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Theory Experiment

Feedback Control of Resistive Wall Mode Stability Using Neutral Beam Injection Heating,* J.M. Hanson, H. Reimerdes, M.J. Lanctot, G.A. Navratil, *Columbia U*; G.L. Jackson, R.J. La Haye, P.E. Sieck, E.J. Strait, *GA*; M. Okabayashi, *PPPL*; Y. In, *FAR-TECH* – Measurements of the plasma response to externally applied, low- n magnetic fields can be used to determine the resistive wall mode (RWM) stability of the plasma equilibrium. A real-time plasma response measurement has been used as an input to a neutral beam injection (NBI) feedback algorithm to directly control the plasma response amplitude and hence the RWM stability for the first time. A rotating $n=1$ perturbation is applied at a fixed frequency, and the plasma response is calculated by Fourier-analyzing magnetic measurements at the applied frequency and subtracting the known vacuum pickup from the control coils. In contrast to stability analysis methods that rely on calculated equilibria, the plasma response measurement naturally includes both ideal MHD and non-ideal contributions to RWM stability. A zero-dimensional model for NBI control of the plasma response has been developed to aid in optimizing feedback settings.

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