

Abstract Submitted  
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**Weakly-Nonlinear Extension of Dispersion Analysis for Multi-Component Reacting Flows**<sup>1</sup> OMKAR SHENDE, ALI MANI, Stanford Univ — Building reduced-order models for turbulent reacting flows is theoretically and computationally challenging as the underlying chemical and transport processes are individually complex and a thorough understanding of the coupled effects of these phenomena remains elusive. Deeper insight into the effects of turbulent transport on reaction dynamics and vice versa is essential for the future design of engineering systems, including those for efficient energy conversion. In this work, using theory developed for non-reactive dispersion of scalars and for linear reactions, a local algebraic Reynolds-averaged Navier-Stokes model is developed which is capable of capturing unresolved interactions between multi-component scalar reactions in turbulent flows. This model has shown improvement over existing ones in the literature and provides a systematic framework for the incorporation of non-local effects.

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