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MHD relaxation, intermittency and the origin of discontinuities in the solar wind[1] W. MATTHAEUS, S. SERVIDIO, A. GRECO, P. CHUYCHAI, University of Delaware, P. DMITRUK, U. Buenos Aires — Simulations of MHD turbulence show that several types of fast, local relaxation processes operate robustly. These include production of correlations associated with force-free states, Alfvenic states, and Beltrami flows. In MHD, all principle nonlinearities - Lorentz force, advection, magnetic induction, and the correlations among these – are weakened by fast relaxation. This occurs in spatial patches bounded by near-discontinuities, and can be described by a local adaptation of global relaxation principles. Non-Gaussian statistics are implied, thus providing a natural real-space explanation of the origin of intermittency. Given the many indications that turbulence is active in the solar wind, one might also inquire as to whether the numerous discontinuities observed are related to intermittency generated by turbulence. We show by analysis using classical methods and intermittency statistics, applied to both simulations and to solar wind magnetic field data, that tangential discontinuities in the solar wind may be signatures of intermittent turbulence associated with the boundaries between interacting flux tubes.

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