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A Numerical Formulation to Study Interactions Between Fluids and Deformable Solid in Extension to Thin Layer Geometries JIAZHEN QIAO, AMIR RIAZ, University of Maryland, College Park, AKASH DHRUV, ELIAS BALARAS, George Washington University — In the present study, level set formulations are used to track solid-fluid interface as well as to track a dynamic grid which captures solid deformation. The deformable solid is governed by a Neo-Hookean model. A unified framework of equation of motion is used to solve for both fluid and solid dynamics. Fluid-Structure Interaction is accounted for by adding a volumetric body force term in the solid region. This solid force is diffused into the fluid by a Heaviside function. Linear extrapolation has been used to reconstruct the dynamic grid in prevention of the distortion in the grid by artificial advection outside the solid region. Validation simulations have been performed in comparison with literatures. Implementation to thin layer geometries has also been explored by defining a thin region of solid for a few computational cells where solid shear modulus quickly goes from solid to zero. Numerical results are shown to present the robustness of this method.

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