Abstract Submitted
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3D Kinematics and Hydrodynamic Analysis of Freely Swimming Cetacean[1] YAN REN, DUSTIN SHEINBERG, GENG LIU, HAIBO DONG, University of Virginia, FRANK FISH, West Chester University, JOVERIA JAVED, Robert E. Lee High School — It's widely thought that flexibility and the ability to control flexibility are crucial elements in determining the performance of animal swimming. However, there is a lack of quantification of both span-wise and chord-wise deformation of Cetacean's flukes and associated hydrodynamic performance during actively swimming. To fill this gap, we examined the motion and flexure of both dolphin fluke and orca fluke in steady swimming using a combined experimental and computational approach. It is found that the fluke surface morphing can effectively modulate the flow structures and influence the propulsive performance. Findings from this work are fundamental for understanding key kinematic features of effective Cetacean propulsors, and for quantifying the hydrodynamic force production that naturally occurs during different types of swimming.

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