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Effects of the subgrid-scale mixture fraction structure on scalar and temperature dissipation in turbulent partially premixed flames CHENNING TONG, DANHONG WANG, Clemson University, ROBERT BARLOW, Sandia National Laboratories, ADONIOS KARPETIS, Texax A&M Universtiy — In LES of turbulent nonpremixed combustion subgrid-scale scalar mixing require modeling. Our previous studies have shown that when the SGS scalar variance is small and large the SGS mixture fraction has Gaussian and bimodal distributions, respectively. Here we study the effects of these SGS structure on the SGS mixing of mixture fraction and temperature. Our experimental results show that or fully burning SGS samples, the conditionally filtered temperature is similar to the conditionally filtered scalar dissipation for small SGS variance but differs from the latter for large SGS variance. For extinguished SGS samples the scalar dissipation generally has large values whereas the temperature dissipation is generally small. For large SGS variance the temperature dissipation is the largest for intermediate temperatures. Both the conditional SGS mixing time scales of mixture fraction and temperature increases as the SGS variance is increased, although the latter's increase is slower. The results show that the two mixture fracture fraction distributions affect the SGS mixing of in non-reactive and reactive scalars different ways, which have implications for modeling their SGS mixing.

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