Abstract Submitted
for the DFD12 Meeting of
The American Physical Society

Active Control of Jet Noise Using Observable Inferred Decomposition and Large Window PIV ZACHARY BERGER, MATTHEW BERRY, KERWIN LOW, Syracuse University, LAURENT CORDIER, BERND NOACK, University of Poitiers, SIVARAM GOGINENI, Spectral Energies, LLC., MARK GLAUSER, Syracuse University — In this investigation, we seek to find sources of noise created in the near-region of a highly subsonic jet, with a nozzle diameter of 2". Using large window PIV alongside simultaneous hydrodynamic and acoustic pressure, we focus on observing flow structures created in the collapse of the potential core. Correlations can be made between the low-dimensional velocity field (using POD) and the far-field acoustics in an effort to identify loud modes in the flow. An advanced reduced order model known as Observable Inferred Decomposition (OID) is used to form closed-loop controllers for noise reduction in the far-field. With this technique, we find low-dimensional representations of near-field velocity and far-field pressure – finding a linear mapping between the two fields. Then, we obtain acoustically optimized modes in the flow field and seek to drive these modes to zero using active control strategies. For flow control, synthetic jet actuators are used as shear layer excitation. A large range of tests are explored, varying Mach number and flow control configurations. Finally, large PIV windows will allow us to investigate several diameters of the flow field in the streamwise plane.

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Date submitted: 03 Aug 2012 Electronic form version 1.4