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**DPIV Measurements on Dolphins: Examining Gray's Paradox**
PAUL LEGAC, Rensselaer Polytechnic Institute, FRANK FISH, West Chester University, TERRIE WILLIAMS, University of California-Santa Cruz, TIMOTHY WEI, Rensselaer Polytechnic Institute — In 1936 James Gray attempted to evaluate the strength of a dolphin by calculating the drag a dolphin must overcome while swimming and comparing that to the theoretical amount of thrust the dolphin can produce using its musculature. According to Gray, the muscles of a dolphin are not powerful enough to overcome the drag produced; this is now known as 'Gray's Paradox'. To solve the problem, Gray surmised that the flow over the dolphin would need to stay laminar in order to reduce the drag. To examine 'Gray's Paradox', DPIV has been modified to be used on a dolphin swimming in a tank of stationary water. Experiments of dolphins performing various swimming behaviors were performed at the Long Marine Laboratory, University of California, Santa Cruz. Vortices generated by the dolphins' tail motions were used to estimate thrust production. Data from two dolphins and multiple runs will be presented.

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