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Non-universality of three-dimensional turbulence in PIC simulations

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We perform kinetic particle-in-cell simulations of Taylor-Green vortex with different initial magnetic field distributions. The evolution starts abruptly, and the system releases a substantial part of the magnetic field energy in a few ion gyration times. In this phase the initial pressure imbalance is compensated, and the system obtains its characteristic energy spectrum. After this phase a rather stationary dissipation of magnetic field energy and heating of plasma particles is observed. We find distinct discrepancies in the evolution and energy spectra of different magnetic configurations, despite the same initial global MHD invariants. Kinetic plasma processes that take place at scales smaller than ion inertial length may explain the non-universality of turbulence observed in the solar wind.