Abstract Submitted
for the DFD17 Meeting of
The American Physical Society

Low Dimensional Study of a Supersonic Multi-Stream Jet Flow[1]

ANDREW TENNEY, MATTHEW BERRY, HALLEY AYCOCK-RIZZO, MARK GLAUSER, JACQUES LEWALLE, Syracuse University — In this study, the near field of a two stream supersonic jet flow is examined using low dimensional tools. The flow issues from a multi-stream nozzle as described in *A near-field investigation of a supersonic, multi-stream jet: locating turbulence mechanisms through velocity and density measurements* by Magstadt at el., with the bulk flow Mach number, M_1, being 1.6, and the second stream Mach number, M_2, reaching the sonic condition. The flow field is visualized using Particle Image Velocimetry (PIV), with frames captured at a rate of 4Hz. Time-resolved pressure measurements are made just aft of the nozzle exit, as well as in the far-field, 86.6 nozzle hydraulic diameters away from the exit plane. The methodologies used in the analysis of this flow include Proper Orthogonal Decomposition (POD), and the continuous wavelet transform. The results from this "no deck" case are then compared to those found in the study conducted by Berry et al. From this comparison, we draw conclusions about the effects of the presence of an aft deck on the low dimensional flow description, and near field spectral content.

[1]Supported by AFOSR grant FA9550-15-1-0435, and AFRL, through an SBIR grant with Spectral Energies, LLC.

Andrew Tenney
Syracuse University

Date submitted: 01 Aug 2017 Electronic form version 1.4