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Category Number and Subject: 5.6.2 DIII-D Tokamak

[] Theory [x] Experiment

Onset Times of SOL Current, Thermal Collapse, and Magnetic Perturbations During ELMs in DIII-D Tokamak,* H. Takahashi, E.D. Fredrickson, Princeton Plasma Physics Laboratory, M.J. Schaffer, E.J. Strait, T.E. Evans, L.L. Lao, General Atomics, M.E. Austin, U. of Texas-Austin, J.G. Watkins, Sandia National Laboratories We report results from the continuing investigations [1] of the effect on MHD stability of scrape-off-layer current (SOLC) flowing along open field lines and detected by the tile current array diagnostic. Onset times of the SOLC will be compared with those of thermal collapse at the plasma edge detected by the electron cyclotron emission diagnostic and magnetic perturbations measured by the Mirnov diagnostic. In the face of noise in the signals before the ELM occurs, onset times will be analyzed statistically, taking into consideration digitizer timing uncertainty and signal processing bandwidth. Preliminary analysis indicates that the SOLC onset is concurrent with the magnetic perturbations and leads the thermal collapse. These results may point to the need to re-examine the usual causality relationships, at least during the initial ELM phase, that heat and particles expelled by a thermal collapse of the plasma edge cause the SOLC to flow, and possibly suggest that the ELM process begins in the SOL.

[1] H. Takahashi, et al., to be published in Nucl. Fusion.

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