

Abstract Submitted  
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**Flexible Flapping Foils**<sup>1</sup> CATHERINE MARAIS, RAMIRO GODOY-DIANA, JOSÉ EDUARDO WESFREID, PMMH UMR7636 CNRS; ESPCI ParisTech; UPMC; Université Paris Diderot — Hydrodynamic tunnel experiments with flexible flapping foils of 4:1 span-to-chord aspect ratio are used in the present work to study the effect of foil compliance in the dynamical features of a propulsive wake. The average thrust force produced by the foil is estimated from 2D PIV measurements and the regime transitions in the wake are characterized according to a flapping frequency-amplitude phase diagram as in Godoy-Diana et al. (Phys. Rev. E 77, 016308, 2008). We show that the thrust production regime occurs on a broader region of the parameter space for flexible foils, with propulsive forces up to 3 times greater than for the rigid case. We examine in detail the vortex generation at the trailing edge of the foils, and propose a mechanism to explain how foil deformation leads to an optimization of propulsion.

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