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Fluid-Structure Simulations of a Flexible Heaving Airfoil
JONATHAN CAPPOLA, DAVID MACPHEE, The University of Alabama — Motivated by experimental studies in biomimetic propulsion, a computational framework is used to simulate the heaving of a two-dimensional NACA airfoil with chordwise flexibility. A strongly-coupled fluid-structure interaction solver is developed using finite-strain solid deformation and a translating reference frame within the OpenFOAM framework. Using this model, we investigate any possible performance improvements of a flexible airfoil over the rigid in varying oscillating frequency and material elastic modulus. Flow structures and stress configurations are analyzed and discussed as related to simulated thrust and lift enhancements.

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