

Abstract Submitted
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Current Sheet Formation and Self-Organization in Turbulent Plasmas¹ STEVEN SPANGLER, University of Iowa — Self-Organization can be defined as the process by which a physical system, in the course of its evolution, changes its spatial structure, the form of its equations of motion, or key coefficients in those equations. A turbulent magnetohydrodynamic (MHD) fluid can exhibit self-organization, so defined. A turbulent MHD fluid with collisional resistivity has a low rate of dissipation of turbulent energy. However, as the turbulence develops, it forms thin current sheets in which the current density increases exponentially. When the electron drift speed becomes comparable to or exceeds the ion acoustic speed, plasma instabilities can enhance the resistivity, and thus the dissipation rate. In turbulent evolution of this kind, an MHD fluid can transform itself from a low dissipation to a high dissipation state. Calculations show that it is plausible that turbulence in the solar corona could exhibit this behavior.

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