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Instabilities induced by the precession of a tilted inner core.

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The dynamics of the liquid core is known to be crucial to the planetary dynamics through angular momentum exchange with the surrounding mantle, kinetic energy dissipation and in some cases dynamo processes. It has been shown that mantle perturbations such as forced precession-nutations, librations can drive complex flows strongly influenced by the rotation in the form of parametric instabilities. Meanwhile, little attention has been given so far to the dynamics resulting from free or forced perturbations of an inner core.
In the present study we investigate numerically the flow in the outer liquid core at moderate Ekman numbers ($\sim$1e-5) driven by the precession of a solid inner core. We aim at deriving the stability diagram and at characterising the mechanism underlying the onset of the instabilities.