

Fluid-Structure Interaction Algorithm for an Elastic Structure with Large Deformations

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Abstract

This contribution presents a modular fluid-structure interaction (FSI) methodology with an elastic structure model. A partitioned approach with weak or strong coupling is used, allowing independent fluid and structure solvers and nonmatching meshes at the fluid-solid interface. The fluid flow is described by the compressible Navier-Stokes equations in the ALE formulation and solved using an implicit discontinuous Galerkin scheme with interior penalty for viscous fluxes. The elastic structure is modeled by nonlinear elastodynamics with large deformations and solved by an implicit finite-element method. Because the meshes do not conform at the interface, aerodynamic stresses and structural displacements are transferred using radial basis function interpolation. The complete FSI framework is validated on the well-known Turek-Hron benchmark.