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Vortex methods for fluid-structure interaction problems with deforming geometries and their application to swimming MATTIA GAZZOLA, Chair of Computational Science - ETH Zurich, PHILIPPE CHATELAIN, Univ catholique de Louvain (UCL) - Institute of Mechanics, Materials and Civil Engineering (iMMC), PETROS KOUMOUTSAKOS, Chair of Computational Science - ETH Zurich — We present a vortex particle-mesh method for fluid-structure interaction problems. The proposed methodology combines implicit interface capturing, Brinkmann penalization techniques, and the self-consistent computation of momentum transfer between the fluid and the structure. In addition, our scheme is able to handle immersed bodies characterized by non-solenoidal deformations, allowing the study of arbitrary deforming geometries. This attractively simple algorithm is shown to accurately reproduce reference simulations for rigid and deforming structures. Its suitability for biological locomotion problems is then demonstrated with the simulation of self-propelled anguilliform swimmers.

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