

Abstract Submitted  
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**Intermittent Swimming with a Flexible Propulsor**<sup>1</sup> EMRE AKOZ, SAMANE ZEYGHAMI, KEITH MOORED, Lehigh University — Some animals propel themselves by using an intermittent swimming gait known as a burst-and-glide or a burst-and-coast motion. These swimmers tend to have a more pronounced pitching of their caudal fins than heaving leading to low non-dimensional heave-to-pitch ratios. Recent work has shown that when this ratio is sufficiently low the efficiency of an intermittently heaving/pitching airfoil can be significantly improved over a continuously oscillating airfoil. However, fish that swim with an intermittent gait, such as cod and saithe, do not have rigid fins, but instead have highly flexible fins. To examine the performance and flow structures of an intermittent swimmer with a flexible propulsor, a fast boundary element method solver strongly coupled with a torsional-spring structural model was developed. A self-propelled virtual body combined with a flexible-hinged pitching airfoil is used to model a free-swimming animal and its flexible caudal fin. The duty cycle of the active to the coasting phase of motion, the torsional spring flexibility and the forcing frequency are all varied. The cost-of-transport and the swimming speed are measured and connected to the observed wake patterns.

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