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Hydrodynamics of efficient propulsion in oscillating foils AZAR ESLAM PANAH, JAMES BUCHHOLZ, The University of Iowa — The flow field and thrust performance of a pitching and heaving NACA 0012 airfoil at a chord Reynolds number of 30000 are investigated experimentally and numerically. In the experimental work, Digital Particle Image Velocimetry (DPIV) is used to examine the strength and dynamics of shed vorticity. The numerical work consists of Euler simulations using FLUENT in which leading edge separation is inhibited. Three kinematic cases from Anderson et al. (J. Fluid Mech, 360, 1998) are considered, two of which include propulsive efficiency peaks that fall in a Strouhal number range well below that predicted by the stability analysis of Triantafyllou et al. (1991, 1993). By considering the disparate experimental and numerical conditions as well as inviscid model results for these flows in the literature, we will discuss the role of vortex shedding on optimal propulsion.

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