Abstract Submitted
for the DFD12 Meeting of
The American Physical Society

Synthetic Jet Control of a Yawing Axisymmetric Body[1] THOMAS LAMBERT, BOJAN VUKASINOVIC, ARI GLEZER, Georgia Institute of Technology — The global aerodynamic forces and moments on an axisymmetric yawing body are controlled in wind tunnel experiments by exploiting the interaction of an array of synthetic jet actuators with the cross flow over the tail section of the body. The model is supported by a vertical wire through its aerodynamic center and is free to move in yaw. The baseline motion of the model is a yaw oscillation with amplitude and frequency that both monotonously increase with free stream velocity, characteristic of vortex shedding. The aft-facing control jet actuators emanate from narrow, azimuthally segmented slots around the perimeter of the tail section, and activation of the control jets effects the model's path through localized flow attachment on integrated Coanda surfaces. The control jets are used to control the yaw trajectory of the model using a closed loop PID controller. The baseline and controlled model motion is monitored using a laser vibrometer, and the flow evolution near the body and in its near wake is investigated using PIV. The coupled, time dependent response of the model to the actuation is investigated with emphasis on controlling its unstable modes.

[1]Supported by ARO

Thomas Lambert
Georgia Institute of Technology

Date submitted: 03 Aug 2012 Electronic form version 1.4