



On the interaction between fronts and vortices

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We investigate the formation and evolution of fronts and vortices in a two-layer stably-stratified fluid experiment. In a rotating tank with a differentially rotating rigid lid, we create a vertical shear across a density interface resulting in a baroclinic front. Different instabilities, such as baroclinic, Kelvin-Helmoltz or Rossby-Kelvin instabilities (RK), appear depending on the regime in Froude, Rossby and dissipation numbers. In the mean time, vortices naturally form that interact with the front. Using space-time analyses and Fourier filter analyses on particle Image Velocimetry (PIV) measurements and dye observations (LIF) for the RK and baroclinic unstable regimes, we investigate the interaction between small-waves with the baroclinic life cycle and the formation of these vortices. We characterise their size, the lifetime and the behaviour of vortices depending on the initial flow parameters.