Abstract Submitted
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A Dispersion Model for Turbulent, Multi-Component Reacting Flows[1] OMKAR SHENDE, ALI MANI, Stanford University — It is theoretically and computationally challenging to build reduced-order models for turbulent reacting flows as the underlying chemical and transport processes are individually complex. Furthermore, an understanding of the coupled effects of these phenomena remains elusive. However, deeper insight into turbulent transport effects on reaction dynamics is essential for the future design of efficient energy systems. Using theory developed for non-reactive dispersion of scalars and linear reactions, an algebraic Reynolds-averaged Navier-Stokes model for capturing unresolved interactions between multi-component scalar reactions in turbulent flows is developed. This work extends the modified gradient diffusion model by Corrsin (JFM, vol. 11, p.407-416) beyond single-component transport phenomena with linear reactions. Using two- and three-dimensional direct numerical simulations, it is shown that this model improves prediction of mean quantities compared to traditional results.

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