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Vorticity Measurements in the Wake of an Inclined Prolate Spheroid KURT KELLER, ALAN BRANT, KEN KALUMUCK, JHU/APL, CHARLES SCHEMM, STEVE SCORPIO — The generation and evolution of axial vorticity in the wake of an inclined 6:1 prolate spheroid is studied experimentally, with comparison to Computational Fluid Dynamics (CFD) results. 2D Particle Image Velocimetry (PIV) measurements were obtained in planes normal to the flow at several stations along the body and at downstream distances up to one body length, at angles of attack of 5, 10, and 20 degrees and body Reynolds numbers (Re_L=UL/ν) of {13.7, 27.3, 45.6} x 10^4. As an extension of previous numerical and experimental studies on the vortex roll-up on the body of a 6:1 Prolate Spheroid [for example, Fu *et al* (1994), Tsai and Whitney (1999)], this study is focused on characterizing the downstream vorticity distribution as a function of the angle of attack and body Reynolds number. Long time average measurements of the circulation, core size, and core location are presented as a function of the angle of attack and the free stream velocity. In addition, measurements of turbulence characteristics of the wake are presented. Vortex migration velocities are found to be less than those estimated from inviscid vortex dipole theory. Experimental results for the 10-degree case are compared. Reynolds Average Navier-Stokes (RANS) CFD calculations show significant differences in the vorticity distribution near the stern, but with good agreement at one body length downstream.

Kurt Keller
JHU/APL

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