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Rapidly rotating Rayleigh-Benard convection under the influence of external magnetic field KRASYMYR TRETIAK, STEVEN TOBIAS, University of Leeds — Motivated by the small-scale dynamics of the Earth's core, we study numerically rapidly rotating Rayleigh-Bénard magnetoconvection with a horizontal field and tilted rotation. We consider small-scales, low Ekman numbers $10^{-5} \div 10^{-7}$ and in the regime where magnetic diffusivity much larger than thermal diffusivity $q = \kappa/\nu \sim 10^{-4}$. The parameters are chosen to investigate the nature of small scale instabilities in the Earth's core which are driven by rotation of the planet and magnetic field generated by the geodynamo. Our local simulation focused on formation and time evolution of parasitic modes on elevator modes, which are driven by inertia. Along with 3D numerical studies which were carried out in open source spectral solver DEDALUS, we provide qualitative analysis of nonlinear solutions, and analyse the turbulent transport relevant for the evolution of larger scales.

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