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Three-dimensional instabilities and transient growth of trailing vortices JEAN-MARC CHOMAZ, CLAIRE DONNADIEU, SABINE ORTIZ, PAUL BILLANT, LadHyX, CNRS-Ecole Polytechnique — An aircraft wake is made of counter-rotating vortices and is known to be affected by a long (Crow) and a short (elliptic) wavelength instabilities. Numerical investigations on the three-dimensionnal instabilities and transient growth of such dipole are performed. By means of a three-dimensionnal linear stability analysis, we retrieve the instability bands corresponding to the Crow and elliptic modes but we also observe less unstable oscillatory modes with very broad peaks. The transient growth of this dipole, investigated by computing the optimal perturbations with a direct-adjoint¹ technique, demonstrates the crucial role of the region of maximal strain. Further investigations on the dynamics of trailing vortices in stratified fluids will be performed. Indeed, as such dipoles propagate downwards, they evolve under the influence of the stratification of the atmosphere.

¹P. Corbett and A. Bottaro, Phys. Fluids **12**, 120 (2000)

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