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Propulsive performance of a flapping foil in a hydrodynamic
tunnel: direct force measurements\textsuperscript{1} RAMIRO GODOY-DIANA, VERONICA
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— The study of simplified flapping wings has received much attention in the past
two decades because of the renewed interest in biomimetic locomotion at intermedi-
ate Reynolds numbers ($10^2$ – $10^4$). 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 inves-
tigate 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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