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Development

Theory Experiment

ELM Control Coils for ITER* M.J. Schaffer, T.E. Evans, A.M. Garofalo, *GA*, M.E. Fenstermacher, *LLNL*, M. Becoulet, *EURATOM CEA*, E. Nardon, *Culham Sci. Centre*, R.J. Hawryluk, J.E. Menard, J-K Park, *PPPL*, S.A. Sabbagh, *Columbia U.*, M. Aldan, *UCB* – Fast Type-I ELM heat pulses in ITER are predicted by empirical scaling to severely limit divertor target lifetime. Type-I ELM suppression by weak ($dB/B_0 \sim 3 \times 10^{-4}$) non-axisymmetric, resonant magnetic perturbations (RMP) was demonstrated definitively on DIII-D. Empirical correlations were developed, but the physical processes are still incompletely understood. The ITER design originally had no place for RMP coils. We proposed, analyzed, and evaluated many conceptual coil sets for their: ability to make suitable resonant field spectra without excessive collateral magnetic braking of plasma rotation; engineering feasibility; and remote maintainability. The presently favored concept can work over the full range of ITER q , and the non-resonant torque can be optimized over a wide range. This collaborative work yielded advances on braking and on plasma screening and amplification of resonant and non-resonant non-axisymmetric perturbations.

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