

Abstract Submitted
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A multi-scalar PDF approach for LES of turbulent spray combustion VENKAT RAMAN, COLIN HEYE, The University of Texas at Austin — A comprehensive joint-scalar probability density function (PDF) approach is proposed for large eddy simulation (LES) of turbulent spray combustion and tests are conducted to analyze the validity and modeling requirements. The PDF method has the advantage that the chemical source term appears closed but requires models for the small scale mixing process. A stable and consistent numerical algorithm for the LES/PDF approach is presented. To understand the modeling issues in the PDF method, direct numerical simulation of a spray flame at three different fuel droplet Stokes numbers and an equivalent gaseous flame are carried out. Assumptions in closing the subfilter conditional diffusion term in the filtered PDF transport equation are evaluated for various model forms. In addition, the validity of evaporation rate models in high Stokes number flows is analyzed.

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