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A direct comparison between single-fliud and Hall-MHD turbulence[1] HIDEAKI MIURA, National Institute for Fusion Science, KEISUKE ARAKI, Okayama University of Science — Effects of the Hall term on energy transfer in MHD turbulence and on intermittency are studied numerically through a direct comparison of the single-fluid MHD turbulence and Hall MHD turbulence, aiming at clarifying and modeling the small-scales so that we can carry out macroscopic simulations of torus plasma and solar wind plasmas with the appropriate contributions by the small scales. Direct numerical simulations of freely decaying incompressible turbulence are carried out. In the single-fluid MHD turbulence, both the enstrophy density and the current density show a typical sheet-like structure. On the other hand, the enstrophy density in Hall MHD turbulence shows a tubular structure which is similar to that in hydrodynamic turbulence. Such a transition can cause a qualitative change of the micro-transport by the fluid flow. We can show that the JxB force is superior to the advection term in the momentum equation. It is conjectured that the magnetic pressure, a part of the JxB force, can play a significant role to form the tubular structure of the enstrophy density once the Hall term is introduced. We will examine the conjecture through detailed analysis of the local field structures as well as through the energy transfer function analysis.

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