

Abstract Submitted
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Understanding of the Poloidal Structure of the Sawtooth Precursor¹ TRACE T. JOHNSON, Drake University, STEFANO MUNARETTO, EDWARD J STRAIT, YUEQIANG LIU, General Atomics — The linear MHD code MARS is used to explain phase folding in the poloidal direction observed by edge magnetic diagnostics during sawtooth instability events in the DIII-D tokamak. The sawtooth relaxation is an MHD instability that occurs when an $m = n = 1$ flux surface exists in the plasma. The instability occurs cyclically as the safety factor q on axis oscillates from $q(0) > 1$, creating good core confinement, to $q(0) < 1$, allowing the instability to grow and the confinement to weaken. Weak confinement allows the $q(0)$ value to grow and restart the cycle. Mirnov coils are used to measure external magnetic field variation during the sawtooth cycle. Fourier analysis of the data shows that the structure of the instability closes on itself after one toroidal turn but the structure of the instability in the poloidal direction, as seen at the wall, has a non-monotonic "zigzag" pattern. Ideal MHD MARS simulations are compared to experimental data. In these simulations, poloidal mode number superposition and wall effects are examined to reproduce experimental data and understand the sawtooth poloidal structure.

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