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The influence of a sloping bottom endwall on the linear stability in the thermally driven baroclinic annulus with a free surface

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We present results of a linear stability analysis of non-axisymmetric thermally driven flows in the classical model of the rotating cylindrical gap of fluid with a horizontal temperature gradient and a sloping bottom endwall configuration. For comparison, results of a flat bottom endwall case study are also discussed. In both cases, the model set-up has a free top surface.

The analysis is carried out numerically using a Fourier-spectral element method well-suited to handle the axisymmetry of the fluid container.

We find significant differences between the neutral stability curve for the sloping and the flat bottom endwall configuration, e.g., in case of a sloping bottom endwall, the wave flow regime is extended to lower rotation rates, i.e. the transition curve is shifted systematically to lower Taylor numbers.