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Oscillating Field Current Drive Experiments on MST K.J. MCCOLLAM, J.K. ANDERSON, D.J. DEN HARTOG, F. EBRAHIMI, J.A. REUSCH, J.S. SARFF, D.R. STONE, H.D. STEPHENS, UW-Madison, D.L. BROWER, W.X. DING, UCLA — Oscillating field current drive (OFCD) is a proposed method of efficient, steady-state RFP sustainment in which applied AC poloidal and toroidal loop voltages interact with magnetic relaxation to produce a DC plasma current. OFCD is added to a standard RFP in the MST device, increasing the net plasma current by up to about 10%, with Ohmic efficiency and without a net decrease in energy confinement or beta ($\beta \propto p/B^2$). The total current can be increased or decreased according to the phase between the two AC voltages. Time series of equilibria are reconstructed using internal measurements for the cases of OFCD with different phases and of OFCD off. Of these the OFCD case with the most added current is calculated to have, on cycle average, the highest confinement time and beta, the lowest fluctuation-induced dynamo electric field, and the lowest magnetic helicity decay rate. To date, increases in input power have not led to further increases in the OFCD-added current, perhaps due to discrete magnetic fluctuation events often observed at increased input power. This work is supported by the US DOE.

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