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Frontal instabilities and waves in a differentially rotating two-layer fluid JAN-BERT FLOR, HELENE SCOLAN, Laboratoire des Ecoulements Geophysiques et Industriels (LEGI) — Fronts are key structures for ocean and atmosphere dynamics and relevant for weather forecasts and climate. In this study, we have investigated the stability of a baroclinic front, generated in a rotating salt-stratified two-layer fluid by a rotating lid at the surface of the fluid. In the parameter space set by rotational Froude number, dissipation (i.e. spin-down to disk rotation time-ratio) and Rossby number, different flow regimes are observed, ranging from axisymmetric, Kelvin Helmholtz instability to irregular baroclinic instable flows, in coherence with former results obtained for two- layer flows in immiscible fluids. New is the evidence of the Rossby-Kelvin instability, which occurs as a consequence of the resonant interaction between Rossby and Kelvin waves. In addition, locally emitted waves with a short wave length are observed in the baroclinic unstable regime. Some of these waves appear for relatively high Richardson numbers, but for wave numbers for which one may also expect Holmboe waves. We discuss these waves in the light of spontaneously emitted inertia-gravity waves and other possible mechanisms.

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