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Entrainment across density interfaces

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The structure of non-homogeneous turbulence affected by stratification and rotation is investigated both by means of laboratory and numerical experiments. The experiments investigate zero mean flow across a stably stratified density interface and are used to quantify the entrainment, the mixing efficiency and different types of dominant instability and the topological aspects of the turbulent cascades detected both horizontally and vertically [1,2]. Grid turbulence in a rotating stratified two layer system is measured with PIV as well as with sonic velocimetry. Observations of the horizontal and vertical velocity energy spectra as well as the structure functions are used to estimate local mixedness, entrainment and intermittency [3,4].
The method of estimation of the average eddy diffusivity from the time series images of a sharp density interface marked by fluoresceine also take anisotropy into account. but on the long run, horizontal (and 2D type flow such as [5]) flow directions will average out so using a single integral length scale defined in Sanchez and Redondo(1998) varying in height will be enough together with the internal frequency. The method of calculating vertical fluxes in time allows to estimate different intermittency parameters as a function of local instability e.g. Kelvin/Helmholtz, Rayleigh-Taylor or Holbmoe[6-8]. Different concentration interfaces show different fractal dimensions, that are also a power function of the local Richardson number, this may be due to different levels of intermittency and thus different spectra, which are not necessarily inertial nor in equilibrium [8,9].

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