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A Numerical Formulation to Study Interactions Between Fluids and Deforming Solid JIAZHEN QIAO, AMIR RIAZ, University of Maryland, College Park, AKASH DHRUV, ELIAS BALARAS, George Washington University — In the present work, level set formulations are used to track solid-fluid interface as well as to track a dynamic grid which captures solid deformation. The solid is assumed to be viscoelastic and a unified framework of equation of motion is used to solve for both fluid and solid dynamics. Fluid-Structure Interaction is accounted for by using an external body force term to enforce no-slip boundary condition at the interface and an elastic stress term to impose elastic stress boundary condition at the interface. The elastic stress term is implemented through a pressure jump which corrects the pressure distribution as well as the velocity field in the computational domain as a result of the presence of the elastic solid. The proposed method has an advantage of robust implementation in three dimensions and has the potential of incorporating different viscoelastic models to account for various material properties.

Jiazhen Qiao
University of Maryland, College Park

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