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**Active Control of High Speed and High Reynolds Number Jets via Plasma Actuators*** JIN-HWA KIM, YURII UTKIN, IGOR ADAMOVICH, MO SAMIMY, The Ohio State University, GAS DYANMICS AND TURBULENCE LAB TEAM — Localized arc filament plasma actuators developed at OSU are uniquely suited to force high speed and high Reynolds number jets and shear flows. The actuators have high bandwidth ranging from 0 to 200 kHz and high amplitude with prescribed duty cycle and phase. Eight of these actuators were distributed around the perimeter of an axisymmetric nozzle of 2.54 cm diameter and were used to force ideally expanded Mach 1.3 jet with a Reynolds number of about $1x10^6$. Axisymmetirc, helical (with m=1,2, and 4), flapping, and m = $\pm 2$ modes were used. The streamwise flow images showed that the jet column mode was forced most effectively around $St_D = 0.33$, which is in line with what other researchers have found. At this Strouhal number, robust and periodic structures were generated. The effects of forcing amplitude were very limited. However, the effectiveness of forcing was strongly affected by forcing frequency and duty cycle. For all the modes of actuation, the optimum duty cycle was 5-15%. Pitot pressure measurements along the jet centerline showed significantly reduced potential core for some forced cases, especially for the forcing frequency around $St_D = 0.33$. From streamwise images and the centerline pitot data, it appeared that helical and flapping modes are best for mixing enhancement. *Supported by NASA Glenn Research Center and OCAPP.

Jin-Hwa Kim
The Ohio State University

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