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3D optimal perturbations developing in homogeneous mixing layers in presence of subharmonic vortex-pairing LAURENT JOLY, ADRIANA LOPEZ-ZAZUETA, JEROME FONTANE, Universite de Toulouse, ISAE, DAEP — Many experimental and numerical studies have found that the pairing of primary Kelvin-Helmholtz (KH) vortices in mixing layers generally inhibits the growth of infinitesimal three-dimensional disturbances, delaying the transition to turbulence. In this work, we investigate the existence of 3D perturbations that grow fast enough to survive the subharmonic merging instability. For this purpose, we perform a numerical study of the transient linear evolution of 3D perturbations emerging in a homogeneous time-evolving mixing layer which undergoes pairing. We look for the optimal perturbation that yields to the largest gain of energy at a specific time horizon, by the use of an optimization method which solves iteratively the linearized direct and adjoint Navier-Stokes equations. In particular, we consider the influence of the time horizon relative to the saturation times of both the primary KH and the subharmonic pairing instabilities.

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