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The spiral turbulence: a secondary instability of the IPS vortices in the Taylor-Couette flow? ARNAUD PRIGENT, TALIOUA ABDESSAMAD, MUTABAZI INNOCENT, Normandie Universit Le Havre — We are interested in the study of the transition to turbulence in the Taylor-Couette flow, the flow between two independently rotating coaxial cylinders. Once the geometry is fixed, the flow is controlled by the inner and outer Reynolds numbers, Rei and Reo, and presents a large variety of flow regimes as described by Coles and Andereck et al. In counter-rotation, the transition is characterized by a succession of flow regimes with laminar-turbulent coexistence as the spiral turbulence, the helical alternance of laminar and turbulent flow. While they were expected to be observed before the apparition of the laminar-turbulent coexistence regimes, like the spiral turbulence, interpenetrating spiral vortices are observed before and also within these regimes. They affect significantly the flow. They are located between the inner cylinder and the nodal surface and disappear where turbulence occurs. We believe that these vortices act like finite amplitude perturbations triggering the turbulent domains in a bursting process like the one proposed by Marcus. We experimentally study the role played by these vortices through visualizations of the flow and PIV measurements.

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