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Sawtooth-cycle variation of electron temperature in MST, and prospects for improvement of fast Thomson scattering measurements[1]
D.J. DEN HARTOG, H.D. CUMMINGS, R. O'CONNELL, J.A. REUSCH, University of Wisconsin-Madison and Center for Magnetic Self-Organization — Initial measurements with the new Thomson scattering diagnostic on MST show a flattening of the Te profile during a sawtooth crash. These measurements were made in standard sawtoothing reversed-field pinch discharges, and show the core temperature dropping from 400 to approximately 150 eV, while the edge rises several-fold. Measurement of Te time dynamics in MST will be advanced by further development of the Thomson scattering diagnostic. In the near term, two independently triggerable lasers will be used to make two Te profile measurements separated by greater than or equal to 100 ns. By varying this separation time over the course of a data ensemble, an initial Te fluctuation spectrum will be produced. In the longer term, a third "pulse-burst" laser will be added to the diagnostic system. This laser will produce a burst of 10-30 approximately 1 J Q-switched pulses at repetition frequencies 5-250 kHz. The planned laser system will operate at 1064 nm and is based on existing Nd:YAG systems used to study fluid dynamics [Brian Thurow et al., Appl. Opt. 43, 5064 (2004)]. The burst train of laser pulses will enable the study of Te and ne dynamics in a single MST shot, and with ensembling, will enable correlation of Te and ne fluctuations with other fluctuating quantities.

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