Abstract Submitted
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Flamelet modeling of differential molecular diffusion in CO/H2 and ethylene DNS flames[1] CHAO HAN, Purdue University, DAVID LIGNELL, Brigham Young University, EVATT HAWKES, University of New South Wales, JACQUELINE CHEN, Sandia National Laboratories, HAIFENG WANG, Purdue University — A class of consistent differential diffusion models suitable for flamelet modeling of turbulent non-premixed combustion is developed recently. In this work, these differential diffusion models are further validated in two DNS temporally evolving jet flames with two different fuels, Syngas and ethylene. The dependence of differential diffusion on the Reynolds number, which is missing is previous models, is incorporated into the new models, and is based on a limiting analysis of the behaviors of differential molecular diffusion at the limits of small and large Reynolds numbers. The performances of the models are thoroughly examined in the two DNS flames. The effect is studied of the Reynolds number, Damkohler number, and Lewis number on the differential molecular diffusion in the temporally evolving jet flames.

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