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Modeling of Feedback Stabilization of External MHD Modes in Toroidal Geometry

M.S. CHU, General Atomic, M.S. CHANCE, M. OKABAYASHI, Princeton Plasma Physics Laboratory — The intelligent shell feedback scheme seeks to utilize external coils to suppress the unstable MHD modes slowed down by the resistive shell. We present a new formulation and numerical results of the interaction between the plasma and its outside vacuum region, with complete plasma response and the inclusion of a resistive vessel in general toroidal geometry. This is achieved by using the Green’s function technique, which is a generalization of that previously used for the VACUUM code and coupled with the ideal MHD code GATO. The effectiveness of different realizations of the intelligent shell concept is gauged by their ability to minimize the available free energy to drive the MHD mode. Computations indicate poloidal coverage of 30% of the total resistive wall surface area and 6 or 7 segments of “intelligent coil” arrays superimposed on the resistive wall will allow recovery of up to 90% the effectiveness of the ideal shell in stabilizing the ideal external kink.

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General Atomics

Prefer Poster Session

Special instructions: MHD, immediately following GA Navratil

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