Progress in Configuration Development

- We discussed, last week, methods by which the required boundary shaping may be reduced for the kink stability.
  - current profile,
  - magnitude of current.

- We also examined various configurations, showing that QAS3_C82 was a good starting point for using the above methods to ease the problem associated with the high coil current density.

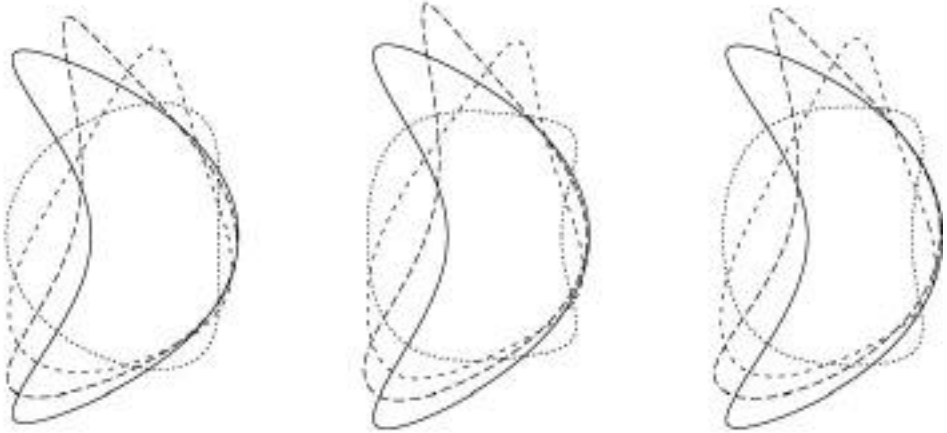
- We now have a new configuration, QAS3_C85, which
  - is kink stable at ~4% beta, Ip~180 kA, with the C10/C82 reference profiles.
  - has comparable, perhaps somewhat better, QAness as in C10/C82, particularly in the outer region.

  - has comparable Jmax as that in C10.

- This is achieved, starting from C82, by

  - relaxing constraint on the kink growth rate at Ip=200 kA,
  - further optimizing the quasi-axisymmetry in regions s>0.5,
  - imposing an additional constraint on the maximum coil current density.

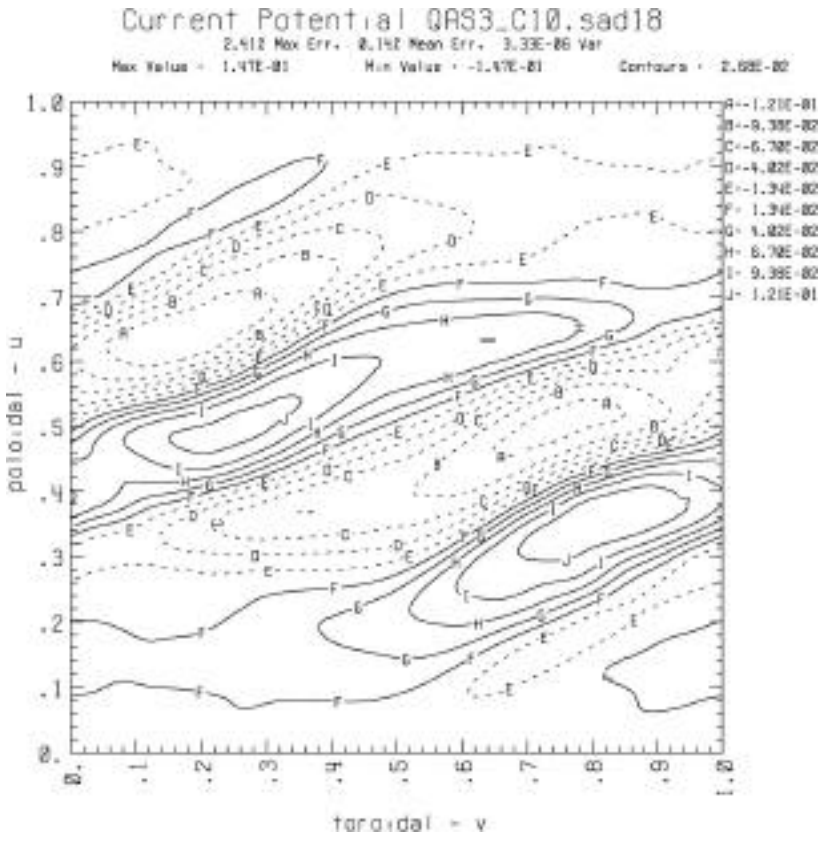
Comparison of Boundary Shapes of Three Recent Configurations



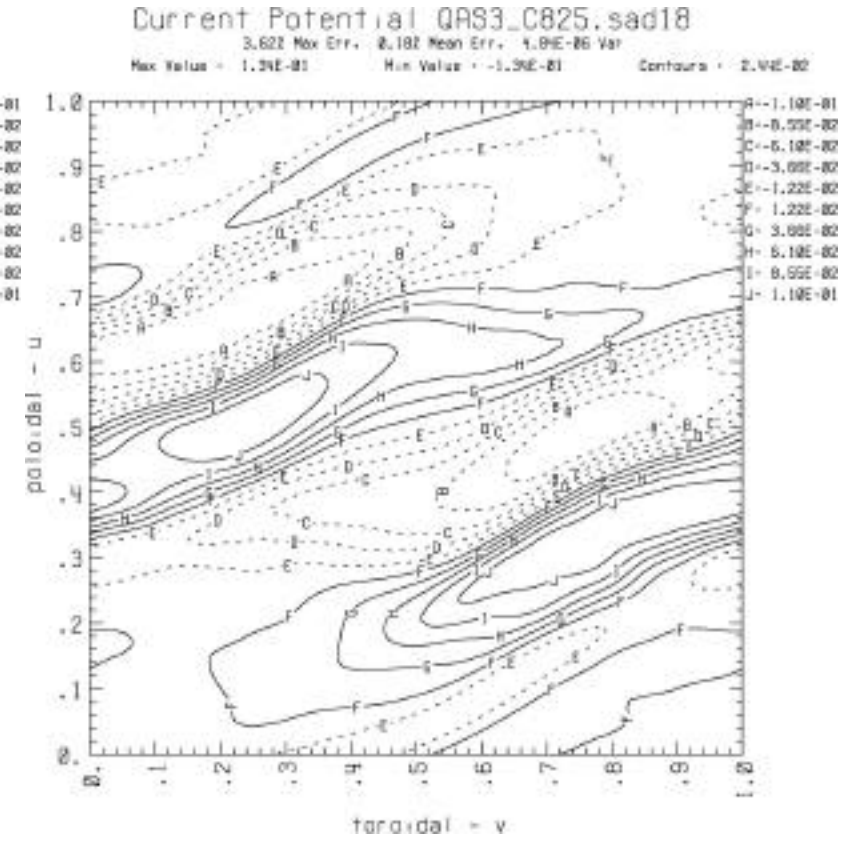
	C10	C82	C85
A	3.43	3.43	3.48
κ	1.81	1.90	1.98
δ	0.48	0.45	0.53
Jmax	0.84	1.02	0.82

Comparison of Potential Contours from Coil Current Sheet Solutions
(18 cm uniform offset)

<M>=2.91

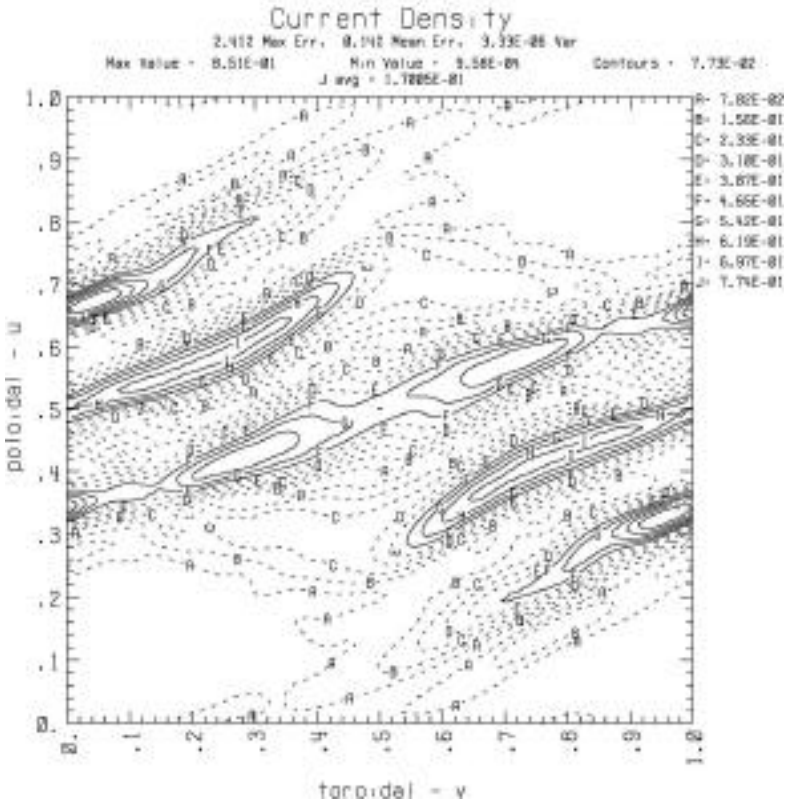


<M>=3.01

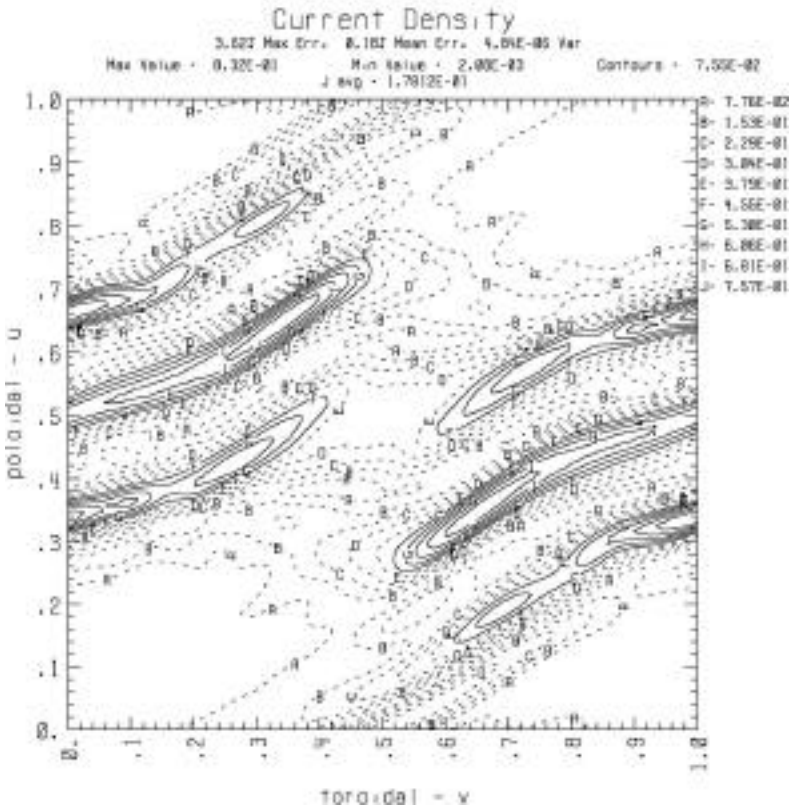


Comparison of Current Densities from Current Sheet Solutions

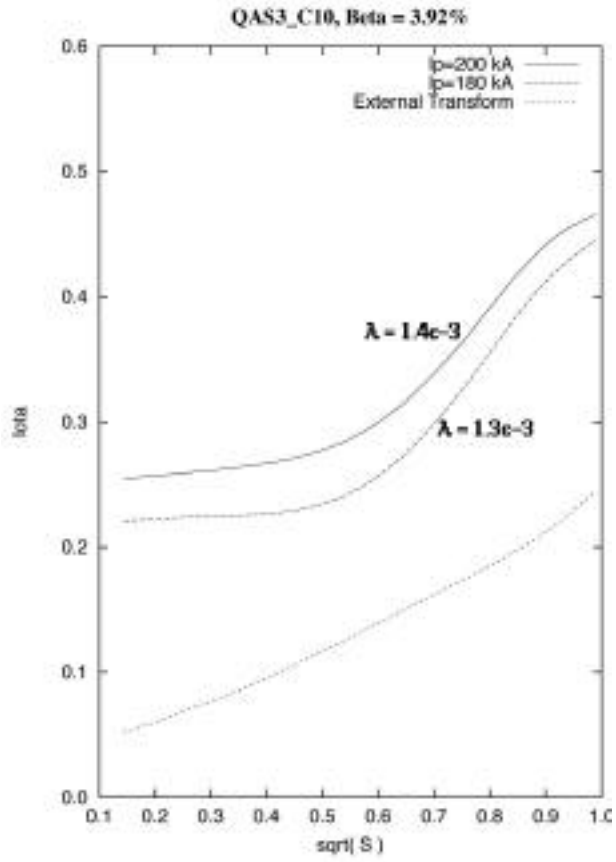
QAS3_C10 Ipol = 2.75

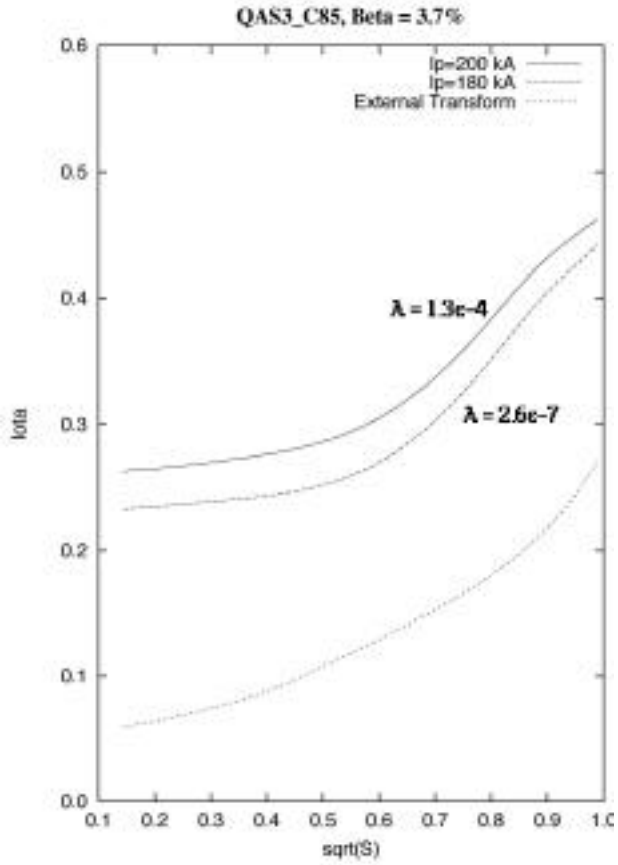


QAS3_C85 Ipol = 2.83

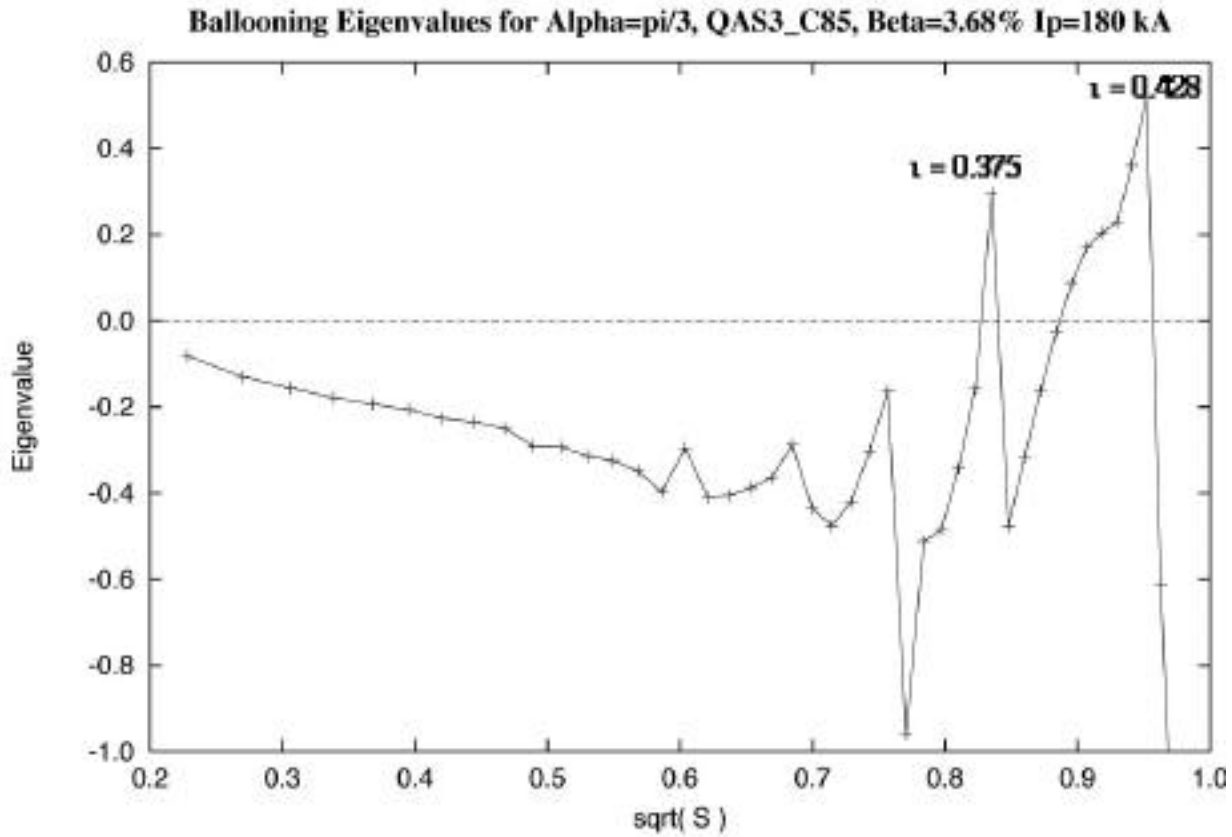


Comparison of Rotational Transform and the Kink Eigenvalues



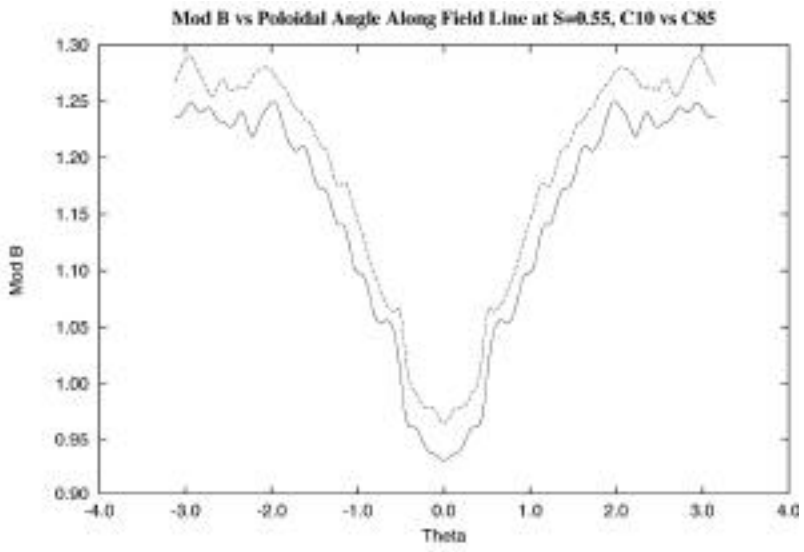


Preliminary Calculations of the Ballooning Stability for C85



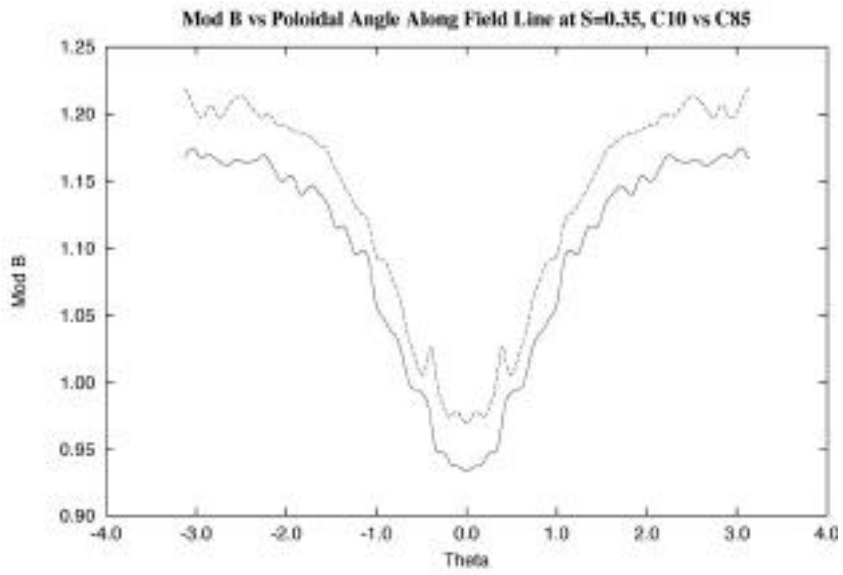
Comparisons of Transport Measures for Particle Confinement

S = 0.55



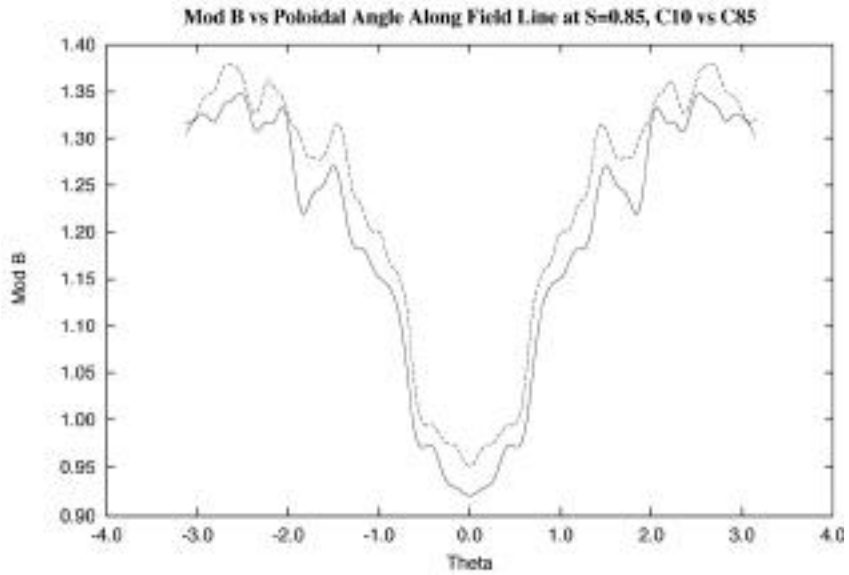
	C10	C82	C85
$\Sigma(Bmn)^2$	2.1e-4	2.5e-4	1.9e-4
$\Sigma\{(\iota m-n)*Bmn\}^2$	5.0e-3	6.2e-3	4.3e-3
$\int w d\theta$	1.8e-2	2.2e-2	1.2e-2
$\int w \sin\theta \, d\theta$	1.0e-2	1.2e-2	6.3e-3
Poloidal flux	0.22	0.22	0.22
B (s=0)	1.01	1.02	1.05
B (s=1)	1.20	1.21	1.23

S = 0.35



	C10	C82	C85
$\Sigma(Bmn)^2$	5.5e-5	5.6e-5	7.6e-5
$\Sigma\{(\iota m-n)*Bmn\}^2$	1.7e-3	1.7e-3	2.2e-3
$\int$ wdθ	5.3e-3	6.3e-3	7.9e-3
$\int$ wsinθ dθ	3.1e-3	2.6e-3	2.9e-3

S = 0.85



	C10	C82	C85
$\Sigma(Bmn)^2$	1.4e-3	2.1e-3	1.2e-3
$\Sigma\{(\imath m-n)*Bmn\}^2$	2.3e-2	4.0e-2	1.7e-2
$\int w d\theta$	3.2e-2	5.4e-2	3.2e-2
$\int w \sin\theta \, d\theta$	2.1e-2	3.5e-2	1.7e-2