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**Onset of reconnection in the near magnetotail: PIC simulations**
YI-HSIN LIU, NASA-GSFC, JOACHIM BIRN, SSI, WILLIAM DAUGHTON, LANL, MICHAEL HESSE, NASA-GSFC, KARL SCHINDLER, Ruhr-University, Bochum — Using 2.5-dimensional particle-in-cell (PIC) simulations of magnetotail dynamics, we investigate the onset of reconnection in realistic tail configurations. Reconnection onset is preceded by a driven phase, during which magnetic flux is added to the tail at the high-latitude boundaries, followed by a relaxation phase, during which the configuration continues to respond to the driving. We found a clear distinction between stable and unstable cases, dependent on the deformation amplitude and ion/electron mass ratio. The threshold appears consistent with electron tearing. The evolution prior to onset as well as the evolution of stable cases, are largely independent of the mass ratio, governed by the integral entropy conservation as imposed in MHD. This suggests that ballooning instability in the tail should not be expected prior to the onset of tearing and reconnection. The onset time and other onset properties depend on the mass ratio, consistent with expectations for electron tearing. At onset, we found electron anisotropies $T_\perp/T_\parallel = 1.1 - 1.3$, raising growth rates and wave numbers. Our simulations have provided a quantitative onset criterion that is easily evaluated in MHD simulations, provided the spatial resolution is sufficient.[1]

[1]Liu et al. submitted to JGR

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