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Shear secondary instability in a precessing cylinder flow WALEED MOUHALI, ECE Paris, THIERRY LEHNER, Luth, Observatoire de Meudon, ATER COLLABORATION — For a certain value of the forcing parameter, cyclones regime has been observed in our experiment involving water in a precessing cylinder. They result from an instability. We propose here to study the nature of this so-called instability. We consider first the mode coupling of two inertial waves with azimuthal wavenumber m=0 and m=1 (mode forced by the precession) in the inviscid regime (at high Re number limit) creates a differential rotation regime which has been observed in the same experiment at small enough Poincaré number ε (ratio of the precession to the rotation frequencies). Secondly, the radial profile of the corresponding axial mean flow vorticity shows an inflexion point leading to a localized inflectional secondary instability. We show that when ε is increased from low values the forced mode m=0 becomes the most instable in this induced differential rotation, which can be responsible for the observed eruptions of jets from the lateral walls of the cylinder leading to the cyclones formation within the volume from the development of an inviscid secondary shear instability.

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