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Nonlinear spin-up of a thermally stratified fluid in cylindrical geometries J. RAFAEL PACHECO[1], Arizona State University, ROBERTO VERZICCO[2], Universita' di Roma "Tor Vergata", SERGEY SMIRNOV, Texas Tech University — We present a numerical study of incremental spin-up of a thermally-stratified fluid enclosed within right circular cylinder/annulus with rigid bottom and side walls and stress-free upper surface.This investigation reveals a feasibility for transition from an axisymmetric initial circulation to non-axisymmetric flow patterns, and it is motivated by the desire to compare the spin-up for Dirichlet and Neumann thermal boundary conditions. The numerical simulations demonstrate that the destabilizing mechanism is not purely baroclinic, but that vertical and horizontal shears may contribute to the instability. By characterizing the azimuthal instabilities without introducing any simplification we were able to assess to what extent an insulating boundary condition changes the time-dependent emergence of the instability. Our results agree with previous experimental data and provide a framework for understanding the role played by the baroclinic vorticity in the development of instabilities in thermally-stratified incremental spin-up flows.

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