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Zigzag instability in a stratified fluid: a direct transfer of energy
AXEL DELONCLE, LadHyX - Ecole Polytechnique - Palaiseau - France, PAUL BILLANT, JEAN-MARC CHOMAZ, LadHyX - Ecole Polytechnique — In a strongly stratified fluid, a columnar counter-rotating vortex pair is subject to the zigzag instability which bends the vortices and ultimately produces layers. We have investigated the nonlinear evolution of this linear instability by means of DNS. We show that the instability grows exponentially without nonlinear saturation and therefore produces rapidly intense vertical shear. The instability growth is only stopped when vertical viscous effects become dominant. This occurs when $F_h^2 Re = O(1)$ with F_h the horizontal Froude number and Re the Reynolds number. No secondary zigzag instabilities or shear instabilities have been observed. This means that the zigzag instability is a mechanism capable of directly transferring the energy from large scales to small vertical scales where it is dissipated without any cascade.

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