

Abstract Submitted
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Eddy transport of reacting substances GLENN FLIERL, MIT —

We examine an exact formulation of eddy fluxes¹ but extended to tracers which react with each other. The resulting formula is evaluated using the lattice model approach,² allowing not only control (including elimination) of sub-grid-scale diffusion and efficient enough computation to generate an adequate ensemble. The theory predicts that the flux is a non-local average of the mean gradients, even for passive scalars, and we can calculate the averaging kernel. The reaction terms alter the effective transport for a single scalar depending on decay time scale compared to that of the Lagrangian covariance. But, in addition, the eddies produce “cross-fluxes” whereby the transport of each tracer depends on the gradients of all of them.

¹c.f. Kraichnan, R.H. (1987) Eddy Viscosity and Diffusivity: Exact Formulas and Approximations. *Complex Systems*, **1**, 805-820.

²Pierrehumbert, R.T. (2000) Lattice models of advection-diffusion. *Chaos*, **10**, 61-74.

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