

Abstract Submitted
for the DFD06 Meeting of
The American Physical Society

Vortical Structure in the Near Wake of a Bluff Body and its Relationship to Base Pressure VIBHAV DURGESH, JONATHAN NAUGHTON, University of Wyoming — The pressure on the base of a bluff body is known to be directly linked to the dynamic behavior of the vortical structures in the wake of the body. Recently, experimental results have shown that modifying the boundary layer state at the separation can have a large effect on the base pressures observed. To quantify the changes in the wake that correspond to changes in the separating boundary layer, two-dimensional PIV has been used to measure the velocity field in the near wake. Proper Orthogonal Decomposition (POD) is applied to identify changes in the vortical structure shed by the bluff body. The results indicate that, in some cases, the thickening of the separating boundary layer increases the base pressure with a notable change in the vortex structures shed. In other cases, thickening of the boundary layer produced little or no change to the base pressure. Although all cases investigated showed a dominance of the first two spatial POD modes, the cases with thicker separating boundary layers exhibit a much higher fraction of fluctuating energy in the first two modes.

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Date submitted: 06 Aug 2006

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