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Adaptive wavelet-based framework for aeroelastic simulations RAJ NAIR, OLEG VASILYEV, Univ of Colorado - Boulder — This study presents the novel adaptive wavelet-based framework for modeling fluid-structure interaction. The approach uses the adaptive wavelet collocation method to solve the linear-elastic structural deformation equations inside the solid obstacle and compressible Navier-Stokes equations in the outer fluid region. The method then combines two mathematical approaches: volume penalization for creating a fluid-structure coupling by specifying traction condition on the solid boundary and enforcing the no-slip velocity conditions consistent with the rate of structural deformation on the obstacle boundary and a level-set-method, which dynamically tracks the solid-fluid interface. The method is applied to a two-dimensional aeroelastic flow and preliminary results are discussed. This work serves as the basis for continuing development of a robust adaptive wavelet based fluid-structure interaction model to accurately model the effects of unsteady aerodynamic loads in aeroelastic problems.

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