Instabilities induced by the precession of spherical shell

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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. In the present study we aim at shedding some light on the influence of an inner core onto the precesssional instabilities. We investigate numerically the flow in the outer liquid core at moderate Ekman numbers ($\sim 10^{-5}$) driven by the precession of the mantle and the inner core. We aim at deriving the stability diagram and at characterising the mechanism underlying the onset of the instabilities.