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Open Loop Control of Self-Excited Transverse Jets[1] JULIETT DAVITIAN, CORY HENDRICKSON, DANIEL GETSINGER, ROBERT M'CLOSKEY, ANN KARAGOZIAN, UCLA — Recent experiments have explored the response of a gaseous, isodensity jet in crossflow to controlled acoustic forcing. Focusing on jet-to-crossflow velocity ratios R below 3.5, for which prior experiments [2] suggest that the upstream shear layer is globally unstable, alternative jet forcing amplitudes and temporal waveforms are explored. Very strong sinusoidal jet forcing at a frequency different from that of the global instability is observed to replace the self-excited mode, consistent with similar open loop forcing results for the globally unstable, low density jet in quiescent surroundings [3]. Yet in many cases for the forced, globally unstable transverse jet, sinusoidal excitation is not observed to have as great an effect on jet penetration and spread as does square wave forcing with the same $U'_{j,rms}$; such forcing can introduce a characteristic time scale associated with optimal vorticity generation. When the upstream jet shear layer is convectively unstable, on the other hand, for values of R above 3.5, strong and moderate sinusoidal excitation can produce the same level of jet spread and penetration as does square wave forcing.

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[2]Megerian, et al., **JFM**, 593, pp. 93-129, 2007
[3]Hallberg & Strykowski, **Phys. Fluids**, 20, 041703, 2008

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