

Abstract Submitted
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Improving Diamagnetic Flux Temporal Resolution to Measure ELM Energy Loss¹ P.E. SIECK, General Atomics, L.R. BAYLOR, ORNL, T.E. EVANS, A.W. LEONARD, T.H. OSBORNE, E.J. STRAIT, General Atomics — When an ELM occurs in a tokamak, a substantial loss of stored thermal energy can occur in a very short time, resulting in a change in the plasma diamagnetism. A diamagnetic loop is therefore an attractive diagnostic for characterizing the change in energy during ELMs. A loop external to the vessel can be used but it is bandwidth-limited by the vessel wall, therefore the signal is severely attenuated above 40 Hz in DIII-D. The temporal resolution can be improved by combining the (slow) diamagnetic signal with a properly scaled internal (fast) toroidal B_T signal. The results agree with finely-spaced EFIT equilibrium reconstructions to within 10% before each ELM, but the diamagnetic calculation often shows up to twice the drop in energy at the ELM. The B_T signal reveals the magnetic change completes in 0.5 ms or less with occasional dynamics above 10 kHz. This improved temporal resolution allows comparison of phenomenology in natural vs. pellet-triggered ELMs, and also effects of partial ELM suppression under resonant magnetic perturbation.

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