Abstract Submitted
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Bubble PIV Measurements of Swimming Sea Lions[1] GINO M. PERROTTA, The George Washington University, FRANK E. FISH, West Chester University, MEGAN C. LEFTWICH, The George Washington University, DANIELLE S. ADAMS, West Chester University, JENIFER ZELIGS, STAFANI SKROVAN, SLEWTHS — California sea lions are among the most agile of swimming mammals. While most marine mammals swim with their hind appendages flippers or fluke, depending on the species sea lions use their foreflippers for propulsion and maneuvering. The sea lions's propulsive stroke generates thrust by forming a jet between the flippers and the body and by dragging a starting vortex along the suction side of the flipper. Prior experiments using robotic flippers have shown these mechanisms to be possible, but no flow measurements around live sea lions previously existed with which to compare. In this work, the flow structures around swimming sea lions are observed using an adaptation of Particle Imaging Velocimetry. To accommodate the animals, it was necessary to use bubbles as seed particles and sunlight as illumination. Three trained adult California sea lions were guided to swim through an approximately-planar sheet of bubbles for a total of 173 repetitions. The captured videos were used to calculate bubble velocities, which were processed to isolate and inspect the flow velocities caused by the swimming sea lion. The methodology will be discussed and measured flow velocities will be presented.

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