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Experiments on baroclinic instability in a differentially heated rotating annulus with inclined bottom

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We present results of experiments in a rotating, baroclinic annulus of fluid. The apparatus is a differentially heated cylindrical gap, rotated around its vertical axis of symmetry, cooled from within, with a free surface, and filled with de-ionised water as working fluid. The base used is a truncated circular cone with an upward slope toward the inner cylinder. While the surface flow is observed with visualization technique, 2D-velocity fields are measured (not simultaneously) using Particle Image Velocimetry.

Results are compared with previous experiments in the same apparatus using a flat bottom topography where regular wave pattern were observed as different kinds of time-dependent flow pattern occured $a)$ in the first transition zone from axisymmetric flow regime to regular wave regime, $b)$ in the (smooth) transition to irregular flows. Not unexpected, slope bottom experiments show a different behaviour of the observed flow pattern. Here, considerable changes occur in the wave characteristics (amplitude and shape) but time-dependent flows appear to be not that various.