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Magnetic Field Shear in Kinetic Models Steps Toward Understanding Magnetic Reconnection Drivers[1] CARRIE BLACK, SPIRO ANTIOCHOS, RICK DEVORE, JUDITH KARPEN, NASA/GSFC — In the standard model for coronal mass ejections (CME) and/or solar flares, the free energy for the eruptive event resides in a strongly sheared magnetic. A pre-eruption force balance consists of an upward force due to the magnetic pressure of the sheared field and a downward tension due to overlying unsheared field. Magnetic reconnection disrupts this force balance; therefore, it is critical for understanding CME/flare initiation, to model the onset of reconnection driven by the build-up of magnetic shear. In MHD simulations, the application of a magnetic-field shear is a trivial matter. However, kinetic effects are dominant in the diffusion region and thus, it is important to examine this process with PIC simulations as well. The implementation of such a driver in PIC methods is challenging, however, and indicates the necessity of a true multiscale model for such processes in the solar environment. The field must be sheared self-consistently and indirectly to prevent the generation of waves that destroy the desired system. Plasma instabilities can arise nonetheless. Here, we show that we can control this instability and generate a predicted out-of-plane magnetic flux.

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