Error Field Update and Plans

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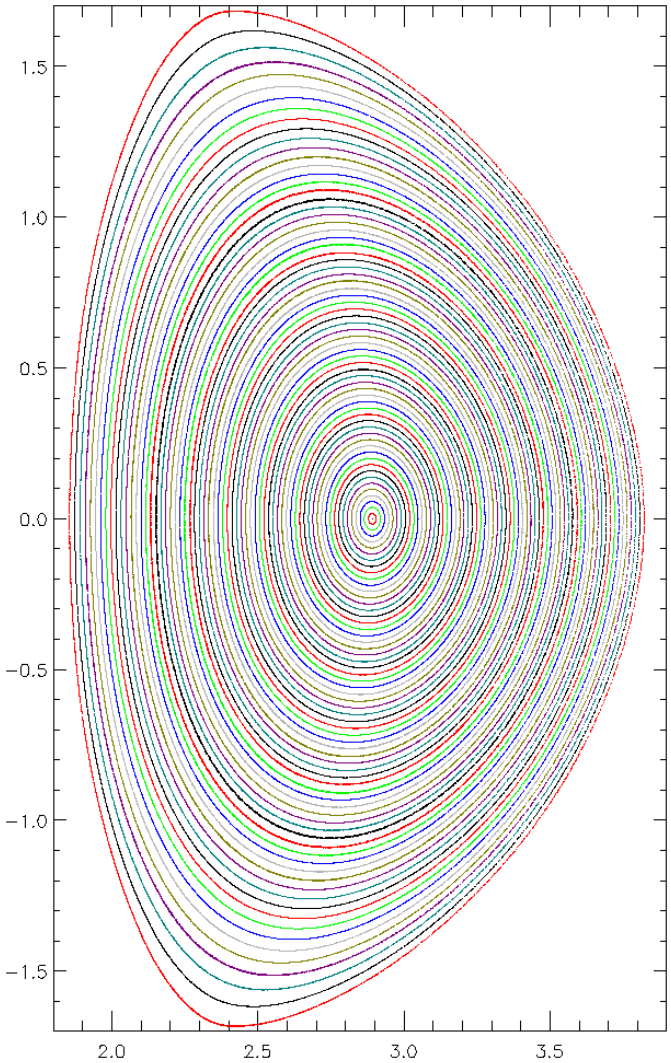
Overview

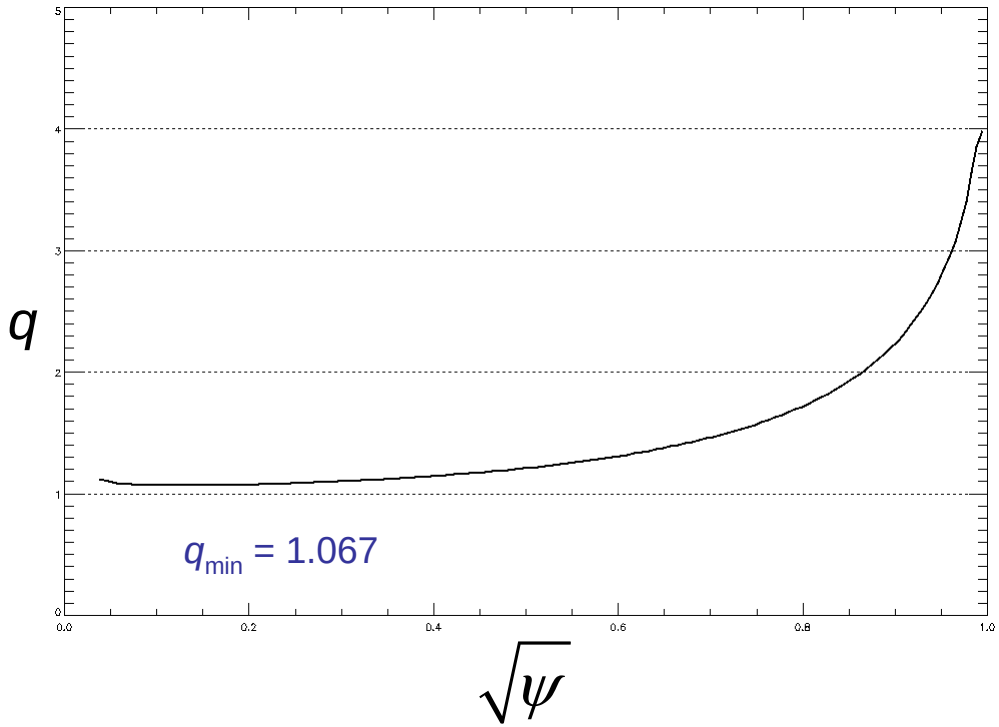
- RWM stabilization by plasma rotation in NSTX is impeded by moving, nonaxisymmetric TF error.
- Active error correction improves confinement.
- J.K. Park has computed ideal, linear plasma response (singular current layers) to pure *m*,*n* perturbations in sample equilibria (see poster 2C46 Tues. am).
- For benchmarking and extension to non-ideal MHD, useful to compare with M3D.

Initial study

- Begin with a DIII-D equilibrium.
- Add an m=2, n=1 perturbation of specified amplitude to initial poloidal flux on plasma boundary.
- Measure plasma displacements, singular currents with linear code; infer island widths.
- Evolve M3D nonlinearly until saturation of n=1 islands; compare widths.

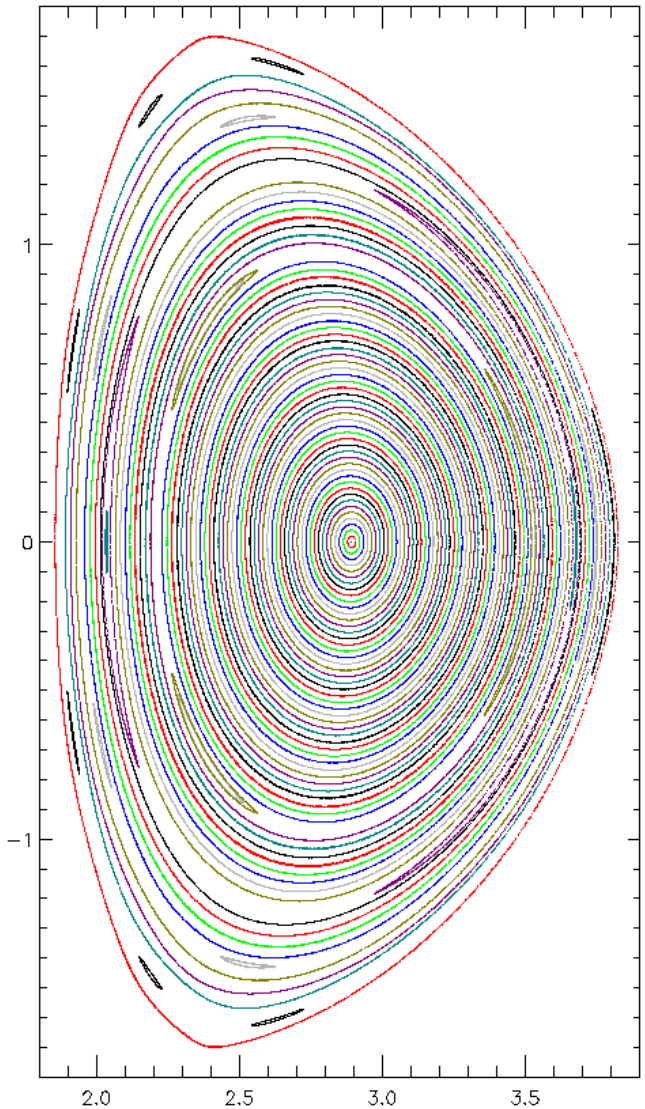
DIII-D Equilibrium





Steady State

$(\Delta\psi/\psi = 10^{-3},\ \eta = 5\times10^{-4})$



Initial Results

Pert. mag.	Island q	Position	Half-width
10 gauss (ideal)	2	$\psi = 0.7462$	$\Delta\psi = 1.887 \times 10^{-2}$
10^{-3} (8.3 gauss)	2	$\psi = 0.7455$	$\Delta\psi = 5.095 \times 10^{-2}$
4.2 gauss	2	$\psi = 0.7448$	$\Delta\psi = 3.678 \times 10^{-2}$
2.1 gauss	2	$\psi = 0.7460$	$\Delta\psi = 2.586 \times 10^{-2}$
10 gauss (ideal)	3	$\psi = 0.9230$	$\Delta\psi = 9.321 \times 10^{-3}$
8.3 gauss	3	$\psi = 0.9228$	$\Delta\psi = 1.763 \times 10^{-2}$
4.2 gauss	3	$\psi = 0.9234$	$\Delta\psi = 1.22 \times 10^{-2}$
2.1 gauss	3	$\psi = 0.9238$	$\Delta\psi = 8.51 \times 10^{-3}$
10 gauss (ideal)	4	$\psi = 0.9797$	$\Delta\psi = 5.736 \times 10^{-3}$

Conclusions

- Code interfaces are now in place for scaling studies.
- Initial results show potential for good comparisons; close coordination is needed.
- Future work to include further scaling studies, investigations of mode locking.