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On a possible mechanism for the generation of cyclonic vortices regime in a precessing cylindrical container WALEED MOUHALI, ECE PAris, THIERRY LEHNER, Luth Observatoire de Meudon, ATER TEAM — We report experimental observations obtained by particle image velocimetry of the behavior of a flow driven by rotation and precession of a cylindrical container. Various flow regimes are identified according to the value of the control parameter ε (also called the Poincaré number) which is the ratio of the precession frequency Ω_{P} to the rotation frequency Ω_{R}. In particular, when ε is increased from small values, we have observed an induced differential rotation followed by the apparition of permanent cyclonic vortices. In particular, when ε is increased from small values, after a linear regime, we have observed a differential rotation followed by the apparition of four permanent cyclonic vortices as a consequence of instability (eruption of jets from the lateral edges of the cylinder). We propose a mechanism for the explanation of this generation. based on the differential rotation created by nonlinear mode coupling of two inertial waves of azimuthal wave numbers $m = 0$ and $m = 1$ (mode forced by the precession) in the inviscid case. The profile of the azimuthal mean velocity and the corresponding axial mean vorticity both show an inflexion point in their radial profile leading to a possible localized instability.

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