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Transitions in an enclosed swirling flow[1] J.M. LOPEZ, Arizona State University — Transitions of the flow in an enclosed cylinder driven by the constant rotation of an endwall, from steady axisymmetric flow to aperiodic flow characterized by intermittent bursting dynamics where all the spatial and spatio-temporal symmetries have been broken, are studied numerically. The problem is controlled by two parameters, the Reynolds number and the cylinder aspect ratio. We vary the Reynolds number, fixing the aspect ratio at a value where the primary bifurcation of the axisymmetric steady state is to an axisymmetric periodic flow. The final transition to weak turbulence, however, is governed by a non-axisymmetric branch of rotating waves, which is the primary mode at lower aspect ratios, and the various branches of modulated rotating waves associated with subsequent bifurcations from the rotating wave. We study in detail the spatio-temporal characteristics of the various states encountered along the way, and how the symmetry of the problem impacts on the transition dynamics.

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