Oscillating-Field Current-Drive Experiments on MST\textsuperscript{1} K.J. McCollam, J.K. Anderson, F. Ebrahim, D.J. Den Hartog, J.A. Reusch, J.S. Sarff, H.D. Stephens, D.R. Stone, UW-Madison, D.L. Brower, W.X. Ding, UCLA — Oscillating-field current drive (OFCD) is a proposed method of efficient, steady-state current drive in which applied AC poloidal and toroidal loop voltages interact with magnetic relaxation to produce a DC plasma current. OFCD at a moderate power level is added to Ohmically sustained reversed-field pinch plasmas in the MST device, and its effects on equilibrium profile evolution, global magnetic fluctuations, and energy balance are examined using a variety of measurements. For the optimal phase between the two applied AC voltages, the cycle-average plasma current increases by up to 10\% with Ohmic efficiency, while both the energy confinement time $\tau_E$ and normalized thermal pressure $\beta$ slightly improve, consistent with a reduction in magnetic fluctuation amplitudes. Nonlinear, 3D, resistive-MHD simulations reproduce the main experimental features, especially the phase dependence of the added current. Internal fluctuation measurements are underway to examine changes in the relaxation dynamics. A new programmable power supply is to be used in optimizing OFCD performance with longer pulses, more power, and improved waveform control, including nonsinusoidal OFCD.

\textsuperscript{1}This work is supported by the US DOE.