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Subgrid scale modeling approaches for LES of low Mach number Jets GREGORY RODEBAUGH, LESTER SU, Johns Hopkins University — Large-eddy simulation of the low Mach number equations provides a computationally attractive option for simulating low speed, complex flows with large density and temperature gradients, particularly for reacting flow applications. Accurately predicting the scalar concentration fields is essential for the development of precise combustion simulations. In this work, we seek to elucidate what effects different subgrid scale (SGS) stress and scalar flux models have on both the mixing properties and turbulent statistics of the flow. Additionally, we aim to understand the coupling between the SGS stress and scalar flux models; therefore, we restrict the study to an isothermal flow with two species of different densities. There have been previous investigations of SGS models in compressible flows, but these focused primarily on higher Mach number regimes and SGS models for the energy equation. We study a canonical axisymmetric turbulent jet in this work, with the low Mach number equations being discretized in cylindrical coordinates. A predictor-corrector scheme is employed for time evolution of mass species fraction and momentum.

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