

Abstract Submitted
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Investigation of pulsed plasma jet for supersonic flow control¹
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University of Texas at Austin — A high-frequency (≈ 5 kHz) and high velocity-
amplitude (250 – 300 m/s) pulsed plasma jet actuator is currently undergoing de-
velopment in our laboratory for application in supersonic flow control. The actuator
is composed of an array of three jets that are pitched and skewed to form three
pulsed streamwise vortices at high-bandwidth. The actuator has been used to con-
trol the separation shock motion in a Mach 3 compression-ramp shock / boundary
layer interaction. Planar laser scattering visualization of a seeded CO₂ fog was per-
formed in planes parallel to the wall 0.012954 to study the disturbance caused by
the actuator. Imaging was performed at distances of 0.25δ , 0.5δ g and 0.9δ g
above the wall, where δ is the boundary layer thickness. It was found that individ-
ual pulsed plasmajet causes considerable heating of the surrounding fluid, which is
seen till a distance of 15 jet diameters downstream of the actuator and 0.5δ from the
wall. The disturbance is convected at a velocity which is very close to the local ve-
locity of the unforced boundary layer. Particle image velocimetry will be performed
in order to obtain quantitative information of the flowfield around the disturbance
with attention to the magnitude of the longitudinal vorticity that is generated by
the pulsed plasma jet.

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