Abstract Submitted
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Evolution of Electron Thermal Transport Through a Magnetic Relaxation Event in MST[1] J.A. REUSCH, J.K. ANDERSON, H.D. CUMMINGS, D.J. DEN HARTOG, C.B. FOREST, R. O'CONNELL, University of Wisconsin - Madison — Magnetic relaxation events known as sawteeth are a consistent feature of the 400kA standard discharges in MST. At the sawtooth crash, global particle and energy confinement change substantially. Within 0.5 ms the global energy confinement time decreases by a factor of two or more (from 2 ms to less than 1 ms), and the pressure and current profiles flatten. The electron thermal diffusivity (χ_e) profile evolves on the time scale of the sawtooth cycle (6 to 8 ms) peaking just before the crash, then flattening and reaching a minimum after the crash. The relatively low χ_e in the core after the crash allows the flattened pressure and current profiles to slowly peak once again. A quantitative analysis of these transport quantities is directly dependent on the input power ($P = \int \mathbf{E} \cdot \mathbf{J} \mathrm{dV}$). By applying Faraday's law, to get the internal loop voltage, and then Poynting's theorem, $\mathbf{E} \cdot \mathbf{J}$, and thus the input power, can be determined. The internal loop voltage can be found by either a finite difference of a time series of equilibrium reconstructions or by reconstructing the time derivative of the Grad-Shafranov equation directly. We compare both methods to the simple Ohm's law approximation, $\mathbf{E} = \eta \mathbf{J}$, using an assumed resistivity profile.

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