

Abstract Submitted
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DPIV measurements of dolphins performing tailstands YAE EUN MOON, ERICA SHERMAN, RPI, FRANK FISH, West Chester Univ., TERRIE WILLIAMS, UC-Santa Cruz, TIMOTHY WEI, RPI — In the past few years, we have adapted DPIV to permit measurements of flow around swimming mammals (human and dolphin). In this study, we apply this technique to measure flow associated with a dolphin performing a tail stand; the behavior in which the dolphin lifts and holds itself vertically out of the water by rapid and strong oscillations of its tail. The objective of this work was i) to validate the ability to compute thrust production from vortices generated by the tail motions and ii) to develop a quantitative measure of the thrust production capability of a dolphin. Data from numerous tail stands taken from two different Atlantic bottlenose dolphins will be presented. Independent thrust comparisons are developed by monitoring how much of the dolphins' bodies were held above the water during the tailstand behavior. The presentation includes both movies showing flow velocity overlaid on the original dolphin videos as well as plots of thrust as a function of percent body weight lifted from the water. The data clearly demonstrate that dolphins produce thrust on the order of their body weight, far more than necessary to overcome turbulent boundary layer drag.

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