Abstract Submitted
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Large eddy simulation of an experimental partially-premixed flame configuration using a dynamic nonequilibrium model for subfilter scalar dissipation rate COLLEEN M. KAUL, The University of Texas at Austin; Center for Turbulence Research, Stanford University, VENKAT RAMAN, The University of Texas at Austin — Accurate prediction of nonpremixed turbulent combustion using large eddy simulation (LES) requires detailed modeling of the mixing between fuel and oxidizer occurring at scales not resolved by the LES filterwidth. The scalar dissipation rate, a critical quantity for describing the rate of small scale mixing in conserved scalar combustion models, is dominated by its subfilter component. Nonequilibrium models for the subfilter scalar dissipation rate, which do not assume a local balance between production and dissipation of subfilter scalar variance, typically contain a model coefficient whose optimal value is unknown a priori for a given simulation. Furthermore, conventional dynamic procedures are not useful for estimating its value. An alternative dynamic modeling approach for the model coefficient has been developed based on the transport equation for subfilter scalar variance and validated in a priori tests. Here, the new dynamic nonequilibrium subfilter scalar dissipation rate model is used for simulation of an experimental partially-premixed flame configuration. Results obtained with the new model are compared to predictions using an equilibrium modeling approach for dissipation.

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