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Analysis of Velocity Measurements on a Towed, Flexible Cylinder[1] BRIAN AMARAL, URI, KIMBERLY CIPOLLA, NAVSEA Newport — High resolution stereo-PIV measurements were made on a long, flexible cylinder towed in the David Taylor Model Basin. The experiments were performed from 12 to 30 kts to generate Reynolds numbers based on momentum thickness greater than one million. The cylinders (130 m long, 38 mm diameter) were approximately neutrally buoyant and towed through a stationary laser sheet oriented perpendicular to the tow direction to obtain 3D velocity fields. The objective of the study was to quantify the mean and fluctuating velocity fields in the turbulent boundary layer on an experimental towed array (flexible cylinder) where boundary layer thickness is much greater than the cylinder radius. Algorithms for image pre-processing and filtering were applied to enhance the instantaneous images and mask the cylinder and its shadow as they move in the 80 cm x 85 cm field of view. Relevant boundary layer parameters were determined as a function of streamwise position and Reynolds number. Initial results indicate that the velocity defect law provides the best collapse of the data in the outer region of the boundary layer, while the log law relation is effective very close to the surface of the cylinder.

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