Cortez, R.; **Minion, M.**

The blob projection method for immersed boundary problems. (English) Zbl 0962.74078

J. Comput. Phys. 161, No. 2, 428-453 (2000).

Summary: We present a new finite difference method for modeling the interaction between flexible elastic membranes and an incompressible fluid in a two-dimensional domain. The method differs from existing methods in the way the forces exerted by the membranes on the fluid are modeled. These are described by a collection of regularized point forces, and the velocity field they induce is computed directly on a regular Cartesian grid via a smoothed dipole potential. We present comparisons between this method and the immersed boundary method of *C. S. Peskin* and *D. M. McQueen* [ibid. 81, No. 2, 372-405 (1989; Zbl 0668.76159)]. The results show that the method proposed here preserves volumes better and has a higher order of convergence.

MSC:

74S30 Other numerical methods in solid mechanics (MSC2010)
74F10 Fluid-solid interactions (including aero- and hydro-elasticity, porosity, etc.)
74K15 Membranes
76D05 Navier-Stokes equations for incompressible viscous fluids

Keywords:

projection method; finite difference method; flexible elastic membranes; incompressible fluid; regularized point forces; smoothed dipole potential; immersed boundary method

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