

Abstract Submitted
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On the hydrodynamics of body/caudal fin locomotion for Carangiform swimmers¹ FOTIS SOTIROPOULOS, IMAN BORAZJANI, University of Minnesota — A systematic numerical investigation of body/caudal fin (BCF) locomotion for a typical Carangiform swimmer - a Mackerel - has been carried out for three different Reynolds numbers- $Re = 300, 4000,$ and 8 (inviscid) and over a range of Strouhal numbers. Our results clearly show that swimming efficiency increases with Reynolds number, which explains why in nature BCF is the preferred mode of locomotion for fast swimmers. We also show that the friction drag is increased by the BCF undulations relative to the rigid body drag while the form drag can increase or decrease depending on the Strouhal number, thus, reconciling previous conflicting views reported in the literature. 3D visualizations of the coherent structures in the wake confirm and further clarify previously hypothesized wake models consisting of single and double row vortex loops.

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