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On the generation of coherent structures and nonGaussianity in magnetohydrodynamic turbulence MINPING WAN, Bartol Research Institute, Department of Physics and Astronomy, University of Delaware, DE, SEAN OUGHTON, Department of Mathematics, University of Waikato, Hamilton, New Zealand, SERGIO SERVIDIO, Dipartimento di Fisica, Universita della Calabria, Rende, Italy, KAREEM OSMAN, WILLIAM H. MATTHAEUS, Bartol Research Institute, Department of Physics and Astronomy, University of Delaware, DE — Numerical simulations of magnetohydrodynamics are used to investigate the production of small scale coherent structures, a feature that is usually associated with enhanced dissipation and the phenomenon of intermittency, and the associated emergence of non-Gaussian statistics. By comparing ideal simulations with well-resolved dissipative simulations with identical initial conditions, non-Gaussianity and characteristic coherent structures are found to initiate almost identically in the two systems. The results suggests that generation of coherent structures and breaking of self-similarity are essentially ideal processes, with dissipation acting only to limit growth of the smallest scale structures. The generation of nonGaussian statistics appears to be related to local rapid relaxation in spatial patches, and the sharp coherent structures that form between them as boundaries. This has important implications for understanding the origin of intermittency in turbulence, as well as to the study of well-resolvedness in spectral method simulations.

Minping Wan
Bartol Research Institute, Department of Physics and Astronomy, University of Delaware, DE

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