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Analysis of numerical errors in subfilter scalar variance models for large eddy simulation COLIN R. HEYE, COLLEEN M. KAUL, VENKAT RAMAN, The University of Texas at Austin — In conserved scalar methods for large eddy simulation (LES) of combustion, the subfilter scalar variance characterizes the degree of small scale mixing. Accurate scalar variance modeling is crucial due to the sensitivity of the combustion process to the extent of this mixing. However, like other subfilter quantities, variance prediction is subject to significant numerical as well as modeling errors. Here, we compare algebraic and transport equation-based variance models using a coupled DNS-LES *a posteriori* analysis approach. Model performance is evaluated for the cases of homogeneous isotropic turbulence (HIT) and turbulent jet flow, which provide complementary information. In the HIT case, results using a variety of finite difference schemes are compared to spectrally computed LES and DNS results. Algebraic models are found to incur large numerical errors while scalar dissipation rate modeling is the foremost source of error for transport equation models. The jet flow case extends the comparison to a more realistic configuration and allows additional numerical and physical factors to be considered, such as variable stencil numerical schemes and persistent large scale gradients.

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