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Analysis of Array Motion in the Wake of a Submarine Model DAMIEN BRETALL, UMD, DEBORAH FUREY, PAISAN ATSAVAPRANEE, NSWCCD, KIMBERLY CIPOLLA, NUWC — 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 Deep Water Tow Basin at NSWCCD at 5 kts. 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 $\delta >>$ the cylinder radius, a. Algorithms were developed to track the array motion through the field of view. This data is used to collocate subsequent images in order to average boundary layer velocity data along the array. Approximately 40 instantaneous vector fields were obtained for each location. The motion of the array is influenced by the wake of the submarine however a turbulent boundary layer still develops.

Deborah Furey
NSWCCD

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