Abstract Submitted
for the DFD17 Meeting of
The American Physical Society

Acoustic Wavepacket-Based Analysis of subsonic and supersonic jet noise radiation S UNNIKRISHNAN, DATTA GAITONDE, Ohio State Univ - Columbus — Wavepacket models for jet noise are based on spatio-temporally coherent features in jet cores. The irrotational-isentropic (or acoustic) component of momentum fluctuation encapsulates several crucial features required for such models. It manifests as a wavepacket containing the signatures of key acoustic phenomena such as intermittency. The acoustic modes of a Mach 0.9 and a 1.3 jet are extracted from Large-Eddy Simulations, and for both, it is shown that the radiative supersonic spectra correctly represent the noise generating content. While the pressure field in the supersonic jet has similar features as the acoustic mode, that in the subsonic jet contains an energetically dominant, but non-radiating subsonic peak, which masks the radiating component. These observations are bridged by examining the solenoidal component of momentum fluctuations of each jet. An examination of energy-based spectral modes of pressure and acoustic fields, reveals that the leading modes of the latter are a better representation of the radiated nearfield, and follow a simple homogeneous wave propagator model even from as close as 1.5 diameters from the jet axes.

Unnikrishnan Sasidharan Nair
Ohio State Univ - Columbus

Date submitted: 31 Jul 2017 Electronic form version 1.4