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Plasmoid-like structures along the reversal surface in simulations of the MST RFP J.A. REUSCH, J.K. ANDERSON, C.B. FOREST, J.S. SARFF, D.D. SCHNACK, UW - Madison and CMSO — Advances in computational power have now made possible nonlinear resistive MHD simulations of the RFP at experimentally relevant parameters. In particular, global magnetic reconnection events known as sawtooth crashes have been simulated at parameters matching those of 400kA discharges in MST (S$\sim$4x10^6) with the Debs code. At these parameters, the simulated sawtooth event is not only similar in character, but also in duration to the events observed in MST. This implies that a single fluid MHD model is able to reproduce the dynamics leading to reconnection times that are significantly faster than Sweet-Parker. One possible mechanism for reducing the reconnection time is a plasmoid-like structure that creates multiple X-points along the reversal surface during a sawtooth crash. Such structures have been seen both experimentally [Tharp, et al., PoP (2010)] and in simulation. To explore this effect, several simulations with an artificially truncated m=0 mode spectrum were performed. As the number of allowed toroidal mode harmonics is reduced, the duration of the sawtooth crash increases and the magnitude of the dynamo electric field decreases. Interestingly, while it has long been known that the m=0, n=1 mode is critical to the sawtooth dynamics in MST, without the higher n, m=0 modes the simulations do not produce well defined sawteeth. The effects of limiting the number of m=0 modes on the sawtooth crash and the temporal behavior of the plasmoid like structures will be presented. This work supported by the US DOE and NSF.

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