Abstract Submitted
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**MST's Programmable Power Supplies: Bt Update, Bp Prototype**[1] D.J. HOLLY, B.E. CHAPMAN, K.J. MCCOLLAM, J.C. MORIN, M.A. THOMAS, University of Wisconsin-Madison — MST's toroidal field programmable power supply (Bt PPS) has now been in operation for several years and has provided important new capabilities. One of the primary goals for the Bt PPS is the partial optimization of inductive current profile control, involving control of the poloidal electric field. The Bt PPS has achieved fluctuation reduction over MST's entire range of Ip. At the largest Ip, the Bt PPS achieves fluctuation reduction with a smaller poloidal electric field than the previous passive system, implying that substantially longer periods of current profile control may be possible. The Bt PPS has also been used to produce Ohmic tokamak plasmas in MST. With an applied toroidal field of 0.135 T, and q(a) $>$ 2, the estimated energy confinement time is roughly consistent with neo-Alcator scaling. Driving q(a) $<$ 2 with larger Ip, the confinement time degrades, but the discharge duration does not terminate prematurely. To fully optimize current profile control and to test MST operational limits, a PPS is also needed for the Bp circuit. Currently in prototype stage, the Bp PPS will feature a number of innovations to increase its flexibility and performance. Isolated charging, control, and monitor systems will eliminate charging relays, reduce coupling between modules, and minimize capacitor heating. Seven-level pulse width modulation will reduce output ripple and switching losses. Solid state shorting bars will eliminate shorting relays and minimize wiring. A balanced switching algorithm will minimize capacitive noise generation.

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