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Energy dissipation in three-dimensional kinetic simulations of relaxing turbulence

Vyacheslav Olshevsky (1,2), Sergio Servidio (3), Leonardo Primavera (3), Francesco Pucci (1), and Giovanni Lapenta (1)

(1) KU Leuven, Center for mathematical Plasma Astrophysics, Department of Mathematics, Leuven, Belgium, (2) Main Astronomical Observatory of NAS, Kyiv, Ukraine, (3) Dipartimento di Fisica, Universita della Calabria, Italy

We investigate the non-universality of turbulence in magnetized plasmas at the kinetic scales. We compute the power spectra in the kinetic particle-in-cell simulations of the Taylor-Green vortex with the superimposed magnetic fields. Three different configurations of the magnetic field having the same initial energies are studied. There is no external forcing, the evolution of the symmetric large-scale vortices starts abruptly due to the pressure imbalance. Maximum dissipation is observed after a few turnover times, much shorter than the Alfvén time or the ion gyration time. At this moment, power spectra are well established in all three magnetic configurations with the inertial range settled right between the ion and the electron scales. However, in two cases they have the slopes close to -2.7, while in the third case magnetic fluctuations show a steeper slope of -3.3, and the kinetic energy spectrum is milder with the slope of -2.4. The unsimilarities in the power spectra expose the intrinsic role of the magnetic field in the turbulent energy dissipation at kinetic scales.