

Abstract Submitted
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Instabilities inside a precessing cylinder PATRICE MEUNIER, IRPHE, Marseilles, France, CHRISTOPHE ELOY, IRPHE, Marseilles France — The flow inside a precessing cylinder is primarily interesting because it is found inside the liquid core of the earth, where it may be responsible for the geodynamo, but also because it is found in the reservoir of rotating spacecrafts. Here, we report results of an experiment in which a cylinder rotating around its axis is mounted on a rotating turntable, with a small angle between the two axis. The flow is analyzed through sideview visualizations and PIV measurements. At low angles of precession, the flow is stable and composed of several Kelvin modes, stationnary in the frame of reference of the rotating platform. Their amplitude, accurately predicted by the linear theory, depends on the aspect ratio of the cylinder, and diverges when the height of the cylinder equals an odd number of half-wavelengths. At high angles of precession, the flow is found to destabilize, giving rise to a very turbulent motion, which can sometimes relaminarize, leading to intermittent breakdown of the flow.

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