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Velocity Measurements of a Cylindrical Turbulent Boundary Layer in a Submarine Wake DEBORAH FUREY, PAISAN ATSAVAPRANEE, NSWCCD, KIMBERLY CIPOLLA, NUWC, DAMIEN BRETALL, UMD — High resolution stereo-PIV measurements were made on a long, small diameter cylinder towed from the control surface of a $1/18^{th}$ scale submarine model. The experiments were performed in the tow tank at NSWCCD at 5 kts. 3-D 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 $\delta >>$ the cylinder radius, a. Analysis required stepwise tracking of the array through the dissipating wake field and isolation of the contribution from the cylindrical boundary layer. Approximately 40 instantaneous vector fields were obtained for each location. Mean and fluctuating streamwise and cross-stream velocities will be presented. Initial results indicate that the contribution of the wake to the total flow field and its effect on the boundary layer development varies in the streamwise direction.

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