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Joint Conserved Scalar Statistics in Three-stream Mixing BRIAN

L. SAWFORD, Monash University, STEPHEN M. DE BRUYN KOPS, University of Massachusetts, Amherst — The double scalar mixing layer (DSML) has been studied recently as a model problem for a piloted jet flame, which is a special case of three-stream mixing of particular interest to combustion researchers. In this special case, mixing can be described in terms of a single conserved scalar. In the more general case, where the inner stream is not a mixture of the two outer streams, two conserved scalars are necessary, one to represent mixing of each of the outer streams (as in binary mixing) and one to represent mixing of the inner stream. We present and compare joint statistics obtained for these two conserved scalars using DNS and a Lagrangian stochastic model. Because of the extra dimension in concentration space, sampling is more difficult than for the DSML, but as for the DSML we find good agreement between the DNS and model results for a range of unconditional and conditional scalar statistics, including joint moments and the joint pdf, the mean velocity conditioned on both scalars and the conditional diffusion.

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