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**Wake Survey of a Marine Current Turbine Under Steady Conditions** ETHAN LUST, LUKSA LUZNIK, KAREN FLACK, US Naval Academy — A submersible particle image velocimetry (PIV) system was used to study the wake of a horizontal axis marine current turbine. The turbine was tested in a large tow tank facility at the United States Naval Academy. The turbine is a 1/25th scale model of the U.S. National Renewable Energy Laboratory's Reference Model 1 (RM1) tidal turbine. It is a two-bladed turbine measuring 0.8 m in diameter and featuring a NACA 63-618 airfoil cross section. Separate wind tunnel testing has shown the foil section used on the turbine to be Reynolds number independent with respect to lift at the experimental parameters of tow carriage speed ( $U_{\text{tow}} = 1.68$  m/s) and tip speed ratio ( $\text{TSR} = 7$ ). The wake survey was conducted over an area extending  $0.25D$  forward of the turbine tip path to  $2.0D$  aft, and to a depth of  $1.0D$  beneath the turbine output shaft in the streamwise plane. Each field of view was approximately 30 cm by 30 cm, and each overlapped the adjacent fields of view by 5 cm. The entire flow field was then reconstructed into a single field of investigation. Results include streamwise and vertical ensemble average velocity fields averaged over approximately 1,000 realizations, as well as higher-order statistics. Turbine tip vortex centers were identified and plotted showing increasing aperiodicity with wake age. keywords: horizontal axis marine current turbine, particle image velocimetry, towing tank, wake survey

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