Spherical MHD dynamo in a thin convection layer above a thick resistive core

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We performed magnetohydrodynamics (MHD) simulations in a sphere of radius r=1 with a thin convection layer between r=0.9 and r=1, with relatively slow rotation rates. The inner sphere of radius r=0.9 is a stable (rigid) region with the same resistivity as the convection layer. The dynamo-generated magnetic field, therefore, diffuses into the inner resistive sphere. Since the convection layer is such thin, the convection pattern and its dynamo action are very different from those observed in the standard geo- or solar dynamo simulations. For these simulations, we applied a newly developed global grid, Yin-Yang-Zhong grid [Hayashi & Kageyama, JCP (2016)] by which we can solve equations on the coordinate singularity at r=0.

Keywords: MHD dynamo, spherical convection, Yin-Yang-Zhong grid

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