Effects of 3-D fields on fast particle losses in ITER

A. Loarte, G. Kramer, R. Maingi, J.-W. Ahn, …

Effects of 3-D fields on fast particle losses in ITER (I)

- 3-D fields will be used for ELM control in ITER
- Recent calculations show that the small perturbation created by 3-D fields can affect significantly edge losses from NBI
- Magnitude of edge NBI losses depend on fine structure of harmonics and NBI orbits → validation of models in present experiments is needed

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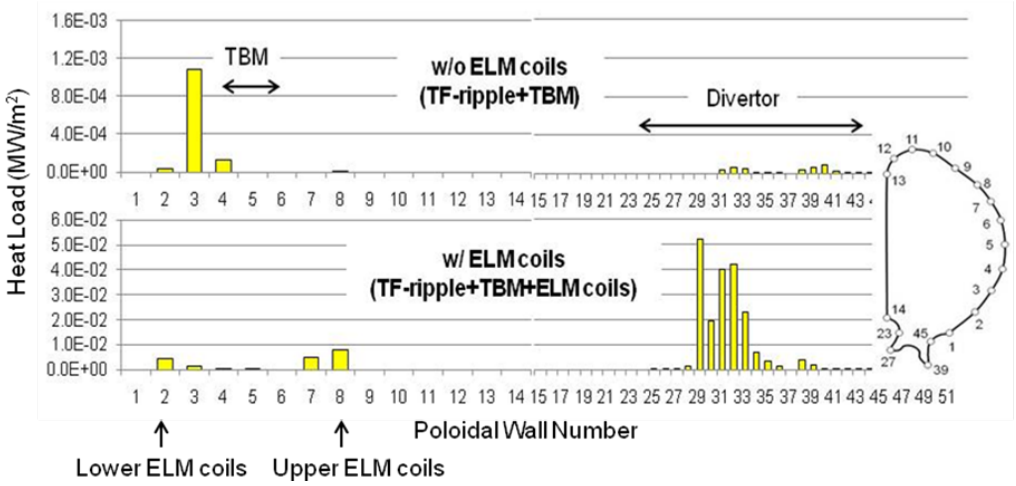
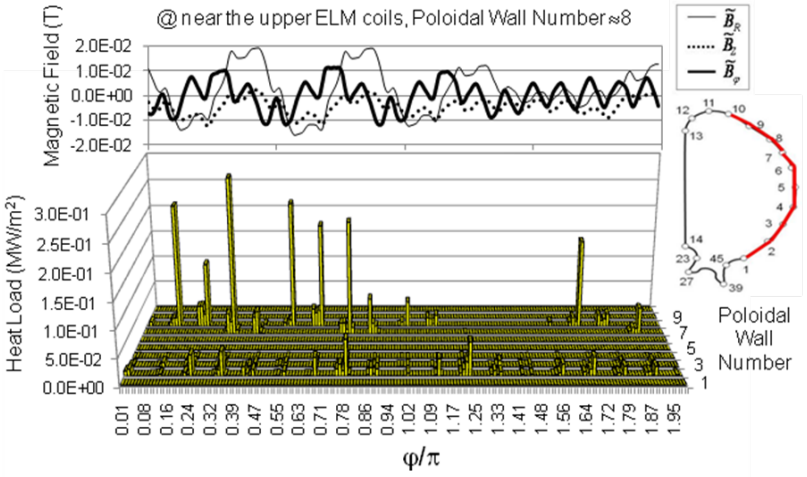
Toroidally Averaged Loads



Toroidally Resolved Loads



Experiment in NSTX on 3-D fields and NBI losses

Validation of models (G. Kramer) in NSTX could be particularly interesting

- Accurate evaluation of 3-D effects on edge fields and plasma response (IPEC)
- Good accessibility to diagnosis of fast particle losses by power load measurements

Development towards a proper experimental proposal

1. Evaluate expected NBI losses with usual 3-D field configuration and plasma configurations in NSTX
2. Determine if loads are measurable (magnitude and location)
3. Explore effects of 3-D field magnitude and harmonic structures achievable in NSTX on NBI losses and whether the differences found can be measured.
4. Select 2-3 modelling cases leading to largest measurable changes and carry out experiment
5. Select one case where plasma response on 3-D fields is largest and carry out modelling of NBI losses with/without plasma response → carry out experiment if differences measurable