

Abstract Submitted
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A vortex-particle mesh method for mixed rigid and soft body fluid–structure interaction¹ TEJASWIN PARTHASARATHY, YASHRAJ BHOSALE, MATTIA GAZZOLA, University of Illinois at Urbana-Champaign — We outline a 2D algorithm for solving incompressible flow–structure interaction problems for rigid and soft bodies, within the framework of remeshed-vortex methods. We adopt a two-fluid model to represent the solid and fluid phases on an Eulerian grid, separated by a diffused interface. Rigid solids are treated using the Brinkman penalization approach while a reference map technique is used to account for elastic stresses in hyperelastic solids. We then test our approach against a variety of increasingly challenging benchmarks, and further illustrate the versatility of our solver by studying elastic effects in the context of self-propelled active swimmers, multi-body contact, heat transfer and rectified viscous streaming. Through these illustrations, we showcase the ability of the solver to deal with different constitutive models and boundary conditions, solve multi-physics problems and achieve fast time-to-solution by sidestepping CFL time-step restrictions.

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