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Modeling studies of a turbulent pulsed jet flame using LES/PDF[1]

PEI ZHANG, HAIFENG WANG, Purdue University — The combustion field in a pulsed turbulent piloted jet flame is studied using an advanced large eddy simulation (LES) / probability density function (PDF) method. Measurement data with a joint OH-PLIF/OH* chemiluminescence/LDV system are available including the temporal series of the axial velocity and planar OH images. A time-dependent inflow condition is specified based on the measurement data. A direct comparison of the mean and rms velocities from the calculations and from the measurement shows a satisfactory prediction of the flow fields by using the employed modeling methods. The predicted OH mass fractions are compared qualitatively with the measured OH images at selected temporal and spatial locations. The comparison shows a good agreement. Conditional quantities and flame index are extracted from the simulations to examine the bimodal and multi-regime combustion dynamics in the flame.

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