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Spiral instabilities in Rayleigh-Benard due to a localized heating[1] HENAR HERRERO, Universidad de Castilla-La Mancha, MARíA CRUZ NAVARRO, Universidad de Castilla-La Mancha (UCLM), ANA MARíA MANCHO, Consejo Superior de Investigaciones Científicas (CSIC), UCLM TEAM, CSIC TEAM
— We study from the numerical point of view, instabilities developed in a fluid layer with a free surface, in a cylindrical container which at the bottom has a heating spike modelled by a parameter β. This localised heating approaches a boundary condition for a thermal plume. The partial differential equations that model this problem are discretized with a Chebyshev collocation method with appropiate conditions for the pressure field. An axysimmetric basic state appears as soon as a non-zero lateral temperature gradient is imposed. A preconditioned Arnoldi method has been used to compute the eigenvalues for the linear stability analysis. The basic state may bifurcate to different solutions depending on vertical and lateral temperature gradients and on the shape of the heating. We find different kinds of instabilities: extended patterns growing on the whole domain which include those known as target and spiral waves. Localised structures both at the origin and at the outer part of the cylinder may appear either as Hopf or stationary bifurcations.

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