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Energy distribution associated to 3D small scale magnetic reconnection in plasma turbulence

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Understanding the energy dissipation in plasmas with low collisionality such as the solar wind is still a matter of ongoing research. While magnetic reconnection and turbulence are processes that can produce the appropriate conditions for heating and energy dissipation at subptroton scales, the energy distribution during 3D reconnection events that occur from a turbulent cascade is not entirely clear. To shed some light on this topic, we use an explicit fully kinetic particle-in-cell code to simulate 3D small scale magnetic reconnection events forming in anisotropic and Alfvénic decaying turbulence. We define a set of indicators to find reconnection sites in our simulation based on intensity thresholds. According to the application of these indicators, we identify the occurrence of reconnection events in the simulation domain and analyse one of these events in detail. The event involves two reconnecting flux ropes, and it is highly dynamic and asymmetric. We study the profiles of plasma and magnetic-field fluctuations recorded along artificial-spacecraft trajectories passing near and through the reconnection region as well as the energy exchange between particles and fields during this event. Our results suggest that the distribution of the internal energy is controlled by the region between the reconnecting flux ropes whereas the kinetic energy is associated to the inner part of the flux ropes.

Student poster?

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