

Abstract Submitted
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Spectral closure for the probability density function of reactive scalars in isotropic turbulence¹ YANJUN XIA, LANCE COLLINS, Cornell University — We present a spectral closure for the joint composition probability density function (PDF) for multiple scalars undergoing isothermal chemical reactions. The formulation, based on the eddy damped quasi-normal Markovian (EDQNM) theory, accounts for macroscopic mixing and scalar dissipation separately and allows for differential diffusion of reactant and/or product species due to differences in their molecular diffusivities. The EDQNM theory has been reformulated into a stochastic differential equation for the particle concentrations in a Monte Carlo scheme. We present results for non-premixed isotropic scalars and one-dimensional mixing without and with differential diffusion. Results are compared with direct numerical simulations (DNS). The model captures well the competing effects of mixing, chemical reaction and differential diffusion.

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Lance Collins
Cornell University

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