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Subfilter scalar variance models for LES of premixed turbulent flames GUILLAUME BLANQUART, SIMON LAPOINTE, TOMAS TUSSIE, Caltech — The subfilter scalar variance plays an important role in large eddy simulations of turbulent reacting flows. It is not available in the simulations and needs to be modeled. Subfilter scalar variance models often take the form of a constant coefficient multiplying the square of the filter width and the square of the gradient of the filtered progress variable (referred to as the mixing model). Variance models are first studied *a priori* using results from constant density DNS of scalar mixing in isotropic turbulence. Scalar variance models based on a generalized Taylor expansion are accurate for small filter widths but errors arise in the inertial subrange. Results suggest that a constant coefficient computed from an assumed Kolmogorov spectrum is often sufficient to predict the subfilter scalar variance in homogeneous isotropic turbulence. The analysis is then extended to variable density reacting flows using DNS of turbulent n-heptane/air premixed flames at varying Karlovitz numbers. Results from homogeneous isotropic turbulence still hold when taking into account the change in the Kolmogorov length scale across the flame. The optimal coefficient in the mixing model varies between the two limits of small filter widths and assumed Kolmogorov spectrum.

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