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Interaction between counterpropagating Rossby and capillarity waves in planar jets and wakes LUCA BIANCOFIORE, Imperial College London, FRANCOIS GALLAIRE, EPFL, PATRICE LAURE, University of Nice - Sophia Antipolis — By means of a global linear analysis, Tammisola et al. (2011) have observed a counterintuitive destabilizing effect of the surface tension in planar wakes. They have justified this destabilization by the presence of two different temporal unstable modes found when analyzing the local stability of an extracted velocity profile from the base flow. In the present study, we approximate the velocity profile of a jet/wake flow through a piecewise broken-line. We then explain the presence of these two temporal unstable modes for such flows using the counterpropagating Rossby wave (CRW) perspective (see Heifetz et al., 1999), which associates to each vorticity discontinuity an individual Rossby wave. The introduction of a finite amount of surface tension at the interface creates two capillarity waves (CW) which move with the same velocity but in opposite directions. The interaction of this four waves originates the two temporal unstable modes for both sinuous and varicose symmetries. Analyses of the influence of the shear layer thickness δ_w and the confinement h on the behaviour of both CRWs and CWs and on their interaction are provided. Finally, comparisons to direct numerical simulations of jets/wakes including surface tension will complete the study.

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