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Residual energy in magnetohydrodynamic turbulence and in the solar wind STANISLAV BOLDYREV, University of Wisconsin-Madison, JEAN CARLOS PEREZ, UW-Madison & U. New Hampshire, VLADIMIR ZHDANKIN, YUXUAN WANG, UW-Madison — Recent observations of the solar wind turbulence reveal puzzling breakdown of equipartition between kinetic and magnetic energies. This phenomenon is studied in the framework of weak magnetohydrodynamic (MHD) turbulence consisting of Alfven waves propagating in opposite directions along the guide magnetic field. It is demonstrated that nonlinearly interacting Alfven waves spontaneously generate imbalance of magnetic and kinetic energies, leading to the accumulation of residual energy Er=Ev-Eb at small field-parallel wavenumbers. The effect is also studied phenomenoligically and numerically for the case of strong MHD turbulence. The generation of the residual energy may be a manifestation of magnetic self-organization in a driven turbulent system. Implication of this phenomenon for the theory of MHD turbulence and for practical applications is discussed.

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