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Investigation of SGS modeling approaches for scalar transport and mixing in LES O.S. SUN, L.K. SU, Johns Hopkins University, T. BURTON, United States Naval Academy — In large-eddy simulation (LES) of non-premixed combustion, accurate determination of subgrid scale (SGS) quantities, including subgrid scalar flux, variance and dissipation rate, is crucial for predicting both large and small scale mixing phenomena. Some previous studies have examined appropriate methods for predicting and analyzing SGS model behavior. [1] However, there are currently no universal metrics for assessing the performance of SGS models and, in particular, SGS scalar mixing models. Here, we perform LES of passive scalar mixing in a spatially developing, free, round turbulent jet. The LES code is based on a spherical coordinate direct numerical simulation (DNS) code. Different SGS models are used to close the subgrid scalar flux term in the scalar transport equation, including eddy diffusivity, scale similarity, and mixed models. Models for the subgrid scalar variance and scalar dissipation rate, necessary for combustion simulations, are studied as well. The primary objectives are to examine the physical implications of SGS mixing models and determine major factors influencing model performance. Results from the LES are compared with DNS as well as experimental measurements of velocity and scalar fields.

[1]Jiménez, C. *et al. Phys.Fluids* **13**, 2433 (2001); Meneveau, C. and Katz, J. *Annu. Rev. Fluid Mech.* **32**, 1 (2000); Liu, S. *et al. J. Fluid Mech.* **275**, 83 (1994)

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