

Code Integration for Efficient Divertor Design



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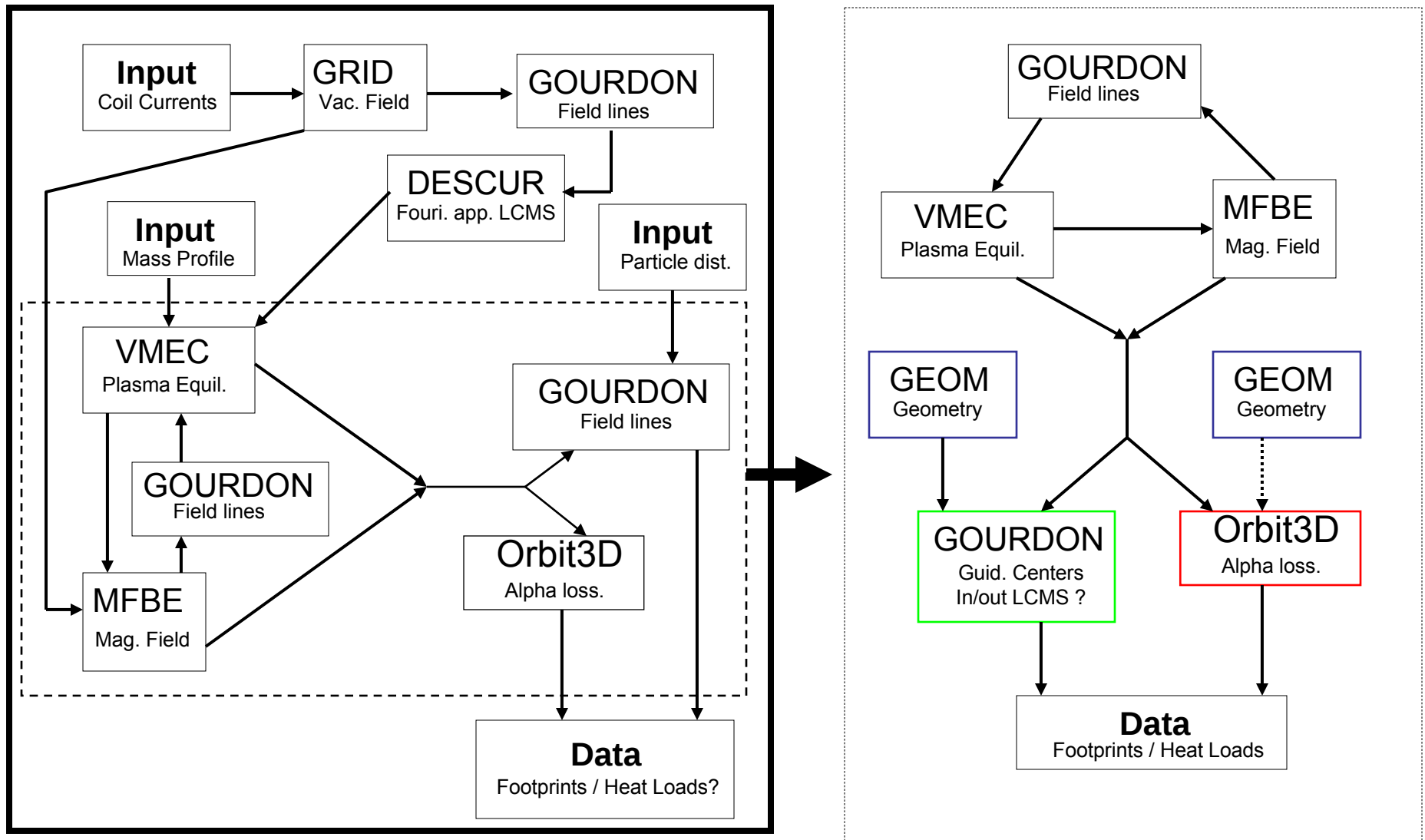
Rensselaer Polytechnic Institute

ARIES project meeting

UCSD, Nov 4-5 2004



Code System



Future Capabilities



GOURDON

- Parallized version → Many more lines
- Capable of tracing guiding centers → ??
- Utilize GEOM → Faster run times, simple intersection data
- T3E version → X1 at ORNL, Convert?

ORBIT3D

- Inclusion of gyro radius → more accurate description of α loss
- Utilize GEOM also?

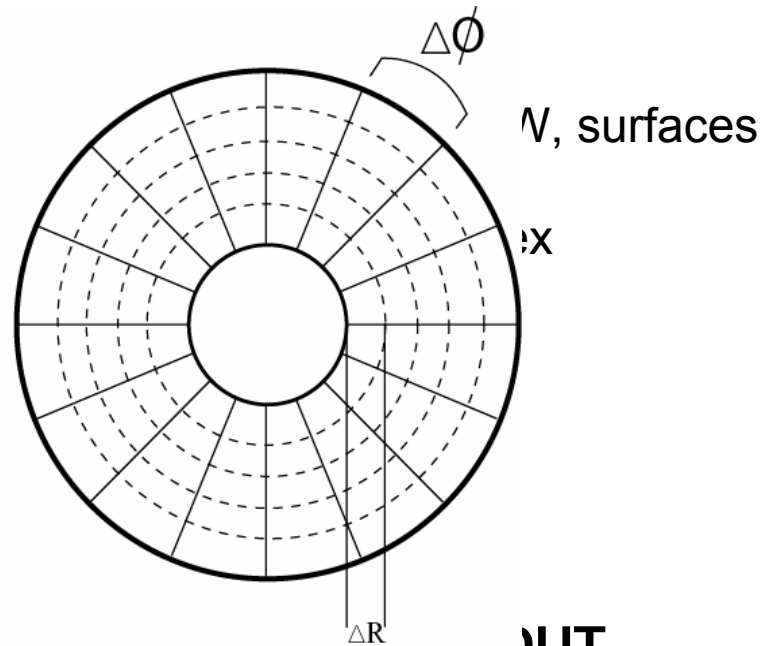
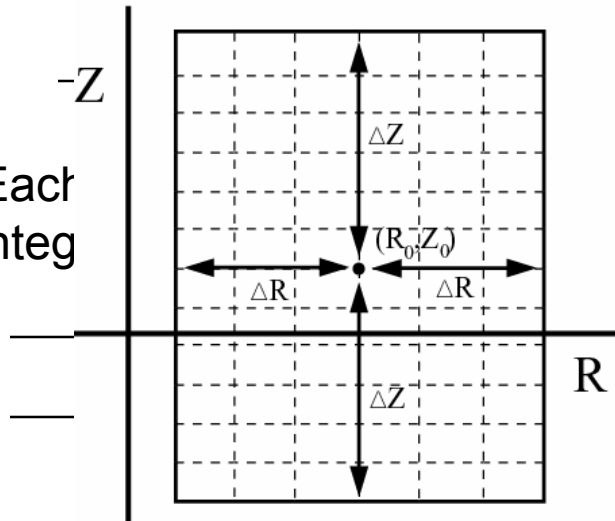
GEOM

- Input PFC, FW, LCMS geometry → Tagged map of geometry

The GEOM Code

- GEOM = GEOMETRIC Mapping
- Like MFBE, divides ROI into grid (N_ϕ , N_R , N_z)
- Each

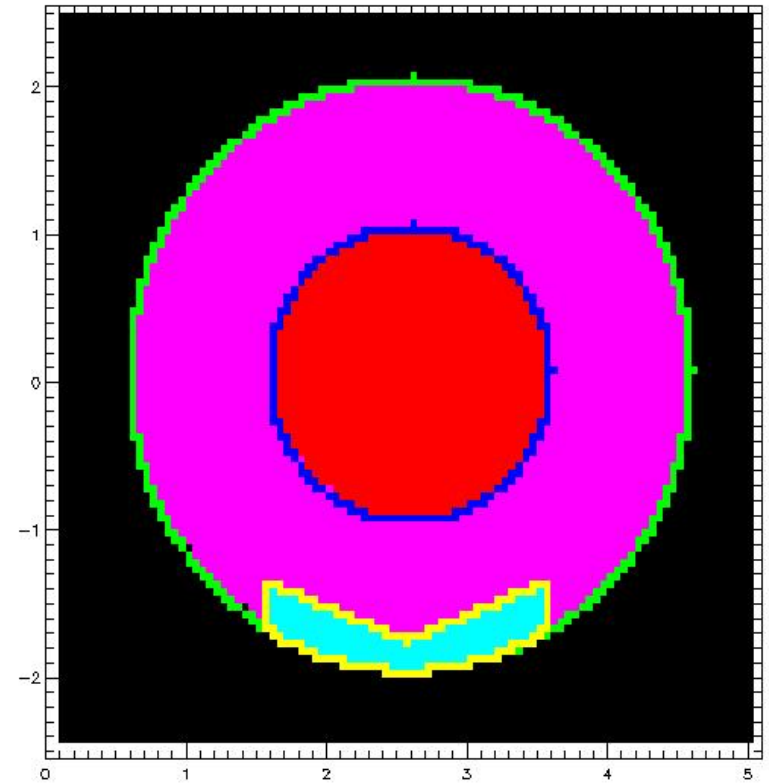
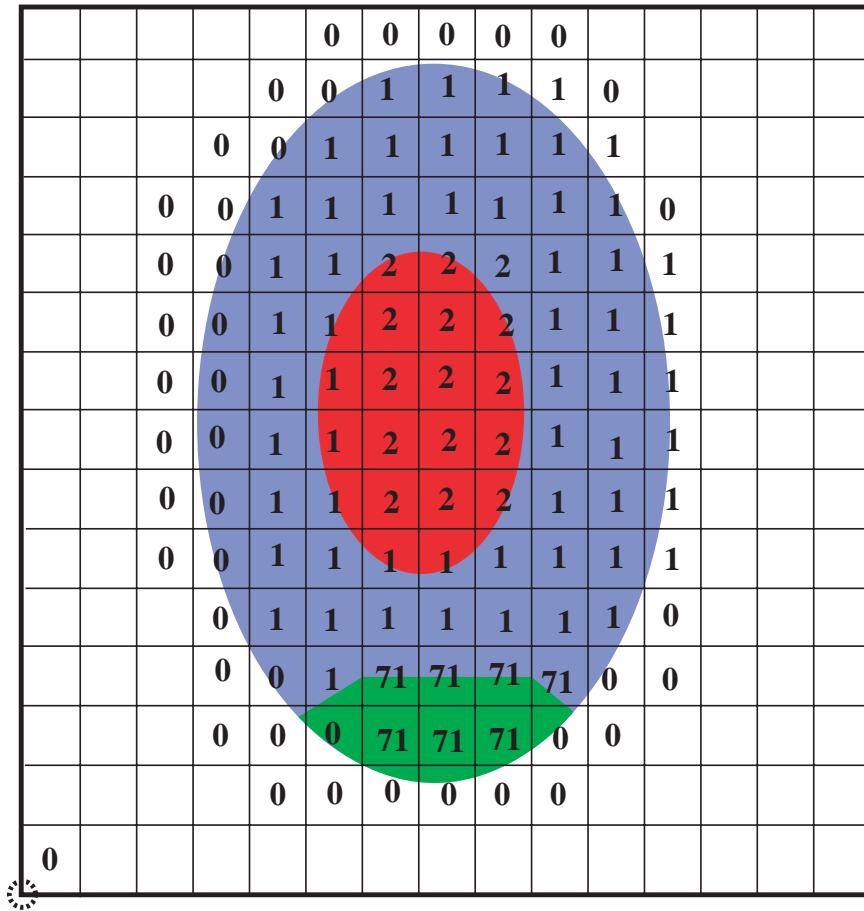
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Geometry of PFCs, FW, LCMS

“Tagged” 3D array of geometry

GEOM Conintued



GEOM/GOURDON Interface

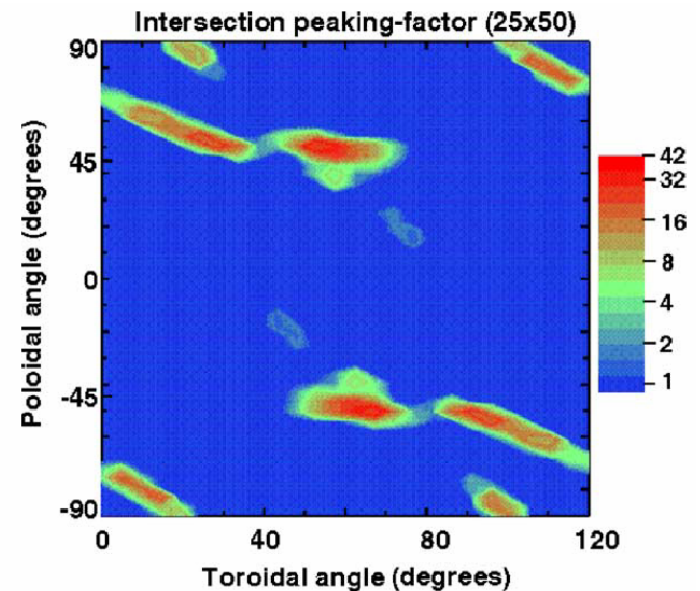
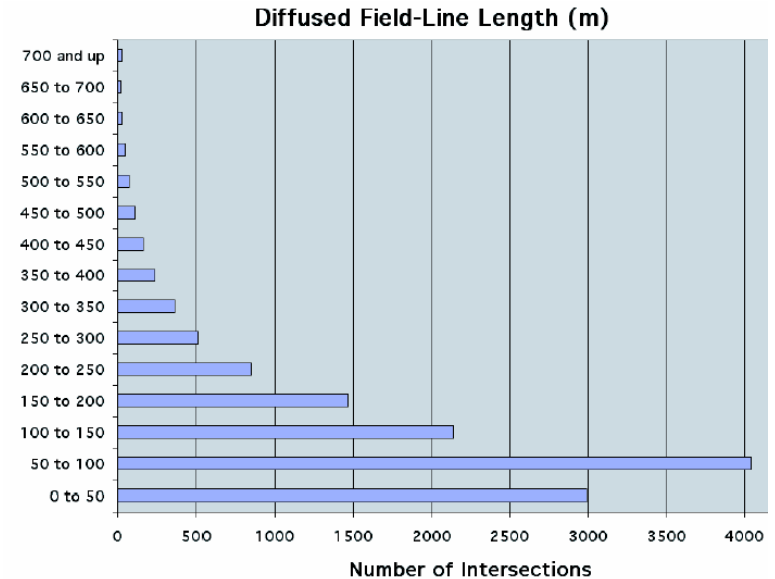
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- GOURDON reads in GEOM tagged mapping
 - Every integration step, it queries the tag cell
 - If appropriate tag, GOURDON does expensive location calculation
 - GEOM introduces no error
 - Saves time, easy to track intersection with PFC/FW (even LCMS)
 - Can be used to find intersection data for arbitrarily shaped surface.

GOURDON Output

- Current GOURDON traces fieldlines
- Use L_c to find approx. for heat flux

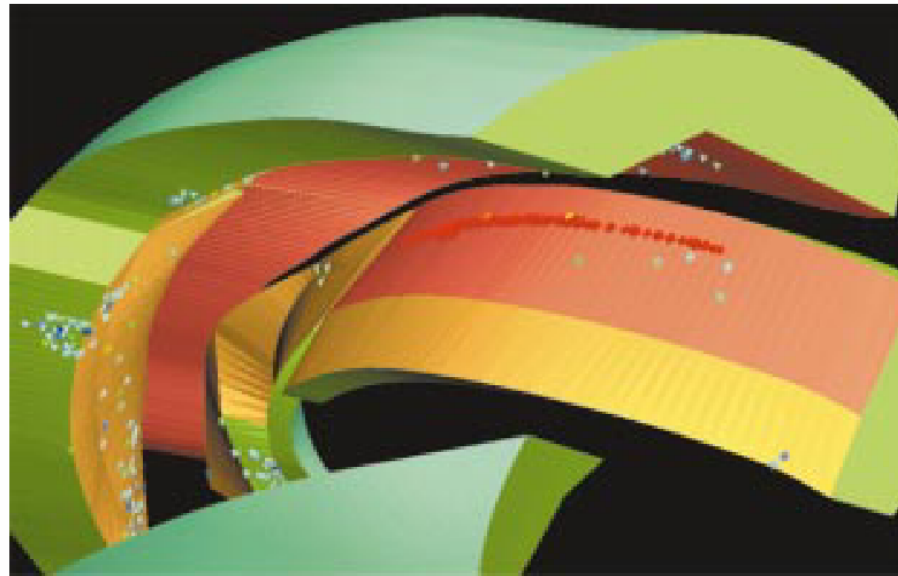
$$T_{et} \propto L_c^{-4/7}$$

- Heat Loads, Peaking factors, etc



Long Lc? Guiding centers...

- What if Lc is too long for analytic model?
- Trace guiding centers instead...
 - Directly find energy deposited by particles



Conclusion

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- New codes will be introduced to help in divertor design
 - GEOM: Simple geometry input, speeds up GOURDON
 - GOURDON: Parallelized, guiding centers
 - ORBIT3D: gyro-radius, GEOM?
 - Need more advanced codes for final design?