

Effects of anisotropic turbulent transport on generation mechanism of the Earth's magnetic field

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Turbulence in the core is anisotropic because of the rotation of the Earth, the gravity, and the magnetic field. However unknown is the effect of anisotropic turbulence on generation mechanism of the magnetic field. We have been performing direct numerical simulations to examine the anisotropy of turbulent transport in the Earth's core. Here we perform numerical simulations by giving tensor eddy diffusivity. Such a study should be needed to examine the effect of tensor diffusivity on generation mechanism of the Earth's magnetic field. After that, we will perform direct numerical simulation in a larger region by taking into account local tensor eddy diffusivity, which would be estimated in terms of a second moment closure model.

Molecular diffusivities in the Earth's fluid core are very small, and therefore it is likely that large-scale fields are transported by small-scale flows. Turbulence in the core is anisotropic because of the rotation of the Earth, the gravity, and the magnetic field. However unknown is the effect of anisotropic turbulence on generation mechanism of the magnetic field.

We have been performing direct numerical simulations to examine the anisotropy of turbulent transport in the Earth's core. Moreover, we have attempted to estimate tensor eddy diffusivity. Here we perform numerical simulations by giving tensor eddy diffusivity. Such a study should be needed to examine the effect of tensor diffusivity on generation mechanism of the Earth's magnetic field. After that, we will perform direct numerical simulation in a larger region by taking into account local tensor eddy diffusivity, which would be estimated in terms of a second moment closure model, for example.