Abstract Submitted
for the DFD08 Meeting of
The American Physical Society

Application of closed-loop control techniques in an axisymmetric jet at Mach 0.6 KERWIN LOW, A.M. HALL, R.D. WALLACE, M.Y. ANDINO, M.N. GLAUSER, Syracuse University — One of the more challenging and far-reaching aspects of fluid dynamics remains the prediction and ultimate control of highly turbulent, non-linear, flow physics. As is pertains to acoustic-noise, the challenge arises in pinpointing the mechanisms within these high-speed flows which are the most efficient propagators of highly intense acoustic pressure fluctuations that translate to the far-field as broadband noise. For the experiment, a simple pressure based proportional closed-loop feedback controller was implemented to manipulate the shear layer of the jet flow. Previous work by Hall *et al.* demonstrated that the modal characteristics of the near-field pressure, sampled within the noise producing region ($x/D = 6 - 10$), were uniquely correlated with the far-field acoustics. The helical azimuthal mode (*mode-1*) diminished the strength of the correlated signature. The pressure is Fourier transformed and the azimuthal mode-1 signature is fed back, using a simple proportional closed-loop feedback controller. This experimental setup makes it possible to manipulate the shear layer of the flow field with a forcing pattern of azimuthal mode-1, as well as directly utilizing the amplitude and frequency characteristics of mode-1 perturbations from the sampled pressure field.

Kerwin Low
Syracuse University

Date submitted: 06 Aug 2008 Electronic form version 1.4