Calculation of the Runaway Electrons Stopping Power in ITER

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The stopping power and scattering angle of relativistic runaway electrons are estimated in realistic ITER boundary plasma, where the inhomogeneous structure of the first wall and the shallow angle of incident are taken into account. The simulations are done for mono-energetic electrons of 10 and 50 MeV, energy densities of 50 MJm^{-2} and impact angles of 1^{o}. After making several turns in the boundary plasma and “slighting” upon the wall surface, relativistic electrons eventually lose their energy and current partly in plasma and partly in the material structure. The electromagnetic energy of RE beam is dissipated due to inductivity in passive structure (wall, etc). The collisional and radiative stopping power is estimated under realistic ITER conditions..

The calculations of the first wall damage in ITER by runaway electrons during disruptions are presented in this paper. The deposition profiles of runaway electrons into W and Be wall by the ENDIP Monte Carlo code are estimated by taking into account the relativistic electron energies and the effect of secondary electron generation. It is found that both Be and W melt to depths of ~1.2-2.5 mm for these conditions.

Suppression of REs by an external magnetic perturbation is also estimated. The required magnetic perturbation is estimated as $\delta B_r/B \approx 0.1\%$. The proper assessment of the required coil current and voltage is derived.