Rotating compositional and thermal convection in Earth's outer core

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A b s t r a c t : The linear stability of compositional and thermal convection in the Earth's rotating outer core was investigated. We have identified the values of Takens–Bogdanov bifurcation points and codimension-two bifurcation points by plotting graphs of neutral curves corresponding to stationary and oscillatory convection for different values of physical parameters relevant to rotating compositional and thermal convection in the Earth's outer core. We have also derived a nonlinear one–dimensional Landau–Ginzburg equation near the onset of stationary convection at a supercritical pitchfork bifurcation, and nonlinear one-dimensional coupled Landau–Ginzburg type equations near the onset of oscillatory convection at a supercritical Hopf bifurcation. We have also discussed the stability regions of standing and travelling waves.

Key words: rotating thermohaline convection, Earth's core, Landau-Ginzburg equation, standing and travelling waves

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