Modeling of Type I ELM control by stochastic fields in ITER.

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Numerical results of heat transport modeling in the presence of Type I ELMs and radial magnetic perturbation from external coils are presented for standard H-mode scenario in ITER. The numerical simulations are based on the ideal linear MHD stability code MISHKA coupled with non-linear energy transport 2D code TELM, 3D magnetic field calculations for external coils and transport code CRONOS. The main mechanism of the ELM crash in the code TELM is the increased parallel conductive flux in the perpendicular to the magnetic surface direction caused by the radial perturbation of the magnetic field due to the unstable ballooning mode. In the presence of the external magnetic perturbation the radial transport is also increased for the same reason, but this time the radial magnetic perturbation is static and hence can be optimized to keep pedestal pressure gradient just under critical for ballooning modes value leading to ELMs suppression. A number of possible designs for ITER ergodic coils and corresponding spectrum in flux coordinates are analyzed in a realistic geometry with a goal to combine ITER technical design restrictions and the optimum perturbation spectrum for main ITER scenarios. The magnetic perturbation should be resonant mainly at the plasma edge in the pedestal region but not to perturb the plasma center where the addition error fields could lead to seed islands creation and hence destabilization of neoclassical tearing modes (NTM).