Abstract Submitted
for the DFD14 Meeting of
The American Physical Society

Properties and Localizations of Acoustic Sources in High Speed Jet[1] PINQING KAN, JACQUES LEWALLE, ZACHARY BERGER, MATTHEW BERRY, MARK GLAUSER, Syracuse Univ, SYRACUSE UNIVERSITY TEAM — Jet noise has become one major concern for aircraft engine design in recent decades. The problem is to identify the near-field (NF) structures that produce far-field (FF) noise and develop noise control and reduction strategies. We developed an algorithm to identify the events that are responsible for NF and FF cross-correlations. Two sets of experimental data from Mach 0.6 jets are analyzed. They consist of 10kHz TRPIV measurement and pressure sampling in both near- and far-field. Several NF diagnostics (velocity, vorticity, Q criterion, etc.) are calculated to represent the 2D velocity fields. The main contributors between these NF diagnostics and FF pressure are extracted as Diagnostic-Microphone (DM) events. The NF localization of DM event clusters will be compared to the NF triangulation of MM events, which were acquired using FF signals alone. In the time-frequency domain, the events are short wave packets, distorted by ambient perturbations. As a result, the matching of DM to MM events at physical lags is particularly difficult. We will report on different algorithms using time, frequency and space information to improve the reliability of the matches. We will also relate the event localization to the NF flow fields that correspond to FF "loud" POD modes (Low et al. 2013 and Berger et al. 2014).

[1]This work is supported by Spectra Energies LLC, Syracuse University MAE Department and the Glauser group at Syracuse University.

Pinqing Kan
Syracuse Univ

Date submitted: 01 Aug 2014 Electronic form version 1.4