An Adaptive Finite Element Method for Flow Problems with Fluid-Structure Interaction

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Abstract: We propose a general variational framework for the adaptive finite element approximation of fluid-structure interaction problems. The modeling is based on an Eulerian description of the (incompressible) fluid as well as the (elastic) structure dynamics. In this approach the deformation appears as a primary variable in an Eulerian framework. Based on this monolithic model of the fluid-structure interaction, we apply the "dual weighted residual (DWR) method" for goal-oriented a posteriori error estimation and mesh adaptation to fluid-structure interaction problems. Numerical results for stationary as well as nonstationary test examples are presented.

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