Transient growth of perturbations on stratified mixing layers
CRISTOBAL ARRATIA, JEAN-MARC CHOMAZ, LadHyX CNRS-Ecole Polytechnique, SABINE ORTIZ, LadHyX CNRS-Ecole Polytechnique, ENSTA — We perform a study on the optimal perturbations developing on mixing layers. The basicly 2-dimensional Kelvin-Helmoltz instability that develops in this type of flow is known to become unstable leading to the development of streamwise vortices and eventually turbulence. This process is essential in many geophysical and industrial flows, where it greatly influences mixing and dissipation. We explore different types of 3-D optimal perturbations by means of numerical integration of the direct and adjoint Navier-Stokes equations in the Boussinesq approximation. Knowledge of these optimal perturbations reveals characteristics of the flow receptivity and helps to understand the different physical mechanisms present in its dynamics. These are key aspects in order to predict and control the flow evolution.

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