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Investigation of the one-point statistics of the scalar dissipation determined from scalar fields in large-eddy simulation ROBERT KNAUS, CARLOS PANTANO, University of Illinois at Urbana-Champaign, JOSEPH OEFELEIN, Sandia National Laboratories — In large-eddy simulation (LES), molecular scalar mixing is completely modeled since it generally occurs at scales below the cutoff. In this case, only the resolved scalar field is simulated. In many situations the statistics of the resolved scalar fields are accurate, e.g., if the supply of unmixed fluids is provided through boundary conditions. In combustion, there are usually subgrid processes, e.g., flames, controlling the rate of chemical conversion whose coupling with the turbulence can not be resolved completely in LES. If the subgrid process is strongly sensitive to the rate of mixing, as in nonpremixed combustion, one question of interest is to what extent can one recover the true statistics of mixing from those available in the LES fields so that the accuracy of the coupling with combustion can be improved. We investigate theoretically the relationship between the resolved and true scalar dissipation and propose a framework to recover the missing one-point statistical information.

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