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An Adjoint Approach for Determining Sensitivity of Combustion Simulations to Model Parameters KALEN BRAMAN, VENKAT RAMAN, The University of Texas at Austin Dept of Aerospace Engineering and Engineering Mechanics — Simulations of turbulent combustion typically involve numerous models including those for the gas phase chemistry, turbulence, and combustion. Such models typically involve a host of parameters, and simulation results are generally sensitive to these parameters. Here, an adjoint-based approach is developed to determine the sensitivity of emissions at the combustion exit to these model parameters. First, adjoint equations for the turbulent combustion system in the context of the Reynolds-averaged Navier-Stokes (RANS) approach are derived. Then, a novel numerical scheme for solving these equations is introduced. The methodology is verified by comparing against a forward sensitivity computation. Finally, the sensitivity of emissions to model parameters is determined in a canonical jet flame configuration.

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