Abstract Submitted
for the DFD17 Meeting of
The American Physical Society

An update on the Eulerian formulation for the simulation of soft solids in fluids[1] SUHAS JAIN S, ALI MANI, Center for Turbulence Research, Stanford University, USA — Soft solids in fluids find wide applications in science, especially in the study of biological tissues and membranes. In this study an incompressible 2D Eulerian Finite volume solver has been developed on a fully collocated grid. We have adopted the Reference Map Technique by Valkov et. al (J. Appl. Mech., 82, 2015) as an approach to fully resolve hyperelastic solids in a fluid on an Eulerian grid. Multiple improvements for this technique are assessed. The extrapolation of the reference map field outside the solid region is performed using a cost effective Least Square Approach. Following recent adoptions, level-set field is constructed using the reference map field at every time step. These modifications allow simulations without artificial viscosity in solid regions while maintaining numerical robustness and have completely eliminated the striations of the interface that was seen before, hence eliminating the additional routines that were required for the smoothing of the interface. An approximate projection method has been used to project the velocity field onto a divergence free field. Cost and accuracy analysis of the solver has been performed. Further details of the computational techniques used and the results will be discussed in the presentation.

[1]Supported by the Johnson Fellowship.

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Date submitted: 04 Aug 2017 Electronic form version 1.4