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Coriolis effects on the elliptical instability in cylindrical and spherical rotating containers MICHAEL LE BARS, STÉPHANE LE DIZÈS, PATRICE LE GAL, IRPHE, UMR 6594, CNRS & Aix-Marseille University — The effects of Coriolis force on the elliptical instability are studied experimentally in cylindrical and spherical rotating containers embarked on a table rotating at a fixed rate $\tilde{\Omega}^G$. For a given set-up, changing the ratio Ω^G of global rotation $\tilde{\Omega}^G$ to flow rotation $\tilde{\Omega}^F$ leads to the selection of various unstable modes due to the presence of resonance bands, in close agreement with the normal mode theory. No instability takes place when Ω^G ranges between $-3/2$ and $-1/2$ typically. When decreasing Ω^G toward $-1/2$, resonance bands are first discretized for $\Omega^G > 0$ and progressively overlap for $-1/2 < \Omega^G < 0$. Simultaneously, the growth rates and wavenumbers of the prevalent stationary unstable mode significantly increase, in quantitative agreement with the viscous short–wavelength analysis. New complex resonances have been observed for the first time in the sphere, in addition to the standard spin-over. We argue that these results have significant implications in geo- and astrophysical contexts.

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