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Energy and vorticity decay in Haloclines and Thermoclines

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Experiments at different Reynolds numbers on the vertical and horizontal mixing structure and efficiency of mixing across a thermocline or halocline are used to investigate the decay of the turbulence [1-3]. Vertical and horizontal grids are used to mix an initialy sharp density interface (mostly made up with brine). Visualization methods are used to derive the velocity and vorticity horizontal fields and density probes allow to evaluate mixing. The vortex behavior is analyzed in detail as well as the process of energy decay and the transfer from kinetic to potential energy.By using the multi-fractal "Box counting Algorithm" [1] on the kinetic energy and vorticity fields and a suitable non dimensional Damkholer type of decay time, based on the local dissipation in the experiments that model ocean haloclines and surface ROFI, it is possible to relate certain patterns to physical processes similar to those in the ocean as in[4]. Diffusion, Spectral variations, Intermittency and higher order estimations of local mixing are presented as functions of the Richardson number and these predictions are compared with practical ocean flows and pollution situations[5].

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