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Generation of Suprathermal Electrons During Magnetic Reconnection at the Sawtooth Instability in Tokamak Plasma¹

P.V. SAVRUKHIN, Kurchatov Institute, E.J. STRAIT, General Atomics — Intense bursts of x-ray and electron cyclotron emission are observed during sawtooth instabilities in high-temperature plasmas in the DIII-D tokamak. The bursts are initiated around the X-point of the $m=1, n=1$ magnetic island at the beginning of the sawtooth crash and are displaced to larger radius later during the temperature collapse. Reconstruction of the magnetic configuration using motional Stark effect (MSE) diagnostic and numerical simulations indicates that the bursts can be connected with suprathermal electrons ($E_v \sim 30 - 40$ keV) generated during reconnection of the magnetic field lines around the $q=1$ surface. The intensity of the non-thermal bursts during sawteeth in ohmically and auxiliary (NBI, rf, ECRH) heated plasma depends on the rate of the magnetic reconnection and amplitude of the MHD mode. Results of the experiments are compared with studies of the sawteeth in T-10 tokamak [1]. Possible effect of the nonthermal electrons on MHD modes is discussed.

[1] P.V. Savrukhn, Phys. Plasmas **9** (2002).

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