Abstract Submitted
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Energetics and Motion Planning for Hamiltonian Fishlike Locomotion[1] SCOTT KELLY, PARTHESH PUJARI, University of North Carolina at Charlotte — The self-propulsion of an undulating body suspended in a fluid hinges on the judicious excitation of the fluid itself, in that forward momentum is developed by the body as equal and opposite momentum is imparted to the fluid. The manner in which this is accomplished is recorded in the structure of the body's wake; the efficiency with which it's accomplished is reflected in the fluid's evolving kinetic energy. Focusing on a model for the self-propulsion of a free hydrofoil with variable camber in an infinite planar fluid, we examine relationships between economy of deformation, wake structure, and wake energetics. The model in question simplifies the underlying physics by restricting vortex shedding to the trailing point of the foil, discretizing shed vorticity, and neglecting dissipation — allowing the remaining dynamics to be framed in a Hamiltonian setting. We consider the self-propulsion of the foil both in a quiescent fluid and in a variety of vortex flows representing wake structures present in vehicle schools.

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