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A-priori analysis of subgrid scalar flux models for turbulent high Schmidt number passive scalar mixing SIDDHARTHA VERMA, GUILLAUME BLANQUART, California Institute of Technology — Numerical study of high Schmidt (Sc) number scalars using LES is hampered by the fact that few well-tested models exist specifically for this regime. Low Sc LES studies generally employ the widely used eddy-viscosity type models. However, these suffer from the fact that the resolved scalar gradient is often not well-aligned with the subgrid scalar flux (SGF). In this work, we perform an a-priori analysis based on $Sc \gg 1$ simulations to explore the alignment of the SGF with the resolved as well as subgrid velocity and scalar quantities. Special attention is given to differences observed in the inertial-convective and the viscous-convective sub-ranges. These differences are related to the fundamental dissimilarities in the transport mechanisms. The alignment trends are used to ascertain the suitability of existing models for use in both sub-ranges.

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