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Simulations of the hinge micro flow field of a bileaflet mechanical heart valve[1] HELENE SIMON, Georgia Institute of Technology, LIANG GE, FOTIS SOTIROPOULOS, University of Minnesota, AJIT YOGANATHAN, Georgia Institute of Technology — Studies have shown that bileaflet mechanical heart valves (BMHV) promote blood cell damage and thromboembolic events due to their non-physiologic hemodynamics. Clinical reports and recent in-vitro experiments suggest that these complications are mainly associated with the hemodynamic stresses of flow through the valve hinge regions. To date, hinge hemodynamics has been largely studied using experimental approaches. This study aims at numerically simulating the pulsatile flow through the hinge region of a BMHV. The numerical technique uses a Cartesian sharp interface immersed boundary methodology and a hybrid staggered/non staggered control volume method. The hinge and leaflet dimensions are obtained from Micro Computed Tomography of an actual clinical bileaflet valve and the leaflet motion is provided as prescribed boundary conditions based on experimental measurements. Calculations will be presented for pulsatile flow conditions and reveal a complex three dimensional flow pattern throughout the entire cardiac cycle.

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Helene Simon
Georgia Institute of Technology

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