Abstract Submitted
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A LES/FDF/PMC-based Detailed Model for Luminous Turbulent Flames[1] ANKUR GUPTA, Graduate Student, Dept of Mechanical and Nuclear Engg, The Pennsylvania State University, DANIEL HAWORTH, MICHAEL MODEST, Professor, Dept of Mechanical and Nuclear Engg, The Pennsylvania State University — A comprehensive model is presented for luminous turbulent flames with full consideration of turbulence/chemistry interactions (TCI), turbulence/radiation interactions (TRI), and detailed gas- phase chemistry and soot. A large-eddy simulation/composition filtered mass density function (LES/C-FDF) formulation is adopted that accounts exactly for the influence of subfilter-scale turbulent fluctuations on chemical source terms and radiative emission. A consistent Lagrangian Monte Carlo particle/Eulerian mesh method is used to solve the modeled C-FDF equation. A second Monte Carlo particle method (photon Monte Carlo - PMC) is used to solve the radiative transfer equation; the radiation model includes spectral radiation properties and absorption. Soot is modeled using a method of moments. The model is validated using experimental data for luminous turbulent nonpremixed jet flames. The model then is exercised to isolate and quantity different contributions to TRI.

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