Advances in understanding of "Sawtooth Oscillation" and Visualization technique for transport study in tokamaks*

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Visualization of Magneto-Hydro-Dynamic (MHD) instabilities and turbulence phenomena in tokamak plasmas have provided unprecedented information in understanding the detailed physics. High resolution (temporal and spatial) 2-D images of electron temperature fluctuations during the sawtooth oscillation (m/n=1/1 mode) have revealed unresolved physics phenomena via studies comparing the experimentally observed 2-D images and the expected 2-D patterns of the plasma pressure (or electron temperature) from prominent theoretical models developed for the m/n=1/1 mode over the last three decades [1]. Recent advancements in visualization techniques adopted in new systems on DIII-D and KSTAR will provide an opportunity to revisit various MHDs. In addition, Microwave Imaging Reflectometry (MIR) based on a multi-frequency source will be examined for turbulence physics such as "zonal flow".

[1] H. Park and A. Bhattarcharjee, Review paper on "Revisiting Sawtooth Oscillations in Tokamak Plasmas: Experiment and Theory" submitted in PPCF

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