Abstract Submitted
for the DFD07 Meeting of
The American Physical Society

Linear Stability Analysis of Chevron Jet Profiles[1] KRISTJAN GUDMUNDSSON, TIM COLONIUS, California Institute of Technology — We investigate the linear stability characteristics of mean flows produced by round, and serrated (chevron) nozzles. We derive a generalized Rayleigh equation for mean-flows composed of an arbitrary number of azimuthal harmonics, allowing fast solution of the chevron stability problem via a shooting method applied to a system of ODEs.Using time-averaged turbulent mean-flows from PIV and RANS data, we compute the stability characteristics of various chevron/round nozzles. We find there are two main differences between the chevron and round jet: chevron jet growth rates are suppressed and peak growth rates shifted to lower frequencies while phase speeds are somewhat increased. We compare our instability wave results to microphone array measurements. Our results indicate that the hydrodynamic pressure field of both round, and chevron jets is consistent with that of the instability modes of the turbulent, spreading mean flow.

[1]Work supported by the AeroAcoustics Research Consortium (AARC).

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Date submitted: 03 Aug 2007 Electronic form version 1.4