Abstract Submitted
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Evolution of plasma density structures during sawtooth events in DIII-D[1] D. LIU, Princeton University, W. FOX, S. BOSE, PPPL, Z. YAN, G. MCKEE, UW, Madison, A. GOODMAN, Princeton University, H. JI, Princeton University and PPPL, V. IGOCHINE, IPP, Y. ZHU, UC, Davis, S. JARDIN, N. FERRARO, PPPL — The sawtooth crash in fusion plasmas leads to a fast drop in core electron temperature, and it may be associated with rapid and explosive plasma phenomena in solar and space plasmas. Several models have been proposed for the fast temperature evolution during sawteeth, including fast magnetic reconnection provided by two-fluid effects, or the plasmoid instability, or growth of secondary MHD instabilities such as ballooning instabilities. Experiments were conducted at DIII-D through the Frontier Science program where the Beam Emission Spectroscopy (BES) system was used for 2-D localized density measurements at the sawtooth region during sawtooth events in DIII-D to understand the role of these mechanisms. We obtained 2-D time-domain movies of the evolution of $\frac{\delta n}{n}$ during sawteeth through 1) cross calibration of the time response and gain for each channel; and 2) careful subtraction of background and plasma-edge-light to isolate the density response in the plasma core. We compare the BES density observations with 3-D mode structures determined by external magnetic probes. Techniques of our analysis are presented and results over numerous shots are analyzed and compared to predictions for the competing models.

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