

Abstract Submitted
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Propulsive performance of a flapping foil in a hydrodynamic tunnel: direct force measurements¹ RAMIRO GODOY-DIANA, VERONICA RASPA², PMMH UMR7636 CNRS; ESPCI ParisTech; UPMC; U. Diderot Paris 7 — The study of simplified flapping wings has received much attention in the past two decades because of the renewed interest in biomimetic locomotion at intermediate Reynolds numbers ($10 - 10^4$). Recent works from our group have been devoted to the study of a pitching foil system in a hydrodynamic tunnel, exploiting particle image velocimetry first to characterize the transitions in the flow around the foil as a function of the flapping parameters (amplitude and frequency), and second to investigate the effect of flexibility. Here we report on our first results with an improved experimental setup where the pitching foil mechanism is mounted on a mechanical balance that allows us to have a time-resolved direct force measurement using an LVDT displacement sensor. We compare the performance of two different foils, one rigid and one flexible that have been previously characterized. We analyze the time-correlation of the thrust measurement with the instantaneous angular position of the foil, as well as the mean values of the force signals.

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