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Implementation of the Joint Frequency-Velocity-Scalar Filtered Mass Density Function for Large Eddy Simulation of Turbulent Reacting Flows REZA SHEIKHI, PEYMAN GIVI, University of Pittsburgh, STEPHEN POPE, Cornell University — The recently developed methodology "frequency-velocity-scalar filtered mass density function" (FVS-FMDF) is implemented for large eddy simulation (LES) of turbulent reacting flows. The FVS-FMDF, takes account of unresolved subgrid scales by considering the joint probability density function (PDF) of the frequency, velocity and scalar fields. A transport equation for FVS-FMDF is derived in which the effects of convection and chemical reaction appear in closed forms. The unclosed terms in this equation are modeled in a fashion similar to PDF methods. The modeled FVS-FMDF transport equation is solved by a Lagrangian Monte Carlo method. This is the most comprehensive form of the filtered density function for turbulent reacting flows to date. The methodology is implemented to simulate turbulent shear flows. The LES results are compared with the direct numerical simulation (DNS) data of the same layer. The LES predictions show close agreements with DNS data.

Reza Sheikhi
University of Pittsburgh

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