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Large-eddy simulation/probability density function modeling of a high Karlovitz number turbulent premixed jet DNS flame[1] UTSAV JAIN, HAIFENG WANG, Purdue University — Simulation studies of a high Karlovitz number turbulent premixed jet DNS flame are conducted by using the combined large-eddy simulation (LES) and transported probability density function (PDF) methods to assess the model's predictive capability for the relevant premixed combustion regime. The interaction by exchange with the mean (IEM) model is used for mixing modeling with a recently develop mixing timescale model based on a power-law scaling. Two model parameters in the power-law scaling model are specified by a machine learning approach. The performance of the machine learning model is compared with an empirical model for the specification of the mixing model parameters. A consistent Eulerian Monte Carlo field method is used for solving the transported PDF equation efficiently and consistently. The impact of the model inconsistency in the traditional Eulerian Monte Carlo field method is examined. The DNS data are used to validate the model predictions. The predictive performance of the employed is assessed in detail.

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