

Abstract Submitted
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Application of PIV-based pressure measurements to the study of aquatic propulsion KELSEY LUCAS, Harvard Univ, JOHN DABIRI, Stanford Univ, GEORGE LAUDER, Harvard Univ — Although it is relatively straightforward to image how fluid moves around a swimmer, translation of these motions to mechanisms that generate forces for propulsion is more difficult. This process is greatly facilitated by a recently developed technique for non-invasive pressure measurements that generate 2D pressure fields. Here, we explore how accurate a purely pressure-based calculation of propulsive forces can be. By comparing these calculations to forces and torques measured directly using a sensor on a robotic flapping foil system, we characterize the effects of motion frequency and out-of-plane flows on the calculation's accuracy. We then apply this calculation to study the dynamics of fish-like swimming of a foil model with non-uniform flexural stiffness, and to those of a freely swimming fish.

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