

Response of a Resistive and Rotating Tokamak to External Magnetic Perturbations Below the Alfvén Frequency

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Abstract

Motivated by the recent experimental observation that plasma stability can be improved by external magnetic perturbations, the general problem of plasma response to external magnetic perturbations is investigated. Different (vacuum, ideal, and resistive) plasma response models are considered and compared. Plasma response, in experiments where stabilization was achieved, is obtained through computation using the MARS-F code, with a plasma model that includes both plasma resistivity and rotation. The resultant magnetic field line stochasticity is much reduced from that obtained formerly using the vacuum plasma model. This reduced stochasticity is more consistent with the favorable experimental observation of enhanced stability. Examples are given for response of an ITER plasma to perturbations generated by the correction coils; and response of a plasma to external coils (antenna) up to the Alfvén frequency.

