Category 5: Application of Resonant Magnetic Perturbations for ELM Control and Implications for ITER
Prefer Poster

Modeling of Plasma Pressure Effects on ELM Suppression With Resonant Magnetic Perturbations in DIII-D*

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Small edge resonant magnetic perturbations (RMPs) are used to control the pedestal pressure gradient without destroying the H-mode transport barrier in low ν_e^* ITER relevant, DIII-D plasmas. During this process the pedestal pressure gradient drops below the linear peeling-ballooning stability limit as calculated by ELITE, which leads to stabilization of edge localized modes (ELMs). The work discussed in this presentation concentrates on modeling the effects of β_N on the structure of the vacuum magnetic field during ELM suppression using *n*=3 RMPs in the DIII-D tokamak. Previously, low-triangularity ($\langle\delta\rangle=0.30$) ELM suppression experiments showed a dependence on the NBI power for the presence of ELMs, indicating that certain power threshold needs to be reached for ELMs to be suppressed. Here, several high-triangularity ($\langle\delta\rangle=0.51$) discharges with different neutral beam injection power levels and β_N's ranging from 1.5 to 2.3 are modeled and compared to low-triangularity discharges with a similar range of β_N's. Kinetic equilibrium fits are used for a reconstruction of bootstrap current and energetic ion population. Changes in the pedestal profiles and vacuum magnetic structure are compared for ELMing and ELM suppressed phases during the RMP pulse. The field line integration code TRIP3D is used to model the magnetic perturbation produced by the intrinsic and externally applied error fields in the DIII-D experiment and to quantify the loss of edge poloidal magnetic flux due to stochastic magnetic fields. Changes in the vacuum field structure are analyzed along with magnetic diffusion coefficient, filed line lengths, and Kolmogorov lengths.

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