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Effects of oscillating poloidal current drive on magnetic relaxation in the MST reversed field pinch. ZICHAO LI, USTC, K. J. MCCOLLAM, JOHN S. SARFF, UW, Madison, HONG LI, WANDONG LIU, USTC, WEIXING DING, UCLA — Magnetic relaxation behavior in the reversed field pinch (RFP) is modified by oscillating poloidal current drive (OPCD) in the Madison Symmetric Torus (MST). OPCD is the application of a sinusoidal poloidal inductive loop voltage. OPCD amplitude and frequency are varied to investigate the entrainment of the RFP sawtooth cycle. In the standard RFP without OPCD, the sawtooth magnetic relaxation cycle is quasi-periodic, but it can be entrained by the OPCD cycle to be strictly periodic. With increasing OPCD amplitude at the same frequency, the number of entrained sawtooth crashes increases gradually; these crashes are bursts of magnetic tearing modes that nonlinearly interact to relax the current profile. The direction of cyclic trajectories in a 2D (Theta, F) space of RFP equilibrium parameters changes from clockwise in the standard case to counterclockwise with OPCD. At low frequency (<200Hz), the OPCD shows a clear PPCD-like effect — no sawteeth occur during the decreasing phase of the edge toroidal magnetic field. At high frequency(>500Hz), the (Theta, F) trajectory seems to show a bifurcation effect not present at lower frequencies. We hypothesize that the OPCD modifies the behavior of the core tearing modes by affecting their linear stability as it moves the plasma equilibrium in its (Theta, F) trajectory. Future work will focus on determining the current profiles and linear stability analysis. This work is supported by the US DOE and the CSC.

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