

Fully Eulerian finite element method for FSI with Characteristics-Galerkin

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The Eulerian variational formulation for Fluid-Structure-Interaction is discretized in a monolithic fashion by the P2-P1 element for the velocity-pressure variables. The total derivatives are discretized by the Characteristics-Galerkin method. Conservation of Energy is shown when the mesh in the solid is convected by the velocities and for a variant 3P1-P1 element of the P1+bubble-P1 element. Some examples will be given in 2D, including the FLUSTRUK test. The method is simple for incompressible hyperelastic material but can be generalized to compressible flow as will be shown theoretically and numerically.