Geophysical Research Abstracts
Vol. 14, EGU2012-10401, 2012
EGU General Assembly 2012

Anisotropy of MHD Turbulence and its Influence on Reconnection

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Turbulence is ubiquitous in astrophysical and space environments and is most likely responsible for the observed reconnection rates being the fraction of the Alfven speed and independent of microscopic dissipation (so called fast reconnection). Lazarian and Vishniac (1999) suggested a model of three-dimensional reconnection which is fast due to a presence of a low-level Alfvenic turbulence. This model used a phenomenological critically-balanced cascade from Goldreich and Sridhar (1995). The properties of this cascade, in particular its anisotropy, is critical for understanding of fast reconnection. Using highest resolution MHD simulation ever ($3072^2 \times 1024$) we were able to measure so-called anisotropy constant $C_A = (\Lambda\epsilon^{1/3})/(v_A\lambda^{2/3})$, the universal constant of Alfvenic turbulence that is the dimensionless combination that contain the ratio of parallel scale Λ and the Alfvenic speed v_A. This constant is highly valuable for observational astrophysics, space physics and studies of three-dimensional turbulent reconnection.