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Measurements in the near-wake of a turbulent wing-body junction[1] J. KLEWICKI, J.H. LEE, S. ZIMMERMAN, J. MONTY, University of Melbourne — Turbulent wing-body junction flows arise from the interaction between a turbulent boundary layer and a surface mounted streamlined obstacle, and are frequently encountered in aerodynamic and hydrodynamic applications. This study uses two-dimensional, three component stereo PIV measurements to investigate the statistical and instantaneous properties of a wing-body near-wake at moderate Reynolds number. The measurements were acquired in an open-return boundary layer wind tunnel at the University of Melbourne. The approach zero pressure gradient boundary layer at $R_\theta = 10,000$ interacts with a Rood wing composed of a 3:2 elliptical leading edge joined to a NACA 0020 profile, with a chord length C =168mm, maximum thickness T =40mm, and height H = 80mm. The freestream velocity was about 20 m/s. Three component velocity measurements were collected at five different streamwise locations ranging from 0.075C to 1C downstream of the trailing edge of the airfoil, whose angle-of-attack was also varied from -15 to +15 degrees in increments of 5 degrees. Results focus on the three dimensional structure of the near-wake flow and the influence of the necklace vortices that form in front of the body and pass through the wake. Variations with angle of attack are described.

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