

Abstract Submitted
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Experimental Measurements of a Cylindrical Turbulent Boundary Layer in a Submarine Wake DEBORAH FUREY, THOMAS FORLINI, NAVSEA Carderock, DAMIEN BRETALL, UMD, KIMBERLY CIPOLLA, NAVSEA Newport — High resolution stereo-PIV measurements were made on a long, small diameter cylinder towed from the control surface of a 1/18th scale submarine model. The experiments were performed in the Deep Water Tow Basin at NSWCCD at 5 kts. An instrumented mounting stock for the horizontal control surface measured the differential load due to cylinder drag force. Three-dimensional velocity fields over ten body lengths downstream were obtained. The cylinders were approximately neutrally buoyant and towed through a stationary laser sheet oriented perpendicular to the tow direction. The objective of the study was to quantify the effect of the flow behind the submarine control surfaces and propeller on the boundary layer development and dynamics of a model towed array where $\delta \gg$ the cylinder radius, a . Results with and without a propeller will be presented. Approximately 40 instantaneous vector fields were obtained for each location. Mean and fluctuating streamwise and cross-stream velocities and vorticity were computed. Initial results indicate that the wake has significant effects on the dynamics and hydrodynamics of the cylinder.

Kimberly Cipolla
NAVSEA Newport

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