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Theory Experiment

Sawtooth-induced Fast-ion Transport in the DIII-D Tokamak: Observations and Comparison to Theory*

C.M. Muscatello, W.W. Heidbrink, D.C. Pace, Y. Zhu, *U. of California-Irvine*; Ya.I. Kolesnichenko, V.V. Lutsenko, Yu.V. Yakovenko, *Institute for Nuclear Research*; M.A. Van Zeeland, R.K. Fisher, *General Atomics*; B.J. Tobias, *U. of California-Davis* — Tokamak sawteeth consist of a reorganization of the plasma magnetic field and various plasma parameters. The extent to which the fast-ion distribution function $F(\mathbf{x},\mathbf{v})$ is influenced can depend on the ions' distribution of pitch and energy as well as the nature of the crash. Recent sawtooth experiments at DIII-D employed the newly extended fast-ion deuterium-alpha (FIDA) diagnostic, 2D FIDA imaging, and the newly commissioned fast-ion loss detector. Consistent with theoretical predictions, the FIDA diagnostic indicates that passing particles are more strongly affected by a sawtooth crash than the trapped population. Furthermore, FIDA imaging reports a depletion of up to 50% of the central fast-ion density. Extensive experimental data provide a rigorous test bed of theoretical models.

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