

Abstract Submitted
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Observations of Harmonic Oscillations and ELM Magnetic Precursors in NSTX¹ F. KELLY, Unaffiliated, E. FREDRICKSON, R. BELL, PPPL, K. TRITZ, JHU, R. MAINGI, ORNL, H. TAKAHASHI, PPPL — Recent experiments in the National Spherical Torus Experiment (NSTX) demonstrated the progressive suppression of edge localized modes (ELMs) with increasing lithium deposition. Sufficient lithium suppressed ELMs and made the occurrence of low-frequency, low-n harmonics more frequent. Signatures of these harmonic oscillations with a significant edge component were observed in both the high-n Mirnov magnetic and soft X-ray diagnostics of NSTX. Two distinct sets of harmonic oscillations can be observed during some ELM-free periods. The harmonic oscillations are consistent with modes localized in the edge with the frequency of the $n = 1$ harmonic near the rotation frequency of the edge plasma. NSTX magnetic diagnostics also observe distinctive signatures of ELMs. Transient $n = 1$ and $n = 2$ mode bursts and occasional higher n modes with frequency in the 30 to 90 kHz range occurred simultaneous with the increase in fast D_a signal. These bursts of $n = 1$ and $n = 2$ modes resemble a model simulation of ELMs by T. Evans in which a bifurcation of magnetic topology is driven by nonlinear feedback amplification of thermoelectric currents from linear peeling-ballooning modes.

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