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Influence of Spontaneously Generated Turbulence on Magnetic Reconnection WILLIAM DAUGHTON, LANL, VADIM ROYTERSHTEYN, HOMA KARIMABADI, UCSD — The 3D dynamics of reconnection is examined for electron-positron plasmas within Harris sheet geometry with a guide field. This configuration is unstable to tearing modes at resonant surfaces across the layer, corresponding to oblique angles relative to 2D models. Vlasov theory predicts a spectrum of oblique modes which can destroy the flux surfaces and produce interacting flux ropes. These structures coalesce to larger scales leading to the continual formation and break-up of new current sheets and the generation of turbulence. The fluctuation spectrum is highly anisotropic and is characterized by two power-laws with a break at $kd_i \sim 1$, where d_i is the inertial length. In the large 3D simulations, the dissipation rate is reduced by $\sim 40\%$ relative to small 2D cases which are steady and laminar. In both limits, the reconnection remains fast (i.e. Alfvénic), is insensitive to the system size and ultimately occurs within inertial-scale current sheets. These results imply that the physics responsible for setting the time scale is not radically altered by the turbulence. However, the results indicate that a larger fraction of the magnetic energy is accessible in 3D and that many more particles are accelerated into the high energy tails due to the turbulence.

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