Abstract Submitted
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Inspecting the fluid-Structure Interaction of wall-mounted rectangular plates.[1] LAHCEN AKERKOUCH, Civil and Environmental Engineering Department, North Dakota State University, LEONARDO CHAMORRO, Mechanical Science and Engineering Department, University of Illinois, TRUNG LE, Civil and Environmental Engineering Department, North Dakota State University — Understanding the dynamics of wall-mounted flexible structures is instrumental for a variety of applications, including energy harvesting, structural design, control, and locomotion. Several non-linear processes are poorly understood. We performed Fluid-Structure Interaction (FSI) simulation of a thin plate attached to a flat wall exposed to a uniform inflow (Jin et al., Physics of Fluids,30, 2018) under various Reynolds and Cauchy numbers. The structure is modeled as Kirchhoff thin shell, and Large Eddy Simulation is used for turbulence modeling. The FSI coupling is performed with the immersed boundary method (Gilmanov, Le, Sotiropoulos, JCP 300, 1, 2015). Simulated flow fields and plate deformations show good agreement with the laboratory experiments; this is also the case of the spectral structure of the plate tip motions. Characterization of the flow in the vicinity of the plate revealed the strong linkage between the wake and vibrations of the plate tip.

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