Abstract Submitted
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Subcritical bifurcation detected in an unstable magnetized plasma column. THIERY PIERRE, CNRS Paris — The study of the transition to turbulence is of major importance in nonlinear dynamics research. We studied the bifurcations in a magnetized plasma when the plasma is rotating (1). When the angular velocity of the plasma column is reduced, the azimuthal modes are evolving from m=3 to m=1. This situation has been revisited checking the existence of a hysteresis near each bifurcation points, determining if the bifurcations are of supercritical or subcritical. A subcritical transition displays hysteresis. This situation has already been investigated theoretically for drift wave in magnetized plasmas (2). The experiment is conducted choosing the same parameters as in (1). The control parameter is the potential of the anode that controls the rotation of the plasma. The control parameter is varied near each bifurcation points in two cases: at first increasing the control parameter and then decreasing the control parameter. Starting from a m=2 mode, the negative anode potential is increased until the m=1 mode is established. Then the anode potential is decreased to get a transition toward an m=2 mode. The results indicate that a hysteresis is present, though a rather high dispersion of the critical value is recorded. The results are more conclusive in the case of the transition from m=1 mode to the turbulent state. A theoretical model is under preparation to get a more precise description of the bifurcations. 1- T. Klinger et al., Phys. Rev. Lett. 79,3913,1997. 2- K. He, and A. Salat, Plasma Phys. Contr. Fusion, 31, 123–141, 1989.

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