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Overview of MST Results and Plans J.S. SARFF, University of Wisconsin-Madison and Center for Magnetic Self Organization in Laboratory and Astrophysical Plasmas, MST TEAM — Improved confinement with high beta has been established in MST over its full range of plasma current capability using transient inductive current profile control. Both thermal electron and ion confinement are increased, and energetic electrons are observed to 100 keV. The global energy confinement time is 12 ms at high current and high temperature (T_e=2 keV, T_i =1 keV), with β_{tot}=10% (only Ohmic heating). Maximum β_{tot}=26% is attained at lower current and temperature with D_2 pellet injection, without evidence of hard-beta-limit phenomena. Momentum transport associated with MHD tearing shows the fascinating behavior that the Maxwell and Reynolds turbulent stresses are both large but oppositely directed in sawtooth magnetic relaxation events. Momentum is transported rapidly in these events, presumably through the imbalance in the stresses. Electron temperature fluctuations associated with MHD tearing are measured using a multi-point, multi-pulse Thomson scattering diagnostic. A 5-250 kHz pulse-burst laser is under construction to extend the Thomson capability to high frequency. Lower hybrid and electron Bernstein wave injection are under development to provide more sustained current profile control and heating. X-ray emission from the plasma is observed for both waves at 175 kW injected power. Substantial new experimental capability will be provided by a recently installed programmable power supply for the toroidal field, a new 1 MW, 20 ms neutral beam injection system, and upgraded OFCD system. Supported by U.S. DoE and NSF.

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