

## Assessing the effect of TBMs and ELM mitigation coils on fast ion confinement in ITER

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ELMs are foreseen to be a serious threat to the H-mode operation of ITER. The most promising method of mitigating ELMs is to generate error fields with in-vessel coils [1]. These magnetic perturbations are, however, likely to lead to additional fast ion losses. We simulate the losses of fast alpha particles and NBI ions in ITER under the 3D perturbations caused by toroidal field coils, Ferritic Inserts (FIs), Test Blanket Modules (TBMs) and ELM Control Coils (ECCs) with the ASCOT code [2].

2D equilibrium and 3D perturbation data from the ITER IDM database are used as background for test particle following and field line tracing simulations to assess the confinement of fast ions in the ITER reference 15 MA and 9 MA operating scenarios. We find that the confinement in the 15 MA reference operating scenario is dramatically decreased when designed maximum current is ran in the ECCs. This is in agreement with recent results of the OFMC code [3].

However, we acknowledge the need for more accurate equilibrium reconstruction before the issue can be fully resolved. Field line tracing simulations reveal that the observed fast ion losses are caused by stochastization of the magnetic field deep inside the pedestal. Were such stochastization to happen, the equilibrium profiles should change significantly. Therefore, the currently used method of adding 3D perturbations to 2D equilibria is inconsistent.

### References

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- [3] K. Shinohara et. al., 12th IAEA Technical Meeting on Energetic Particles in Magnetic Confinement Systems (2011)