

Study of nonaxisymmetric ELM control coils for ITER

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Abstract. Large Type-I edge-localized mode (ELM) heat pulses may limit the life of divertor targets in a burning plasma. Recent experiments show that pitch-resonant nonaxisymmetric magnetic perturbations of the plasma edge of 0.0005 or less of the main magnetic field offer a useful solution, but there is little room in the presently designed ITER for the many small perturbation coils. We briefly review coil requirements for ELM suppression. We show by many calculated examples that large arrays of coils (e.g. 4 toroidal rows of 9 coils each) on the outboard wall near the plasma (at the radius of the blanket-vacuum vessel interface, $R \sim 8$ m) can meet the known quantitative requirements, expressed in terms of the helical Fourier harmonic spectrum, for both low- and high- q ITER expected plasmas. Arrays of less than 4 rows of 9 coils do not satisfy the non-quantified requirements (rapid decay of the perturbation into the core and low amplitude of nonresonant side lobes) as well, but the consequences of these shortfalls are unknown at present.