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The influence of the magnetic field on the heat transfer rate in rotating spherical shells.[1] ARES CABELLO , RUBEN AVILA, Facultad de Ingenieria. UNAM. Mexico — Studies of the relationship between natural convection and magnetic field generation in spherical annular geometries with rotation are essential to understand the internal dynamics of the terrestrial planets. In such studies it is important to calculate and analyze the heat transfer rate at the inner and the outer spheres that confine the spherical gap. Previous investigations indicate that the magnetic field has a stabilizing effect on the onset of the natural convection, reduces the intensity of convection and modifies the flow patterns. However so far it is still unclear how the magnetic field change the heat transfer rate behaviour. We investigate the heat transfer rate (Nu) in a rotating spherical gap with a self gravity field varying linearly with radius, and its relation with the intensity of the magnetic field induced by the geodynamo effect. The Boussinesq fluid equations are solved by using a spectral element method (SEM). To avoid the singularity at the poles, the cubed-sphere algorithm is used to generate the spherical mesh. Several cases are simulated in which the Rayleigh number, the magnetic Reynolds number and the Taylor number are the variable parameters. The flow patterns, the temperature distribution and the Nusselt numbers at both spheres are calculated.

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