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# Plans for Power and Particle Deposition Estimates using Field Line Tracing with Diffusion

Prepared by

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**NCSX Project Meeting**

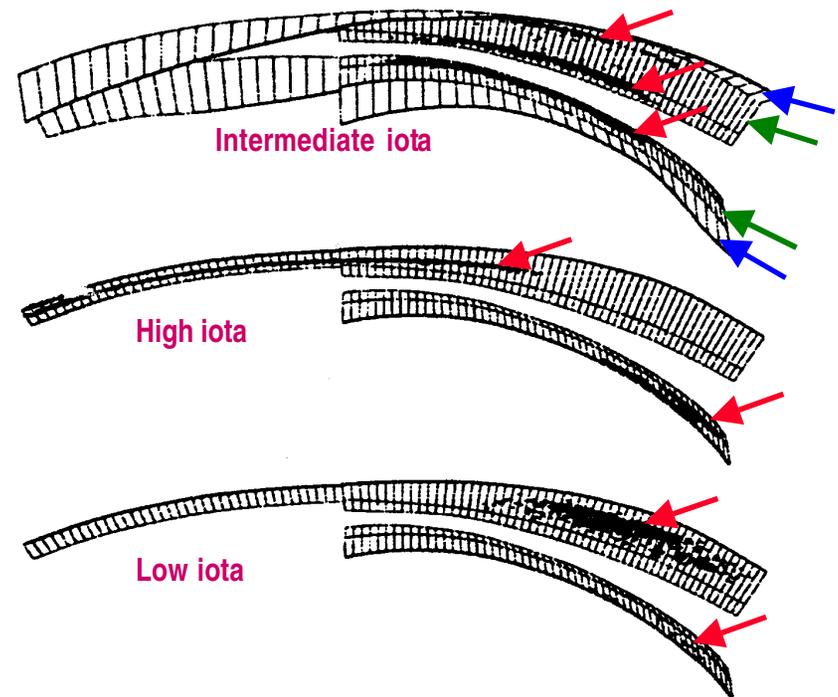
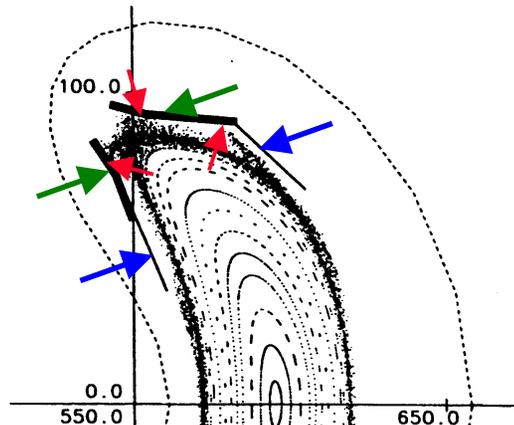
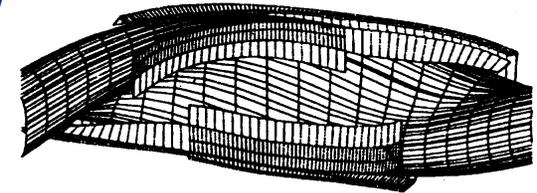
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# Island divertor requirements for W7-X were estimated using field line tracing with diffusion.

Kisslinger 21<sup>st</sup> EPS 1994

- Diffusive broadening of the SOL power flux simulated by field line integration with perpendicular displacements
  - Example: 1 mm displacement per 30 cm field line length simulates  $D_{\text{parallel}} / D_{\text{perp}} = 3e6$  and  $\lambda_{Te} \sim 1.5$  cm for 25 m average field line length to intersection.
- Starting points statistically spread on (or just inside) LCMS.
- Power load estimated from density of intersection points on vessel wall.



# The infrastructure necessary to obtain this kind of calculation for NCSX has been developed.

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- Art Grossman (UCSD) and Johann Kisslinger (IPP-Garching) have worked out the details of the coding necessary to couple MFBE to the field line tracing (Gourdon code) with diffusion.
  - Work for W7-As and W7-X done in vacuum fields with zero current.
  - Coding for communication between MFBE (fields with finite current) and Gourdon field line tracing with diffusion will be done next month.
- To get a good estimate of power deposition profile requires tracing of many more field lines than previously done for NCSX.
  - Gourdon code must be parallelized to allow ~ 1000 line tracings to wall intersection with diffusion in reasonable time
  - Computational physicist Alice Koniges from LLNL will apply expertise in code optimization and stellarator equilibria to parallelize Gourdon code.
- This work will be documented in the power and particle handling section of PVR proposal although results from the calculation may not be available for the document.

