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Thrust Vectoring Flow Control Using Plasma Actuators JAMEY JACOB, MICHAEL BOLITHO, Oklahoma State University — Thrust vectoring flow control is demonstrated using plasma synthetic jet actuators (PSJA). The PSJA is a geometric variant of a plasma actuator, consisting of a symmetric electrode array that results in a circular region of dielectric barrier discharge plasma. Quiescent flow PIV measurements of the PSJA reveal that the flowfield on actuation resembles that of a zero-mass flux or synthetic jet that is useful for flow control, particularly separation reduction. Like synthetic jets, unsteady pulsed actuator operation results in formation of multiple vortex rings. The output jet momentum is found to be affected by the power input, actuator dimension and pulsing frequency. While increasing the input power increases the maximum jet velocity, an optimum range of pulsing frequencies and actuator dimensions are observed to exist in order to maximize jet momentum. By asymmetrically varying the plasma input parameters, such as frequency, amplitude and duty cycle, it is possible to control the jet angle. Vectoring using high frequency pusling akin to synthetic jets is more effective than vectoring by modifying steady control inputs and differences in control effectiveness are due primarily to the time scales associated with the vortex formation.

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