Abstract Submitted
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Reynolds-Averaged Navier-Stokes Modeling of Turbulent Free Shear Layers[1] OLEG SCHILLING, Lawrence Livermore National Laboratory — Turbulent mixing of gases in free shear layers is simulated using a weighted essentially nonoscillatory implementation of ϵ- and L-based Reynolds-averaged Navier–Stokes models. Specifically, the air/air shear layer with velocity ratio 0.6 studied experimentally by Bell and Mehta (1990) is modeled. The detailed predictions of turbulent kinetic energy dissipation rate and lengthscale models are compared to one another, and to the experimental data. The role of analytical, self-similar solutions for model calibration and physical insights is also discussed. It is shown that turbulent lengthscale-based models are unable to predict both the growth parameter (spreading rate) and turbulent kinetic energy normalized by the square of the velocity difference of the streams. The terms in the K, ϵ, and L equation budgets are compared between the models, and it is shown that the production and destruction mechanisms are substantially different in the ϵ and L equations. Application of the turbulence models to the Brown and Roshko (1974) experiments with streams having various velocity and density ratios is also briefly discussed.

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