Abstract Submitted
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Horizontal shear instabilities at low Prandtl number[1] PASCALE GARAUD, University of California, Santa Cruz — We present a first attempt at quantifying mixing by horizontal shear instabilities at low Prandtl number using Direct Numerical Simulations. This problem has many applications in stellar interiors, for instance. The shear in our model setup is driven by a body force, and rapidly becomes unstable. At saturation, we find several distinct dynamical regimes, depending on the relative importance of stratification and thermal diffusion. Based on our findings, we predict that shear in stars should fall into one of two categories: high Péclet number stratified turbulence, and low Péclet number stratified turbulence. The latter is presented in an accompanying talk by Cope, Garaud and Caulfield. Here, we focus on the case of high Péclet number (but low Prandtl number) stratified turbulence. We propose new theoretically-motivated scaling laws for mixing in this regime, as well as a criterion to determine when this regime should be present. These compare well with our numerical experiments.

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