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Sharp Interface Methods for Cardiac Fluid-Solid Interaction EBRAHIM M. KOLAHDOUZ[1], BENJAMIN L. VADALA-ROTH[2], AMNEET P. S BHALLA[3], BOYCE E. GRIFFITH [4], University of North Carolina at Chapel Hill — Fluid-solid systems are common in scientific and engineering applications. The immersed boundary (IB) method is a general approach to simulating fluid-structure interaction (FSI) in such systems, but a difficulty of the IB formulation of these problems is that the pressure and viscous stress are generally discontinuous at fluid-solid interfaces. The immersed interface (II) method is an IB-like approach to FSI that exactly imposes stress jump conditions, but this method has largely been limited to FSI problems involving thin elastic boundaries. We present extensions of the IB method that sharply resolve stress discontinuities at fluid-solid interfaces that can be viewed as extensions of the immersed interface method to non-interfacial (codimension-0) solid bodies, and the application of these methods to cardiovascular FSI, including the dynamics of the cardiac valves.

[1]Department of Mathematics
[2]Department of Mathematics
[3]Department of Mathematics
[4]Departments of Mathematics and Biomedical Engineering

Ebrahim M. Kolahdouz
University of North Carolina at Chapel Hill

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