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Reference Map Technique for Incompressible Fluid–Structure Interaction Problems CHRIS RYCROFT, Harvard University, CHEN-HUNG WU, Massachusetts Institute of Technology, YUE YU, Lehigh University, KEN KAMRIN, Massachusetts Institute of Technology — We present a fully Eulerian approach to simulate soft structures immersed in an incompressible fluid. The flow is simulated on a fixed grid using a second order projection method to solve the incompressible Navier–Stokes equations, and the fluid–structure interfaces are modeled using the level set method. By introducing a reference map variable to model finite-deformation constitutive relations in the structure on the same grid as the fluid, the interfacial coupling is highly simplified. This fully Eulerian approach provides a computationally efficient alternative to moving mesh approaches. Example simulations featuring many-body contacts and flexible swimmers will be presented.

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