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Large-Eddy Simulation/ Filtered-Density Function Modeling of Turbulent Reactive Flows VENKATRAMANAN RAMAN, HEINZ PITSCH, Center for Turbulence Research, Stanford University — Hybrid large-eddy simulation/filtered-density function (LES-FDF) approach for turbulent combustion simulations has the unique feature that the chemical source terms appear closed and do not require modeling. The FDF evolution equation is a high-dimensional transport equation that can be practically solved using a notional particle-based Monte-Carlo scheme. This approach has been widely used in RANS-based modeling. However, the inherent unsteady nature of the LES method combined with large computational cost require efficient, robust and numerically consistent algorithms. In this work, we provide verification and validation of a consistent numerical algorithm for LES-FDF simulation of turbulent combustion. We illustrate the accuracy of the algorithm using several test cases. In addition, we show comparisons with experimental flame data for several standard configurations including the Sandia D/E flames and the bluff-body stabilized flame.

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