

Subj category: 1 (ergodization of the magnetic field)

Title: Preliminary Study of ITER Correction Coils for ELM Suppression

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Fourier harmonic spectra of external perturbation magnetic fields generated by ITER error correction coils are computed on plasma equilibrium magnetic surfaces, in order to evaluate these coils for a possible edge localized mode (ELM) suppression rule. ELM damage amelioration is required to limit ITER divertor and wall erosion. ELM amplitude reduction and/or suppression by static edge magnetic perturbations, recently demonstrated in DIII-D experiments, might prove suitable for ITER. One aspect of “suitability” is whether this technique could be implemented on ITER by using the already-designed error control coils.

While magnetic field integration is the gold standard of stochastic field synthesis and analysis, it is time consuming and poorly suited to preliminary field geometry studies in which several parameters are varied. Fourier analysis of a small perturbing field on a toroidal magnetic surface into helical harmonics is fast and reveals many important features of the perturbation. We will report on Fourier analysis on ITER magnetic surfaces with the new SURFMN code, which is part of the TRIP3D suite. SURFMN integrates with the proper area metric, a necessary feature for quantitative work, especially if cancellation among various coil contributions is present.

Because the necessary and sufficient features of successful ELM amelioration are not yet known, we will compare computed spectra of fields that can be applied by ITER coils against spectra from successful and unsuccessful DIII-D ELM suppression experiments. Preliminary results from this study will be presented.

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