Abstract Submitted
for the DFD16 Meeting of
The American Physical Society

The effect of mean flow swirl on the transfer function of an M-flame CALUM SKENE, PETER SCHMID, Imperial College London — Direct numerical simulations of the compressible, reactive Navier-Stokes equations are used to probe the influence of mean flow swirl on the frequency response of an axisymmetric M-flame. Using linearized governing equations, coupled with its adjoint analogue, the optimal gain with respect to harmonic forcing is computed using an iterative direct-adjoint looping technique. The discrete adjoint equations are determined by modular automatic differentiation of the linearized code. The direct and adjoint information are further used to provide sensitivity information with respect to the forcing frequency, as well as to changes in the governing parameters (swirl number, Reynolds number, etc.). Special emphasis will be put on the influence of mean flow swirl on amplification and frequency shifts in the flame transfer function (FTF).

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Date submitted: 01 Aug 2016 Electronic form version 1.4