Abstract Submitted
for the DFD06 Meeting of
The American Physical Society

Numerical Prediction of Combustion-induced Noise using a hybrid LES/CAA approach MATTHIAS IHME, HEINZ PITSCH, Department of Mechanical Engineering, Stanford University, MANFRED KALTENBACHER, Department of Sensor Technology, Friedrich-Alexander University Erlangen-Nuremberg — Noise generation in technical devices is an increasingly important problem. Jet engines in particular produce sound levels that not only are a nuisance but may also impair hearing. The noise emitted by such engines is generated by different sources such as jet exhaust, fans or turbines, and combustion. Whereas the former acoustic mechanisms are reasonably well understood, combustion-generated noise is not. A methodology for the prediction of combustion-generated noise is developed. In this hybrid approach unsteady acoustic source terms are obtained from an LES and the propagation of pressure perturbations are obtained using acoustic analogies. Lighthill's acoustic analogy and a non-linear wave equation, accounting for variable speed of sound, have been employed. Both models are applied to an open diffusion flame. The effects on the far field pressure and directivity due to the variation of speed of sound are analyzed. Results for the sound pressure level will be compared with experimental data.

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Date submitted: 04 Aug 2006 Electronic form version 1.4