

Abstract Submitted
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Experimental comparison of steady and unsteady propulsion of a self-propelled swimmer LYDIA TREVINO, JOHN DABIRI, California Institute of Technology — Aquatic animals differ from typical engineering systems in their use of unsteady flows for transportation. Traditional definitions of propulsive efficiency have not taken these effects into account and are typically based on steady flow through propellers or rocket motors. The purpose of this study is to develop a metric for fluid dynamic efficiency which will allow for a quantitative comparison between biological and engineering propulsion systems. For this study, we designed a submarine that has the capability to produce either a steady or an unsteady jet for propulsion. Several methods for the evaluation of propulsive performance were implemented including propulsive efficiency and power output. The unsteady Froude efficiency, which uses an equivalent jet speed based on energy considerations, was also measured.

Lydia Trevino
California Institute of Technology

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