

Abstract Submitted
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Instability of jet plume from an overexpanded nozzle DIMITRI PAPAMOSCHOU, PAUL ROSSETTI, University of California, Irvine — Our study involves the phenomenon of supersonic nozzle flow separation wherein a shock forms inside a convergent-divergent nozzle. Of particular interest is the instability of the jet plume exiting this type of nozzle. A rectangular apparatus of aspect ratio 3.57 and flexible walls enabled a parametric study of the mean and turbulent properties of the jet plume versus nozzle pressure ratio (from 1.2 to 2.0), exit-to-throat area ratio (from 1.0 to 1.8) and wall divergence angle at the nozzle exit (from 0 to 4 deg.) Time-resolved surveys of total pressure were obtained by means of a dynamic Pitot probe. The growth rate of the jet and the peak rms value of total pressure fluctuation near the nozzle exit increase several fold with area ratio. This trend becomes most pronounced for nozzle pressure ratio around 1.6. At fixed area ratio and nozzle pressure ratio, the wall divergence angle has little effect on the instability.

Dimitri Papamoschou
University of California, Irvine

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