Abstract Submitted
for the DFD07 Meeting of
The American Physical Society

**Entropy generated noise : a comparison between compressible simulations and Golstein's acoustic analogy**[1] ALEXIS GIAUQUE, ANNE LAURE BIRBAUD, HEINZ PITSCH, Center for Turbulence Research, Stanford University — Combustion noise is one of the main noise sources of aircraft auxiliary power unit gas turbine engines, and with the better understanding of jet and fan noise, combustion generated noise is also becoming increasingly important for the the main aircraft engines. Combustion generated noise comes from two major sources: direct noise, produced by the unsteady heat release, and indirect noise, produced by entropy fluctuations passing through pressure gradients in the turbine. Two approaches are considered to investigate the fundamental aspects of indirect noise. For the first, high order fully compressible simulations of a modulated entropy wave passing through a converging diverging nozzle are performed. The second approach uses a flow solver based on Goldstein's analogy in order to propagate the acoustic and entropy waves using the perturbed velocity, pressure, and entropy components coming from low Mach number or fully compressible calculations. The capability of these two methods to predict the acoustics produced by the modulated entropy wave are finally discussed. Numerical results are compared to the experiment performed by Bake et al. (GT2005-69029, ASME Turbo Expo 2005).

[1]supported by NASA - Subsonic Fixed-Wing project

Anne Laure Birbaud
Center for Turbulence Research, Stanford university

Date submitted: 08 Aug 2007 Electronic form version 1.4