Abstract Submitted
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Large-eddy simulation/PDF modeling of a non-premixed CO/H_2 temporally evolving jet flame[1] YUE YANG, Cornell University and Sandia National Laboratories, HAIFENG WANG, STEPHEN B. POPE, Cornell University, JACQUELINE H. CHEN, Sandia National Laboratories — We report a large-eddy simulation (LES)/probability density function (PDF) study of a non-premixed CO/H_2 temporally evolving planar jet flame at Re = 9079 and Da = 0.011 with skeletal chemistry. The flame exhibits strong turbulence- chemistry interactions resulting in local extinction followed by re-ignition. In this study, the filtered velocity field in LES is computed using the NGA code (Desjardins et al., 2008) and the PDF transported equations with the modified Curl's mixing model are solved by the new highly-scalable HPDF code (Wang and Pope, 2011) with second order accuracy in space and time. The performance of the hybrid LES/PDF methodology is assessed through detailed a posteriori comparisons with DNS of the same flame (Hawkes et al., 2007). The comparison shows good agreement of the temporal evolution of the temperature and mass fractions of major chemical species, as well as the prediction of local extinction and re-ignition. In addition, the effects of the subgrid scale model, the mixing model, and grid resolution on turbulence-chemistry interactions are investigated to improve the capabilities of LES/PDF.

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