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Mixing efficiency in stratified flows

J.M. Redondo (1,2), M.A.. Sanchez(1)

(1) Dept. Fisica Aplicada Universitat Politecnica de Catalunya, Barcelona, Spain (redondo@fa.upc.edu) (2) DAMTP, Cambridge University, Cambridge, U.K.

An experimental study of mixing across density interfaces produced by laterally heterogenous turbulence is presented in this paper. The turbulence is generated by a flow or air bubles rising through a density interface produced by brine and fresh water or by a stirring grid. The mixing efficiency, of the process is measured comparing the increase in potential energy with the available kinetic energy. We find that there is a decrease in the global mixing efficiency of the process with the length of the tank, the shape of (Ri) depends also on the air flow producing the turbulence, showing a geometrical limit to the ammount of kinetic energy which may be used for mixing. Experiments have been performed on a strongly stratified two layer fluid consisting of brine in the bottom and freshwater above in a 1 square meter tank. The evolution of the vortices after the passage of an array is video recorded and particle tracking is applied on small pliolite particles floating at the interface. The combination of internal waves and vertical vorticity produces separate time scales that may produce resonances. These complex non homogeneous structures occur in many industrial and environmental applications and elucidating their structure will be useful for better estimates of entrainment and mixing efficiency.