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Fluid-structure interaction of turbulent boundary layer over a compliant surface[1] SREEVATSA ANANTHARAMU, KRISHNAN MAHESH, University of Minnesota — Turbulent flows induce unsteady loads on surfaces in contact with them, which affect material stresses, surface vibrations and far-field acoustics. We are developing a numerical methodology to study the coupled interaction of a turbulent boundary layer with the underlying surface. The surface is modeled as a linear elastic solid, while the fluid follows the spatially filtered incompressible Navier-Stokes equations. An incompressible Large Eddy Simulation finite volume flow approach based on the algorithm of Mahesh et al. (*JCP 197.1 (2004): 215-240*) is used in the fluid domain. The discrete kinetic energy conserving property of the method ensures robustness at high Reynolds number. The linear elastic model in the solid domain is integrated in space using finite element method and in time using the Newmark time integration method. The fluid and solid domain solvers are coupled using both weak and strong coupling methods. Details of the algorithm, validation, and relevant results will be presented.

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