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Evaluation of a strain-sensitive transport model in LES of turbulent nonpremixed sooting flames JEFFRY K. LEW, SUO YANG, MICHAEL E. MUELLER, Princeton University — Direct Numerical Simulations (DNS) of turbulent nonpremixed jet flames have revealed that Polycyclic Aromatic Hydrocarbons (PAH) are confined to spatially intermittent regions of low scalar dissipation rate due to their slow formation chemistry. The length scales of these regions are on the order of the Kolmogorov scale or smaller, where molecular diffusion effects dominate over turbulent transport effects irrespective of the large-scale turbulent Reynolds number. A strain-sensitive transport model has been developed to identify such species whose slow chemistry, relative to local mixing rates, confines them to these small length scales. In a conventional nonpremixed "flamelet" approach, these species are then modeled with their molecular Lewis numbers, while remaining species are modeled with an effective unity Lewis number. *A priori* analysis indicates that this strain-sensitive transport model significantly affects PAH yield in nonpremixed flames with essentially no impact on temperature and major species. The model is applied with Large Eddy Simulation (LES) to a series of turbulent nonpremixed sooting jet flames and validated via comparisons with experimental measurements of soot volume fraction.

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