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Shear Layer Instabilities in Low Density Transverse Jets[1] DANIEL GETSINGER, KEVIN CANZONIERI, CORY HENDRICKSON, OWEN SMITH, ANN KARAGOZIAN, UCLA Department of Mechanical and Aerospace Engineering — Shear layer instabilities associated with the gaseous, isodensity jet in crossflow have been explored in detail in recent experiments[2], indicating that the jet shear layer is globally unstable when the jet-to-crossflow velocity ratio, R, is less than 3.2 for a flush injected jet. Low density jets in quiescent surroundings are also known to become globally unstable for jet-to-ambient density ratios below approximately 0.6-0.7. It is thus of interest to explore the nature of changes in the character of shear layer instabilities for the low density jet in crossflow, with special focus on the influence of jet-to-crossflow momentum flux ratios at which instabilities are altered. A specially designed mixing device is utilized for exploration of helium and nitrogen jet mixtures. Calibration of the mixing device is accomplished using an acoustic waveguide capable of exploring alterations of standing wave frequencies with different gas mixtures. A range of flow conditions are explored, and alterations in the jet's spectral character suggesting transition to absolute instability are quantified.

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[2]Megerian, et al., **JFM**, 593, pp. 93-129, 2007

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