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**Rapid distortion theory for mixing efficiency of a flow stratified by one or two scalars**[1] CHRIS REHMANN, JENNIFER JEFFERSON, Iowa State University — The mixing efficiency of unsheared homogeneous turbulence in flows stratified by one or two active scalars was calculated with rapid distortion theory (RDT). For one scalar the mixing efficiency $\eta$depends on the Schmidt number and the Grashof number. For two scalars the efficiency also depends on the density ratio $R_\rho$, which compares the density differences caused by temperature and salt. In the one scalar case when $Gr$ is large, $\eta$ decreases as $Sc$ increases. The mixing efficiency increases with $Gr$ up to a maximum value, as in numerical simulations and experiments. The maximum of approximately 30% for low $Sc$ is consistent with simulations, while the maximum of 6% for heated water is consistent with laboratory measurements. However, RDT underpredicts the maximum for saltwater and the value of $Gr$ at which the efficiency becomes constant. For two active scalars, $\eta$ decreases as $R_\rho$ decreases, as in experiments. Results from simulations with low $Sc$ likely overestimate the efficiency of turbulence in strongly stratified flows in lakes and oceans.

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Chris Rehmann
Iowa State University

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