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An Eulerian Numerical Method for Fluid-Solid Interaction YANG ZHANG, MIT ERL, KEN KAMRIN, Harvard SEAS, JEAN-CHRISTOPHE NAVE, MIT MATH — Fluid-solid interaction is a difficult computational problem, primarily because solids and fluids are described in different perspectives — solid laws are written in Lagrangian frame while fluids are represented in Eulerian. Our work attempts to resolve this dilemma using a new method for Eulerian solid mechanics. We study the interaction of a large-deformation elastic solid with a Newtonian fluid in a single computational framework. We use a level set to track the interface between the two phases. The standard projection method is used to impose incompressibility in both phases, and the equations are discretized with an explicit, staggered finite-difference scheme. In the current implementation, a smeared Heaviside function is used to blur material properties across the interface. Simulations of various test cases will be presented in this talk.

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