

Abstract Submitted
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Measuring mixing efficiency¹ CHARLES R. DOERING², University of Michigan, TAKAHIDE OKABE, The University of Texas at Austin — The mixing efficiency or stirring effectiveness of a flow can be quantified in terms of the suppression of concentration variance of a passive scalar sustained by steady sources and sinks. The mixing efficiency defined this way is the ratio of the scalar variance mixed by molecular diffusion alone to the (statistically steady state) variance in the presence of stirring. This measure of the effectiveness of the stirring is naturally related to the enhancement factor of the equivalent eddy diffusivity over molecular diffusion. This mixing efficiency naturally depends on the Péclet number, but it was recently noted that the maximum possible mixing efficiency at a given Péclet number depends as well on the structure of the sources and sinks. That is, in general it does not make sense to talk about the mixing effectiveness or eddy diffusion of a flow without also specifying the source-sink structure of whatever is being stirred. We present the results of particle-based numerical simulations quantitatively confirming the source-sink dependence of the mixing efficiency as a function of Péclet number for a model flow.

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