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Evaluation of a Consistent LES/PDF Method Using a Series of Experimental Spray Flames COLIN HEYE, VENKAT RAMAN, The University of Texas at Austin — A consistent method for the evolution of the joint-scalar probability density function (PDF) transport equation is proposed for application to large eddy simulation (LES) of turbulent reacting flows containing evaporating spray droplets. PDF transport equations provide the benefit of including the chemical source term in closed form, however, additional terms describing LES subfilter mixing must be modeled. The recent availability of detailed experimental measurements provide model validation data for a wide range of evaporation rates and combustion regimes, as is well-known to occur in spray flames. In this work, the experimental data will used to investigate the impact of droplet mass loading and evaporation rates on the subfilter scalar PDF shape in comparison with conventional flamelet models. In addition, existing model term closures in the PDF transport equations are evaluated with a focus on their validity in the presence of regime changes.

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