

# C82 Coils from Optimized Contours Status

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# Overview

- Based on c10 efforts to develop coils over the full discharge, coils for c82 are being developed first for vacuum.
- Coils were generated by Neil using NESCOIL with SVD for current sheet and 10 Optimized Coil Contours and Currents
- PF and possibly trim coils will be added afterwards and coil currents reoptimized for other operating points
  - finite beta
  - zero beta, full current

## Overview, cont'd

- VMEC reconstruction performed, but VMEC has difficulty converging even in fixed boundary for low transform on axis (  $< .05$  )
- Need to use field line tracing to access reconstruction in Vacuum
- Having Difficulty getting AVAC to run on KMA
  - Vicki Lynch of ORNL helping to resolve problems
- Developed and presently testing independent code to do field line tracing from nescoil filaments or current sheets
- Used old version of NESCOIL ( from Dave Anderson ) which does field line tracing ( for Modular Coils ) to benchmark

# C82 Current Sheet with and without SVD

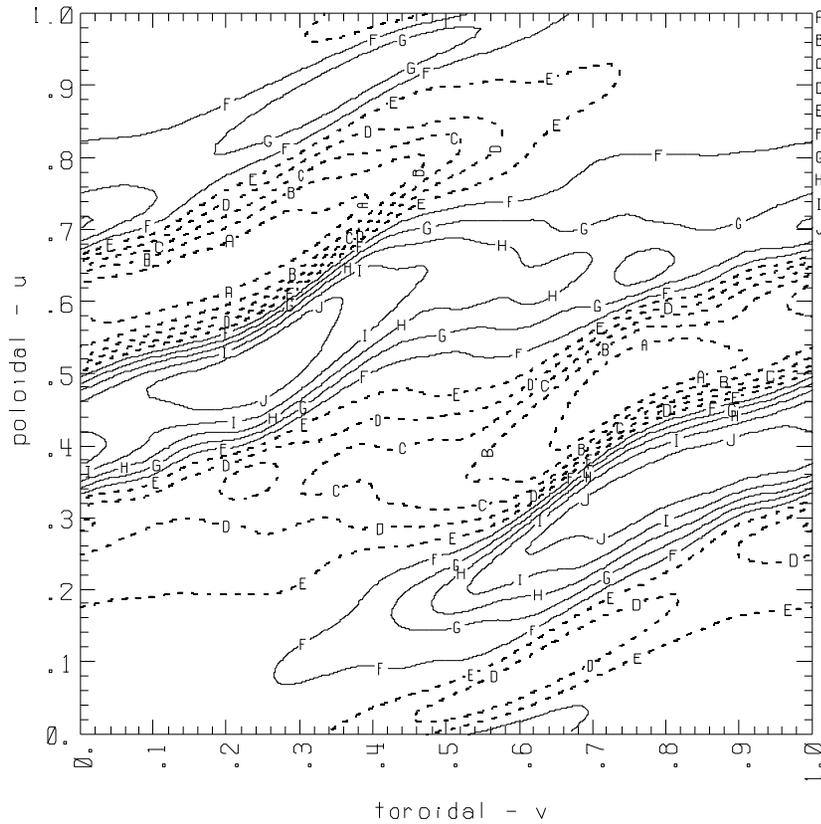
Current Potential pc\_3\_c82a.10sad18v

1.09% Max Err, 0.20% Mean Err, 3.35E-06 Var

Max Value = 1.41E-01

Min Value = -1.41E-01

Contours = 2.56E-02



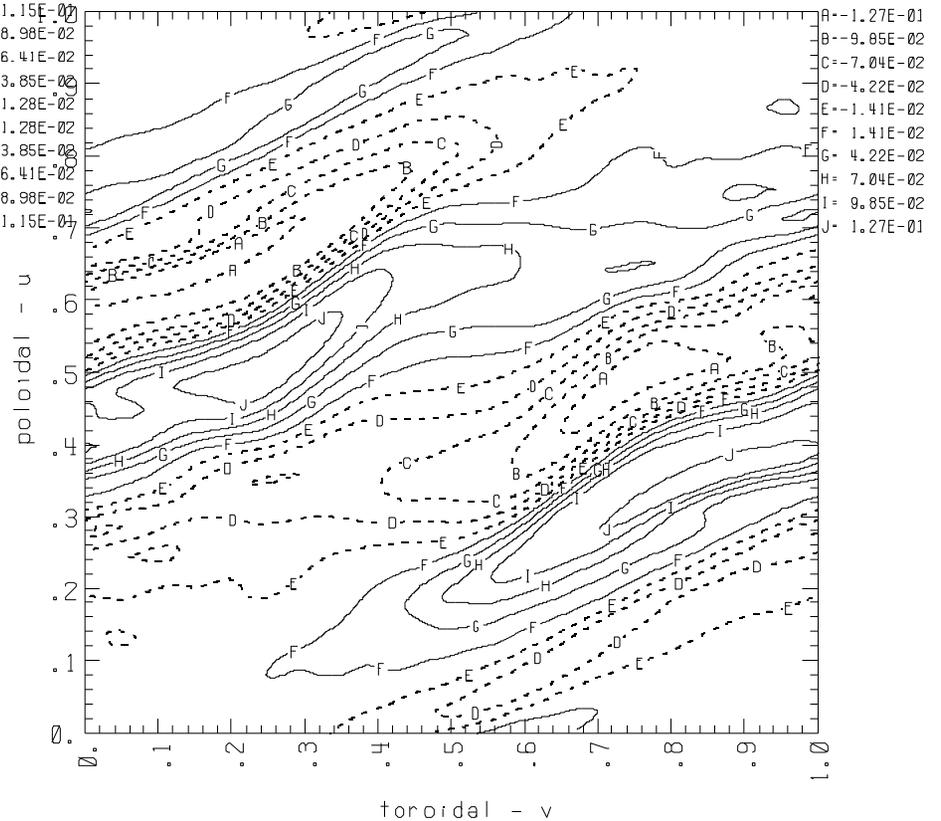
Current Potential pc\_3\_c82a.sad18ef

1.65% Max Err, 0.33% Mean Err, 6.62E-06 Var

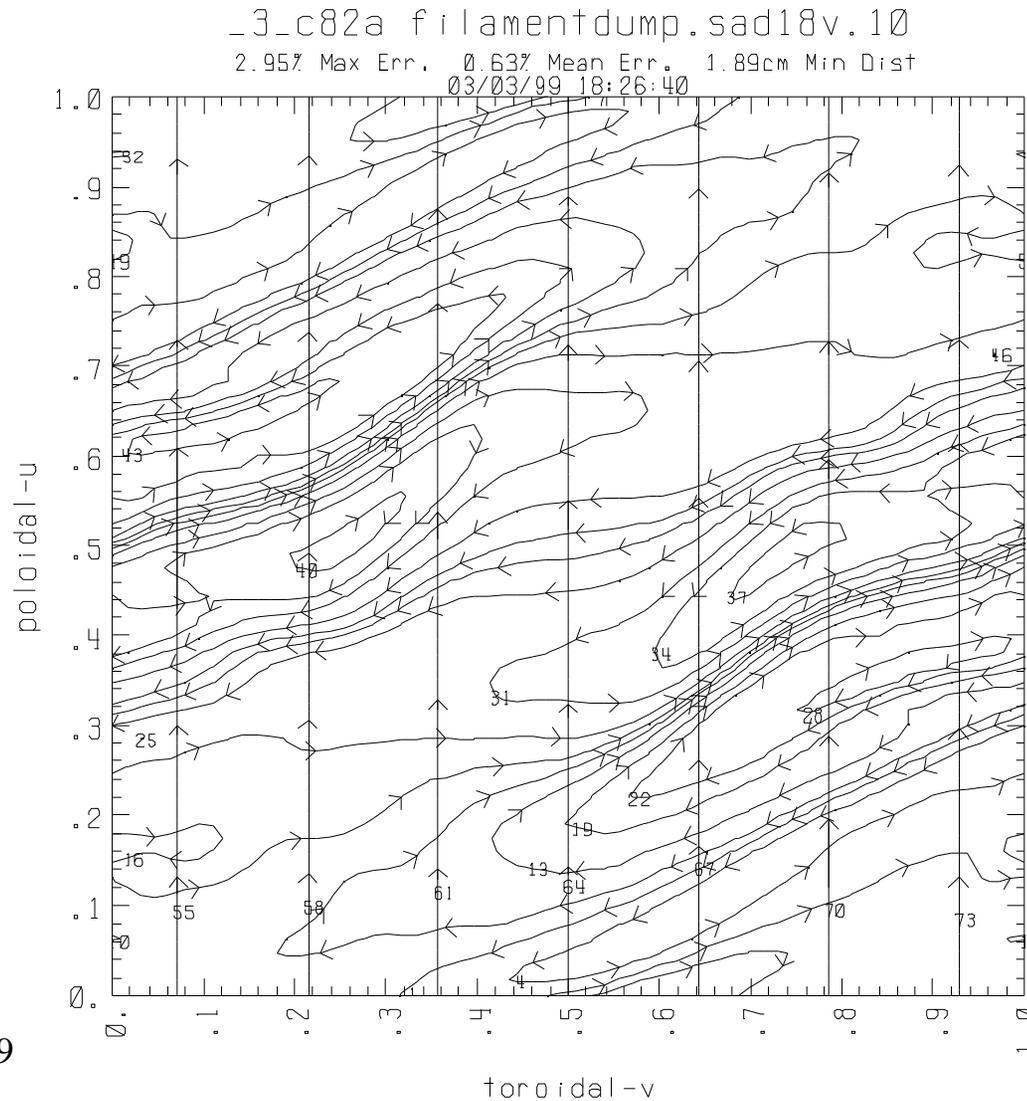
Max Value = 1.55E-01

Min Value = -1.55E-01

Contours = 2.81E-02

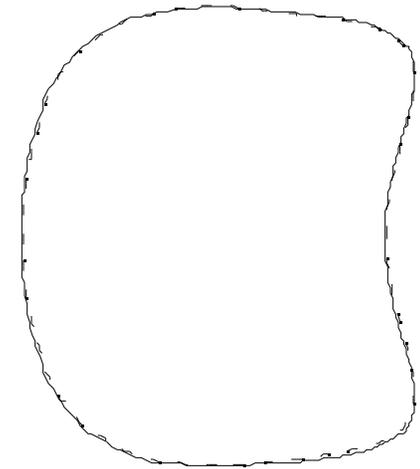
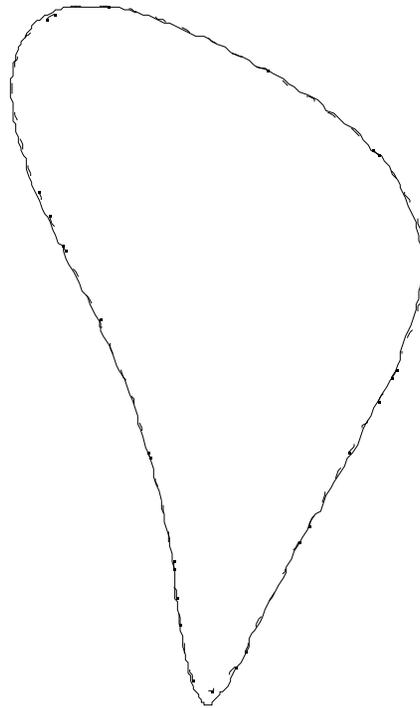
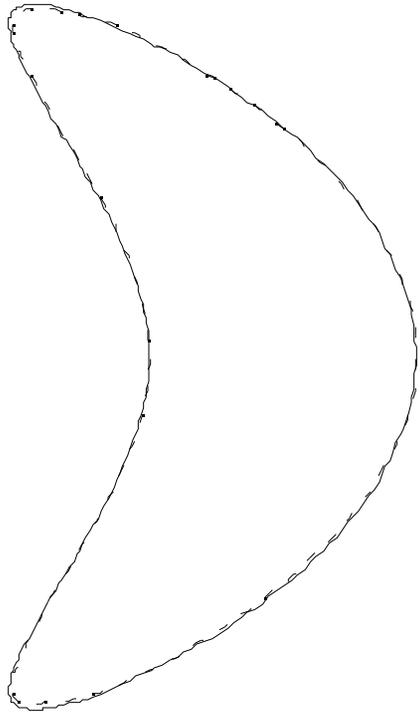


# C82 Optimized Coils 10 contours



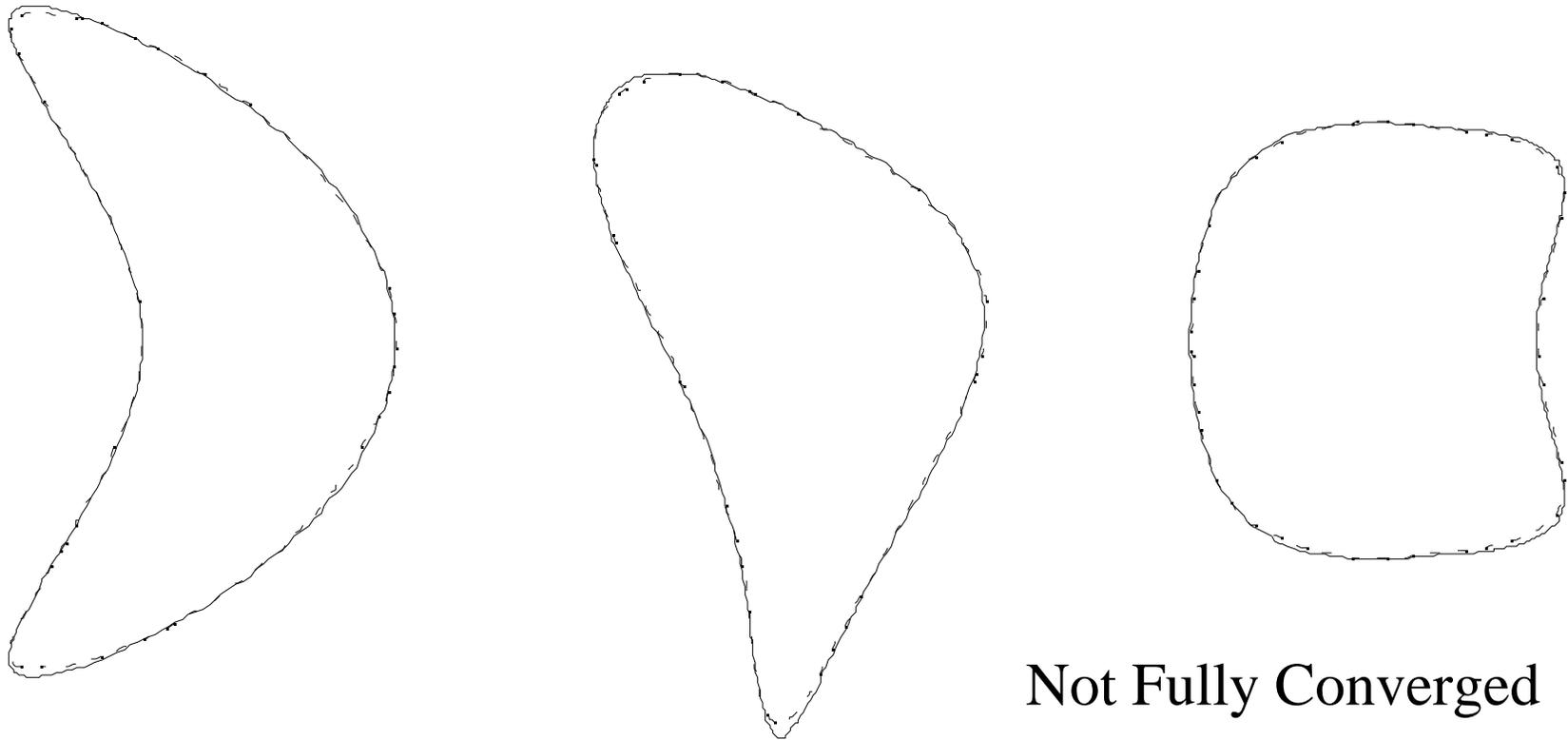
AWB 03/11/99

# C82 Reconstruction from Current Sheet- Vacuum

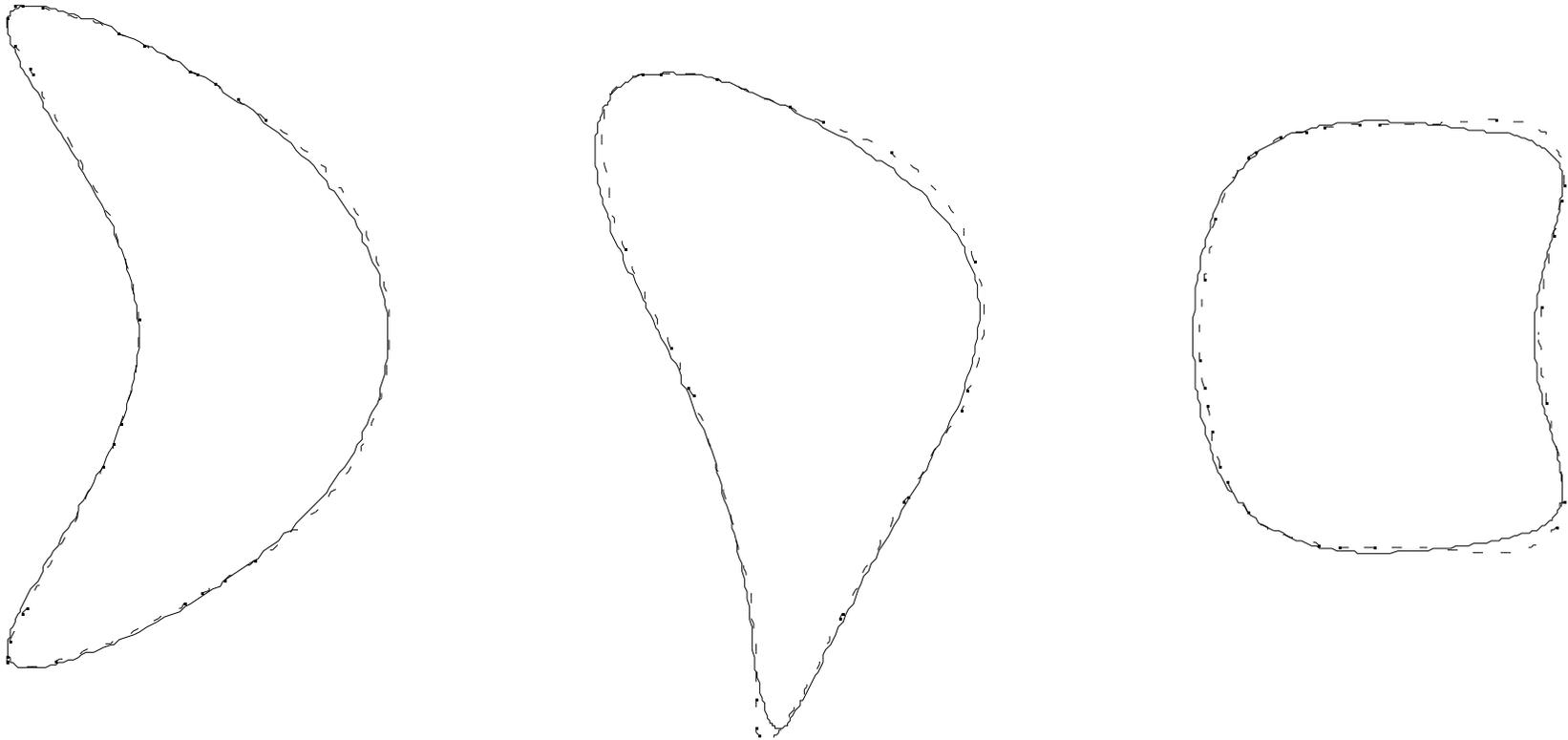


Not Fully Converged

# C82 Reconstruction from Optimized Coils - Vacuum



# C82 Reconstruction from Optimized Coils - Finite Beta



# Coils from Optimized Contours

## Summary

Optimized Contour Levels and Coil Currents  
c82 Plasma at Vacuum ( no EF )

Case	Field Errors From Filaments, %		VMEC Free Boundary Boundary Separation		Max Current Density In Coil Bundle, MA/m	
	Max	Mean	Max	Mean	t=0	t=8mm
10 contours Optimized in Vacuum	3.07	0.63	29.9	4.2	3.01	5.62
10 Contours with PF Currents reoptimized at finite beta	5.49	1.14	36.8	8.9	2.77	3.93
c10 Reference -10 contours Optimized at finite beta	3.429	0.514	13.4	2.9	2.66	3.92

Notes:

- 1) All coils on 18 cm offset from plasma
- 2) t=0 assumes no structure between coils,  
t=8 assumes 8mm of structure between coils