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Current Sheet Boundaries in MHD Turbulence and in the Solar Wind VLADIMIR ZHDANKIN, STANISLAV BOLDYREV, UW-Madison, JEAN PEREZ, UW-Madison, UNH, JOANNE MASON, University of Chicago — Current sheets inside of plasmas are characterized by strong changes in the magnetic field direction. We study this property of current sheets by measuring the angular change of the magnetic field direction across fixed spatial increments throughout the plasma domain. Using data from turbulent MHD simulations, we find that the probability distribution of angular change obeys an exponential law, with a scaling that is largely independent of the choice of spatial increment. In the first case, reduced MHD is used with a strong guide field ($\frac{\delta b}{B_0} = 1/5$), and the scaling is approximately fit by $\exp(-\theta/6.5)$. In the second case, full MHD is used with a weak guide field, and the fit is $\exp(-\theta/21.7)$. It is proposed that the difference in scaling parameters between the two regimes is due to the strength of the background magnetic field. This may explain the observations of spacecraft in the solar wind, which found two distinct populations of magnetic discontinuities with different exponential distributions of angular change in magnetic field, e.g. Borovsky (2008) and Miao et al. (2011).

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