

ASSESSMENT OF A MODEL FOR SUBGRID-SCALE TURBULENCE-RADIATION INTERACTION APPLIED TO THE SCALED SANDIA FLAME D

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ABSTRACT. A preliminary assessment of a simple model to account for subgrid-scale turbulence-radiation interaction (SGS-TRI) in a methane-air jet diffusion flame is presented. Results of this model are compared to those obtained by fully neglecting SGS-TRI and to a solution fully considering the phenomenon, this last one obtained via an Eulerian Monte Carlo stochastic field (ESF) method. The studied model did not offer a significant improvement in the predicted radiative emission, though this is mainly due to a heavy underestimation of the subgrid-scale temperature variance, which is determined in the model by assuming local equilibrium between dissipation and production of this quantity. If the SGS temperature variance calculated with the ESF method is used instead, the performance of the SGS-TRI model improves considerably. Even so, contributions of SGS fluctuations of the absorption coefficient, which are currently altogether neglected, should be included for a better prediction of the filtered emission.