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Impact of Scalar Forcing Simulation Techniques on High Schmidt Number Turbulent Mixing K. JEFF RAH, GUILLAUME BLANQUART, Caltech — Numerous Direct Numerical Simulations of turbulent scalar mixing have been performed with a forcing technique to prevent the turbulent mixing from decaying. In this work, two scalar forcing techniques, namely the mean gradient forcing and the linear scalar forcing, are compared to assess the validity of Batchelor's theory. For high Schmidt number scalars, it predicts a κ^{-1} scaling of energy spectrum in the viscous-convective region. When using the mean gradient forcing technique, the energy spectrum agrees well with Batchelor's theory. When using the linear scalar forcing, on the other hand, the energy spectrum does not follow the κ^{-1} scaling. This difference can be explained by considering Yaglom's equation for the scalar structure functions and are due to the form of the forcing source term. These results give a hint to the disagreement between theoretical predictions and experimental data in turbulent mixing literature.

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