



Cascade processes in the planetary dynamo

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The planetary dynamo system is a good example of the nonlinear system with inverse cascades. The first reason of the inverse cascades is the rapid daily rotation (the Rossby number is $Ro \sim \mathcal{O}(10^{-5})$, and the Ekman number $E \sim \mathcal{O}(10^{-15})$, which corresponds to the quasigeostrophic regime, where inverse cascades take place). The other point is the inverse cascades concerned with the magnetic field, the so-called α -effect, well-known in the mean-field dynamo theory. This is a typical example of the non-local energy transfer from small scales to large scales. Using a pseudospectral MHD code in a Cartesian system of coordinates we investigate cascade properties of the Boussinesque-like dynamo system in wave space: the direction of the energy and enstrophy transfer in the wave space, anisotropy, as well as locality of the nonlinear interactions with and without a magnetic field. Applications to the mean-field magnetic field generation are considered.