

Abstract Submitted
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Experimental measurement of dolphin thrust generated during a tail stand using DPIV TIMOTHY WEI, University of Nebraska - Lincoln, FRANK FISH, West Chester University, TERRIE WILLIAMS, University of California - Santa Cruz, VICKI WU, Boeing Corp, ERICA SHERMAN, MITCHEL MISFELDT, HUNTER RINGENBERG, DYLAN ROGERS, University of Nebraska - Lincoln — The thrust generated by dolphins doing tail stands was measured using DPIV. The technique entailed measuring vortex strength associated with the tail motion and correlating it to above water video sequences showing the amount of the dolphin's body that was being lifted out of the water. The underlying drivers for this research included: i) understanding the physiology, hydrodynamics and efficiency of dolphin locomotion, ii) developing non-invasive measurement techniques for studying marine swimming and iii) quantifying the actual propulsive capabilities of these animals. Two different bottlenose dolphins at the Long Marine Lab at UC-Santa Cruz were used as test subjects. Application of the Kutta-Joukowski Theorem on measured vortex circulations yielded thrust values that were well correlated with estimates of dolphin body weight being supported above water. This demonstrates that the tail motion can be interpreted as a flapping hydrofoil that can generate a sustained thrust roughly equal to the dolphin's weight. Videos of DPIV measurements overlaid with the dolphins will be presented along with thrust/weight data.

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