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Theory Experiment

Edge Current Dynamics During the Type 1 ELM Cycle,*

D.M. Thomas, R.J. Groebner, A.W. Leonard, and T.H. Osborne, *General Atomics* – Initial studies have been made with the DIII-D LIBEAM system to examine the behavior of the edge current density $j(r)$ during the Type 1 ELM cycle. While the ion and electron pressure profiles have been extensively studied, the behavior of the edge current is less known. To address this need, the LIBEAM system has been developed to provide a finely spaced profile of the edge poloidal magnetic field from which one can infer $j(r)$. Conditional averaging of the signals for multiple ELMs improves the sensitivity and allows us to examine the dynamics of edge (j, V_p) growth and decay as a fraction of ELM spacing, or fixed absolute time after an ELM. Initial analysis shows that the current peak can relax by about a factor of two within a few ms after an ELM, consistent with edge resistive decay times. The physics mechanism for the reduction of current has not yet been studied. The current appears to lag the pressure gradient evolution, both during the collapse and during the rest of the cycle, where the pressure has already returned to its pre-ELM value but the current continues to increase until the next ELM.

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