goal of this work is to accurately simulate the hemodynamics of a PVAD. We perform FSI simulations using an Arbitrary Lagrangian-Eulerian (ALE) finite element framework to account for large motions of the membrane and the fluid domains. The air, blood, and membrane are meshed as distinct subdomains, and a method for non-matched discretizations at the fluid-structure interface is presented. The use of isogeometric analysis to model the membrane mechanics is also discussed, and the results of simulations are presented.

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