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Computational Modeling and Analysis of Aeroelastic Wing Flutter[1] KARTHIK MENON, JOSEPH KATZ, RAJAT MITTAL, Johns Hopkins University — Aeroelastic flutter is ubiquitous in aeronautics; of particular relevance here is the flutter of aircraft wings, helicopter rotor blades, flexible wing MAVs and UAVs, and long-endurance aerial systems such as airships and solar powered air-vehicles. Here, we attempt to understand some fundamental aspects of this problem via immersed boundary method based numerical simulations of canonical bodies. We report findings on the effect of body geometry on the dynamics of flutter involving coupled pitch-heave oscillations. We also explore flow-induced flutter of airfoils in pre and post-stall configurations, including the effect of stiffness and pitch axis location. Finally, a novel force decomposition method is used to provide some insight into the flutter dynamics and associated unsteady flow physics.

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