# GA Results for LI383

William H. Miner, Jr

And

NCSX Coil Group

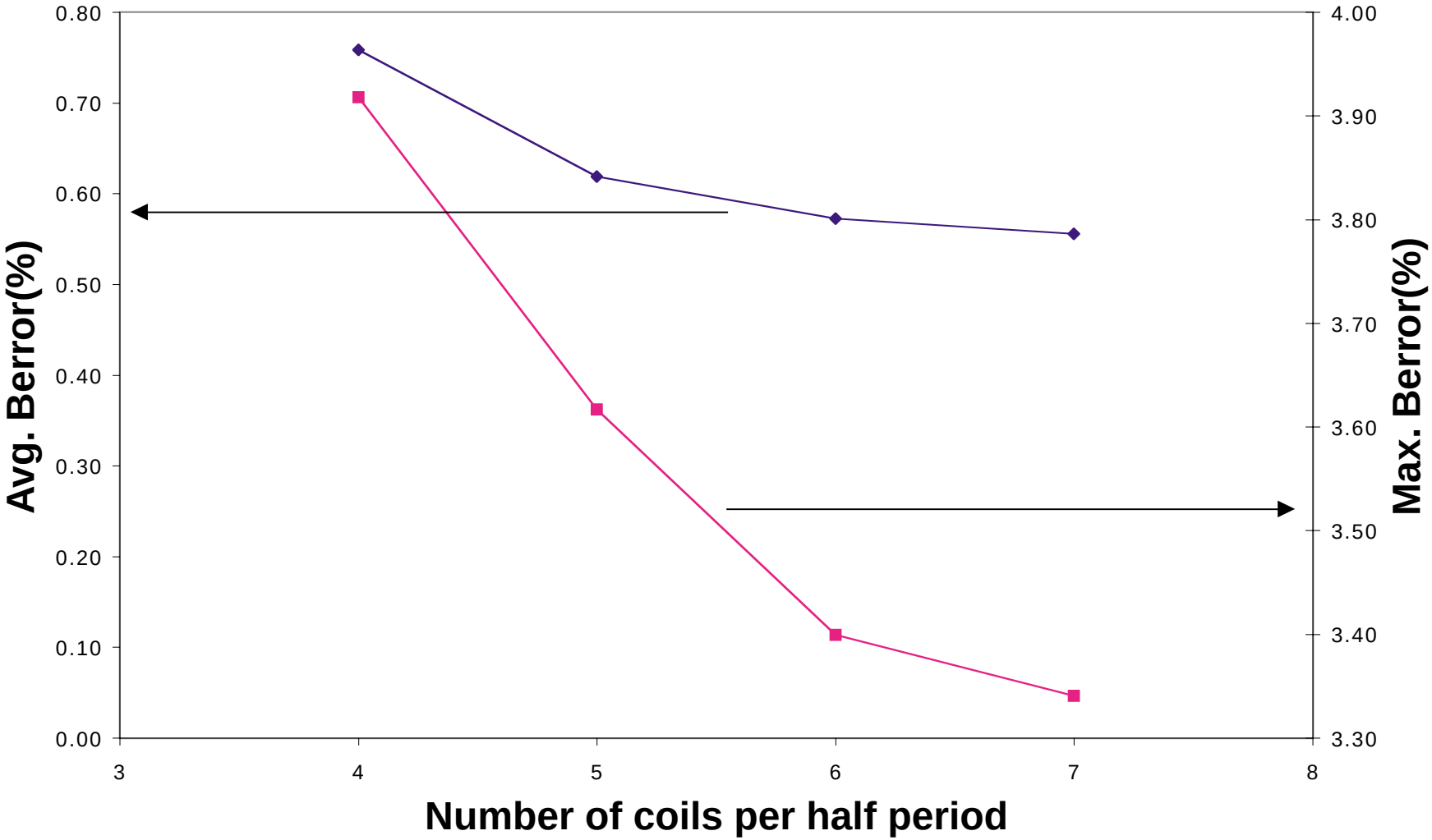
# Outline

- First runs for LI383
- Search for missing data
- Minimum current density results

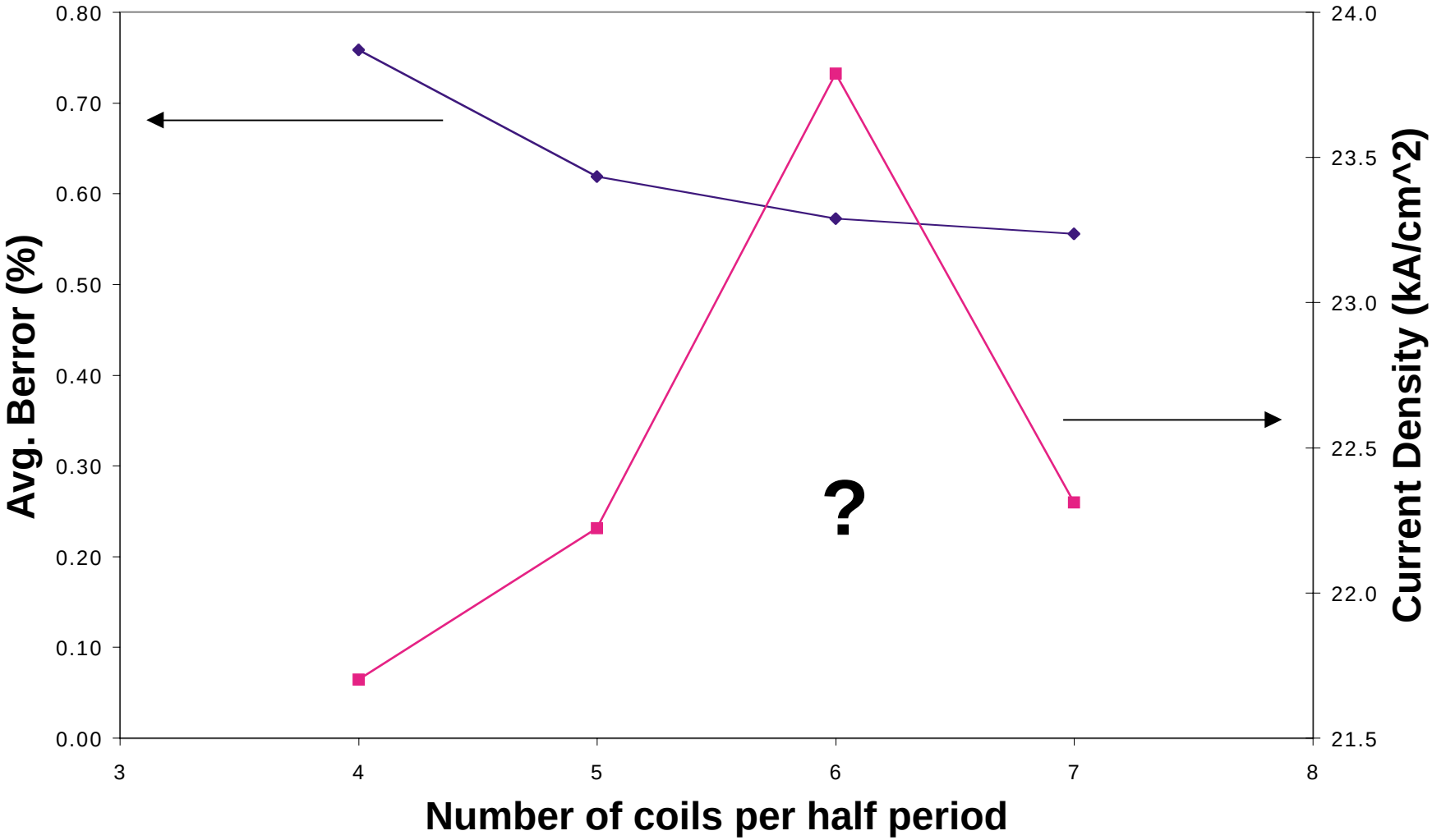
# Point of Departure

- Nescoil
  Avg. Berror = .429%
  Max. Berror = 3.45%
- Equal Spacing in $\Phi$ (7 coils/half period)
  Avg. Berror = .6%
  Max. Berror = 3.2%
  Current Density = 22.1 kA/cm^2

# LI383


0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
4.00
3.90
3.80
3.70
3.60
3.50
3.40
3.30
3
4
5
6
7
8
Avg. Berror(%)
Max. Berror(%)
Number of coils per half period

# LI383


0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
Avg. Berror (%)
24.0
23.5
23.0
22.5
22.0
21.5
Current Density (kA/cm^2)
?
3
4
5
6
7
8
Number of coils per half period

Half of the chromosome

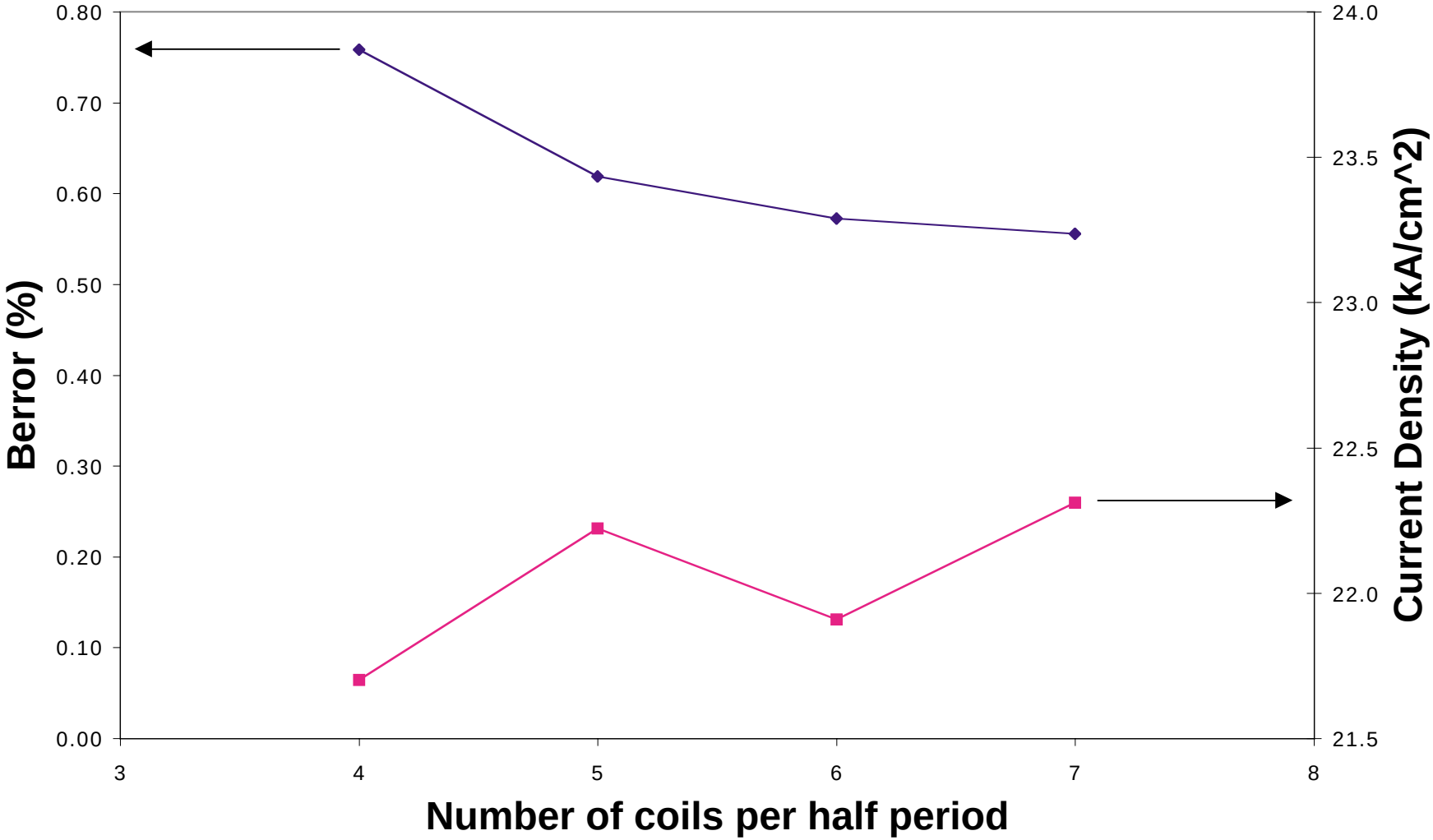
```
000100000001000001000000100001001 0  6 coils/half period

000001100000100000100000010001001 0  7 coils/half period

000000100000100000100000010001001 0  new population
000001000000100000100000010001001 0
000001100000000000100000010001001 0
000001100000100000000000010001001 0
000001100000100000100000000001001 0
000001100000100000100000010000001 0

000100000000010000100000010001001 0  6 coils/half period new
000100000001000001000000100001001 0  6 coils/half period old
```

# LI383


0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
Berror (%)
24.0
23.5
23.0
22.5
22.0
21.5
Current Density (kA/cm^2)
3
4
5
6
7
8
Number of coils per half period

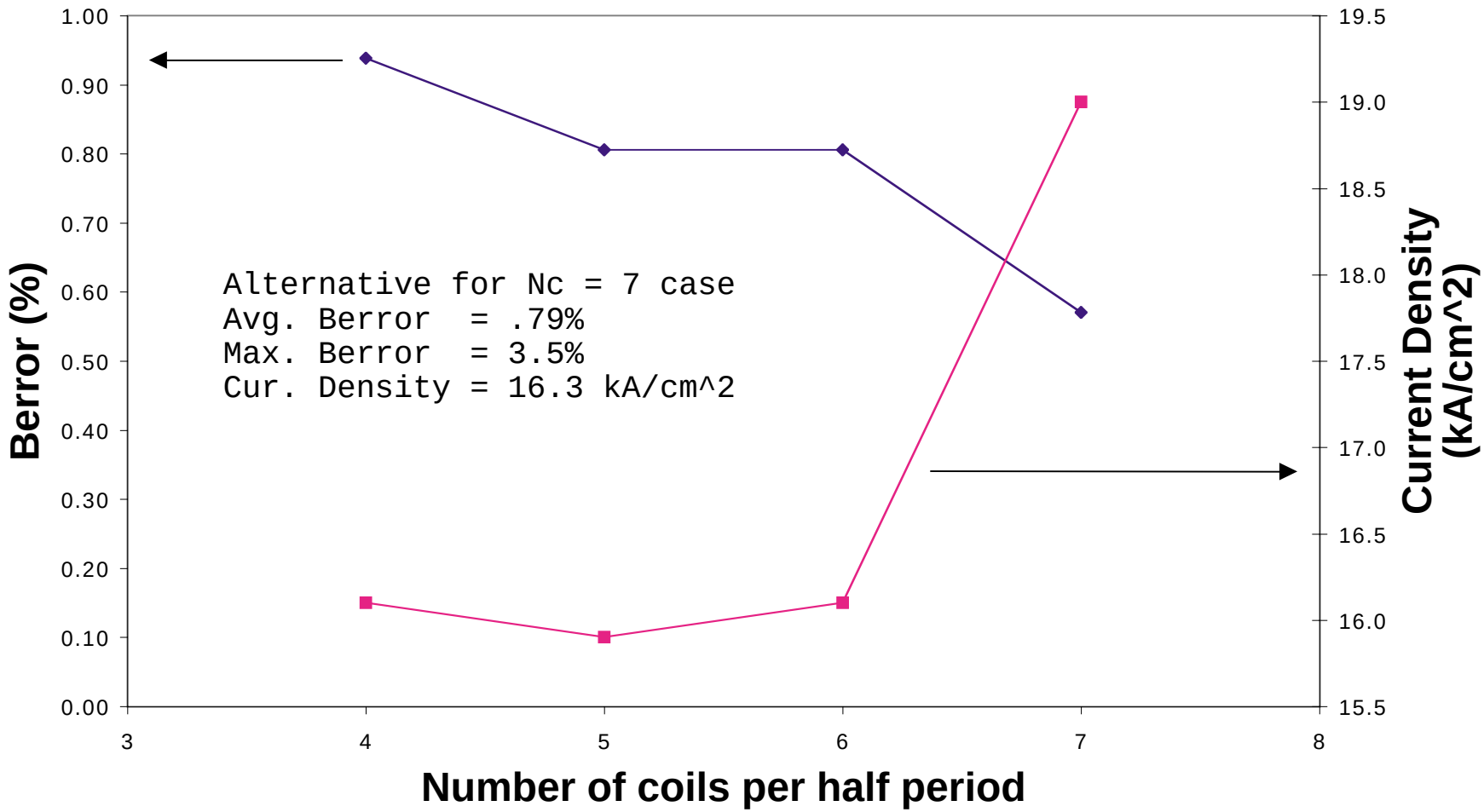
# Error Weighting

$$\text{Error} = (1-wt)*B_{error} + wt*J/J_{norm}$$

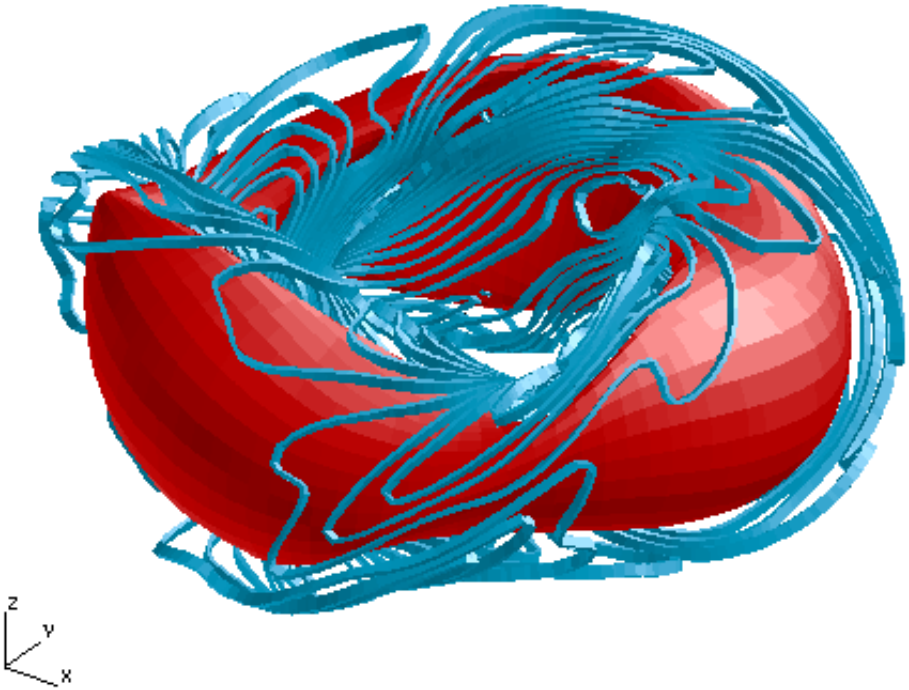
# Optimum Chromosome

| Avg. Berror(%) | Max. Berror(%) | Cur. Dens. (kA/cm^2) | Value |
|---|---|---|---|
| .946 | 4.2 | 17.3 | 70.92 |
| .938 | 3.9 | 16.1 | 58.90 |
| .902 | 4.9 | 16.4 | 72.48 |
| .862 | 4.3 | 17.0 | 63.01 |

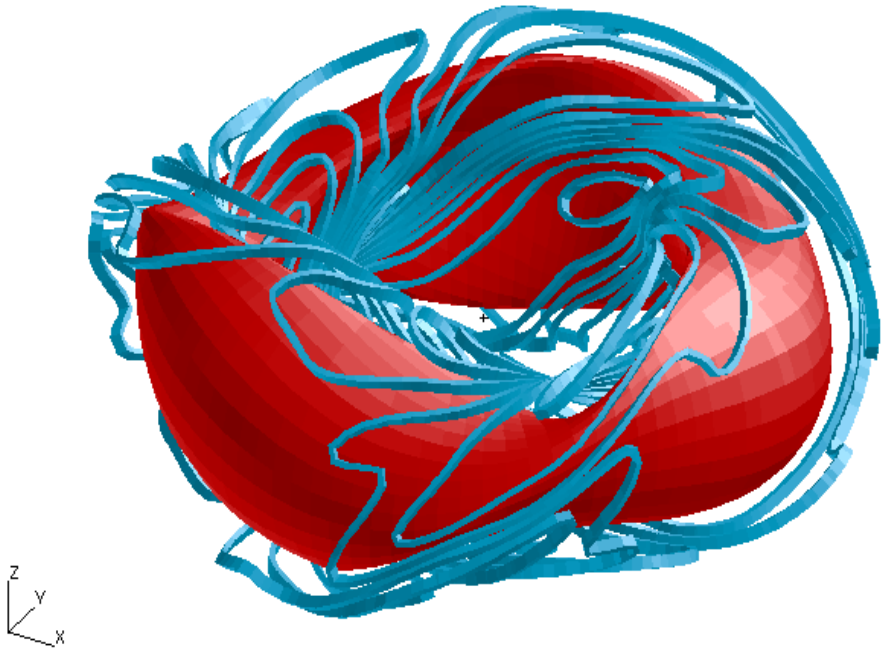
# LI383


Berror (%)
1.00
0.90
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
Current Density (kA/cm^2)
19.5
19.0
18.5
18.0
17.5
17.0
16.5
16.0
15.5
3
4
5
6
7
8
Number of coils per half period
Alternative for Nc = 7 case
Avg. Berror = .79%
Max. Berror = 3.5%
Cur. Density = 16.3 kA/cm^2

# Uniform Contours vs GA




22.1 kA/cm2




17.2 kA/cm2