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Conditional Mixing Statistics in a Self-Similar Scalar Mixing Layer STEPHEN DE BRUYN KOPS, Univ. of Massachusetts Amherst, MIKAEL MORTENSEN, Chalmers University — Conditional scalar mixing statistics from a three-dimensional direct numerical simulation (DNS) of a scalar mixing layer are presented in the context of modeling non-premixed turbulent combustion. The simulation is closely matched to a particular laboratory experiment but with slight adjustments so that the simulated flow is very nearly self-similar. All statistics commonly used in mixing models are presented, along with comparisons to models and laboratory data where available. A model for the conditional scalar dissipation rate (CSD), recently introduced by Mortensen, is tested against the data set, as is a Lagrangian stochastic trajectory technique recently published by Sawford. It is concluded that (i) the DNS data set provides an excellent, high resolution description of the scalar mixing layer that can be used for developing and verifying models for scalar mixing; (ii) the self-consistent CSD model of Mortensen is necessary for consistent implementations of the conditional moment closure, but, for the current flow it gives only small adjustments to the more commonly adopted model of Girimaji; and (iii) Sawford's Lagrangian technique very closely predicts the DNS results.

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