Abstract Submitted
for the DFD05 Meeting of
The American Physical Society

PIV Measurements in the Wake of a Magnetically Supported Axisymmetric Bluff-Body HIROSHI HIGUCHI, Syracuse University, HIDEO SAWADA, HIROYUKI KATO, Japan Aerospace Exploration Agency — Flow over a short cylinder suspended in the axial free stream was studied using a PIV system. Two length-to-diameter (fineness) ratios, 1.31 and 1.68, were selected. Between these fineness ratios, the drag coefficient reaches the minimum as the separated shear layer from the leading edge starts to reattach near the trailing edge. (Higuchi et al 2005.) The cylinder model was supported magnetically in the wind tunnel free stream at ReD=100,000. Performance of the optical sensors used to monitor and control the position of the model was not affected by the PIV laser sheet. Free of any physical support protruding into the flow, an excellent flow axisymmetry was achieved both in the mean velocity and turbulence profiles, while instantaneous flowfield was fully three-dimensional. Unsteady longitudinal large-scale vortical structures travel across the entire wake but were on the average organized axisymmetrically to exhibit maximum (for fineness ratio 1.31) or minimum (for fineness ratio 1.68) turbulence energy at the center of the immediate wake, which depended on the shear layer reattachment. Leading edge shear layer vortices and downstream helical vortex structure were also observed. The base pressure was recorded via telemetry (Sawada et al, 2005) and its results will be also discussed with the measured flowfield and drag coefficient.

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Date submitted: 05 Aug 2005 Electronic form version 1.4