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Numerical simulation of the convective flow patterns within a rotating concentric annulus with radial gravity ARES CABELLO, Facultad de Ingenieria, UNAM, RUBEN AVILA, Center for Aerospace Research and Education, UCI — The GEODYNAMO research requires the numerical study of the natural convection of the fluid confined in a rotating spherical shell. We present the flow patterns of a uniform-density Boussinesq fluid within a rotating spherical annulus with radial aspect ratio $\eta = 0.35$. The convective flow is induced by a gravity field acting radially inwards towards the center of the spheres, and the temperature difference between the internal sphere at T_i and the external sphere at T_e (where $T_i > T_e$). We also show (i) the influence of the rotation on the heat transfer rate, and (ii) the influence of the differential rotation (the internal sphere rotates at a different angular velocity than the reference frame and the external sphere) on the heat transfer rate. The fluid equations are solved by using the spectral element method (SEM). In order to avoid the singularity at the poles of the spheres, the numerical mesh is generated by using the Cubed-Sphere algorithm. The flow patterns are obtained for subcritical and supercritical Rayleigh numbers and Taylor numbers in the range 10^3 and 10^5. The results are successfully compared with data previously reported in the literature.

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