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Acoustic response of heated jets to nozzle-upstream perturbations[1] MATTHIAS IHME, YEE CHEE SEE, GHOBAD AMINI, University of Michigan — Effects of nozzle-upstream entropy perturbations on the acoustic radiation from heated jets are investigated. For this, a model problem is considered, in which a gas-turbine combustor discharges reaction products through a converging nozzle into the ambient environment. The turbulent reacting flow field in the combustor is computed using large-eddy simulation, and the unsteady flow-field at the combustor exit is extracted to provide realistic inflow conditions to the jet-flow simulation. To study the indirect coupling process, arising from the interaction of the combustion-generated entropy fluctuations with the adverse pressure gradient through the nozzle, a linearized Euler formulation is employed. Parametric studies are performed to investigate effects of frequency and amplitude of the nozzle-upstream entropy perturbations on the jet instability and the jet noise directivity. It is shown that the excitation near the preferred shear-layer instability leads to strong acoustic radiation in the jet-forward direction, and the radiation angle decreases with decreasing excitation frequency.

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Matthias Ihme
University of Michigan

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