



Self-Feeding Turbulent Magnetic Reconnection on Macroscopic Scales

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We find that on the same given macroscopic system described with a fluid MHD approach, magnetic reconnection can progress in two entirely different ways. The first is the well-known laminar Sweet-Parker process. But a second, completely different and turbulent reconnection process is possible. This regime presents properties of immediate observational and experimental relevance: it is much faster, developing on Alfvénic rather than diffusive scales and the areas of reconnection become distributed chaotically over a macroscopic area of the system. The onset of this fast turbulent reconnection process is the formation of closed circulation patterns where the jet going out of the reconnection region turns around and forces its way back in, carrying along copious amounts of magnetic flux and allowing fast macroscopic reconnection.

Reference:

G. Lapenta, **Phys. Rev. Lett.**, Self-Feeding Turbulent Magnetic Reconnection on Macroscopic Scales, submitted.