

Abstract Submitted  
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**Lift and drag of cetacean flippers**<sup>1</sup> MARK MURRAY, U. S. Naval Academy, PAUL WEBER, LAURENS HOWLE, Duke University, FRANK FISH, West Chester University — Field observation and collection of biological samples has resulted in cetacean (whales, dolphins and porpoises) flipper geometry being known for most species. However, the hydrodynamic properties of cetacean flippers have not been rigorously tested and thus their performance characteristics are unknown. Here, conducting water tunnel testing using scale models of cetacean flippers derived via computed tomography (CT) scans, as well as computational fluid dynamic (CFD) simulations, we present a baseline work to determine the hydrodynamic characteristics of cetacean flippers. We found that flippers of similar planform shape had similar hydrodynamic performance characteristics. Furthermore, one group of flippers of planform shape similar to a modern swept wing was found to have lift coefficient versus angle of attack curves that were biphasic rather than linear in nature, which was caused by the onset of vortex-dominated lift. Drag coefficient versus angle of attack curves were found to be less dependant on planform shape.

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