

Abstract Submitted
for the DFD09 Meeting of
The American Physical Society

Noise reduction in a heated Mach 1.3 jet using plasma actuators¹

MARTIN KEARNEY-FISCHER, MO SAMIMY, Ohio State University — Heating capabilities have recently been added to the free jet facility at the Gas Dynamics and Turbulence Laboratory (GDTL) of the Ohio State University using a storage-based off-line electric heater. This addition makes it possible to test the effectiveness of the localized arc filament plasma actuators (LAFPAs) for the purpose of either noise mitigation or mixing enhancement over a wide range of temperatures. These actuators have been used successfully at GDTL in high Reynolds number, high-speed unheated jets. The facility consists of an axisymmetric jet of exit diameter 2.54 cm with different nozzle blocks and variable jet temperature in an anechoic chamber. Previous work with a Mach 0.9 jet has shown significant increases in noise reduction effectiveness with increasing temperature. The next step is to determine if and how this trend continues in supersonic heated jets. A number of combinations of forcing azimuthal mode and temperature ratio at a wide range of forcing frequencies are experimented in a perfectly-expanded Mach 1.3 axisymmetric jet to examine LAFPAs effectiveness for far-field noise mitigation. The preliminary results to be presented indicate that the trends observed in the previous work continue in this supersonic jet.

¹Supported by NASA.

Mo Samimy
Ohio State University

Date submitted: 04 Aug 2009

Electronic form version 1.4