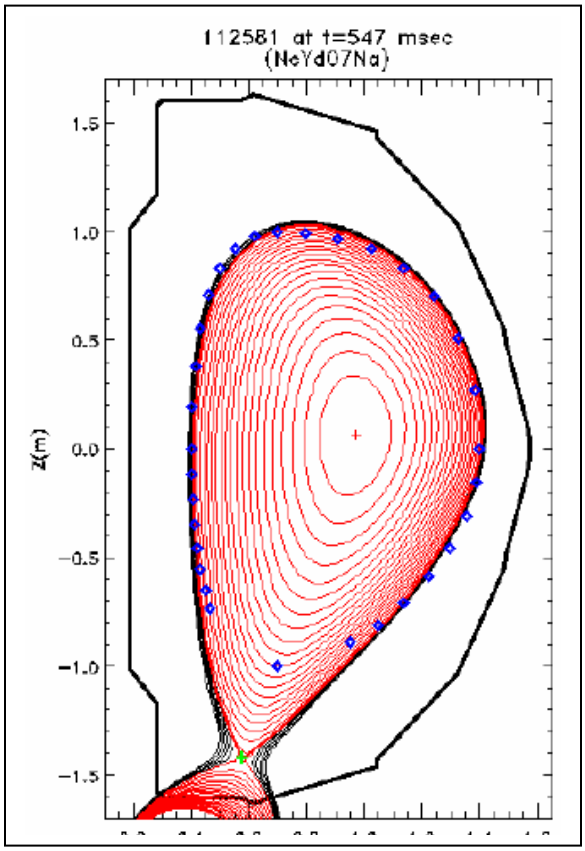
Variation in shape for large changes in external poloidal field coil currents

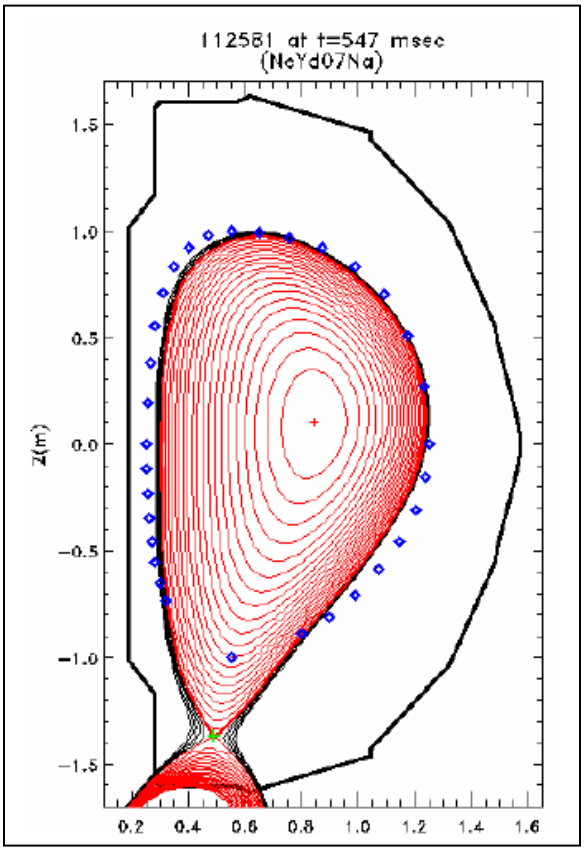
PF1B = +4, PF2L = 0, PF1AL = -2, Ip = 100kA, Hollowness param = 5

Case	R	Z	a	PF5	PF3U	PF3L	PF2U	PF1AU	
a	0.9	0	0.5	-0.48	-0.51	-1.01	0.24	0.14	
b	0.75	0	0.5	-0.41	-0.65	-1.4	-0.008	0.055	

a



b

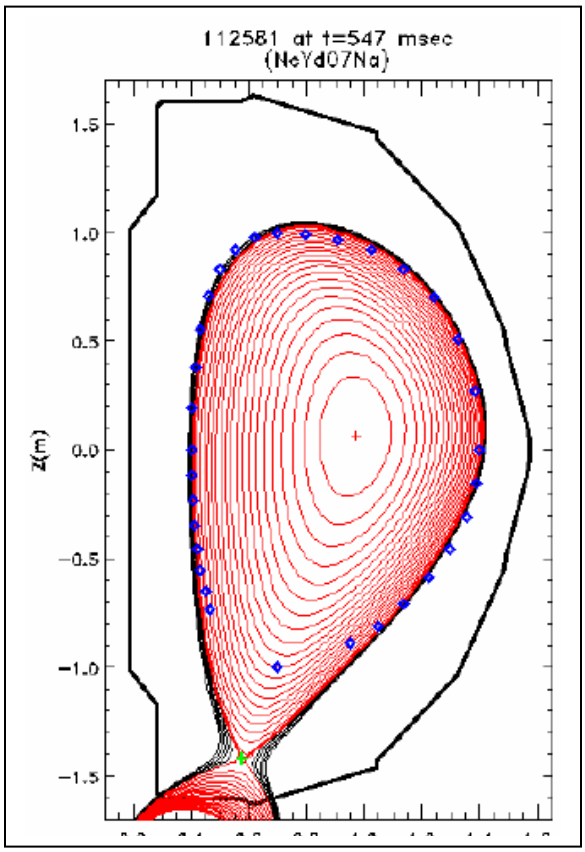


Variation in shape for large changes in external poloidal field coil currents

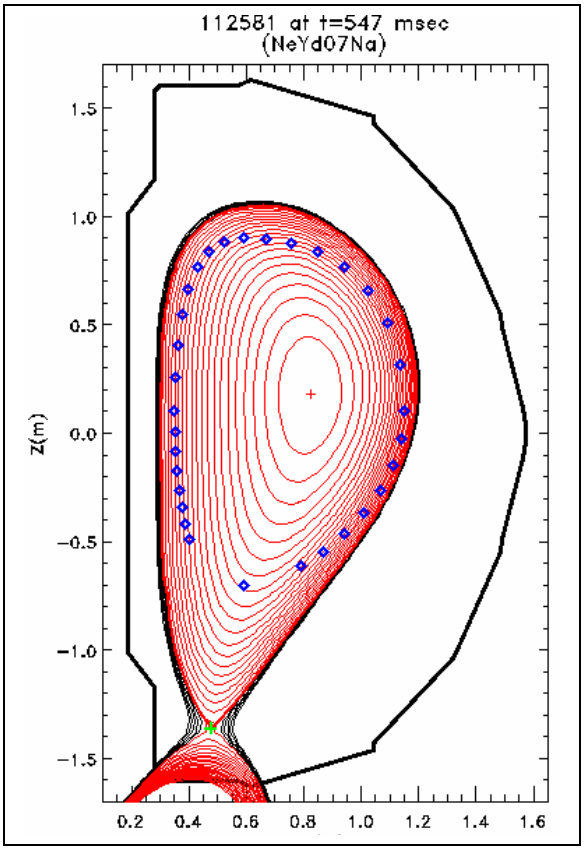
PF1B = +4, PF2L = 0, PF1AL = -2, Ip = 100kA, Hollowness param = 5

Case	R	Z	a	PF5	PF3U	PF3L	PF2U	PF1AU	
a	0.9	0	0.5	-0.48	-0.51	-1.01	0.24	0.14	
c	0.75	+0.1	0.4	-0.48	-0.44	-1.4	0	-1.0	

a



c



Case c

```
RMS boundary change during iteration (mm) =       0.30005926
RMS boundary error at this iteration (mm) =        248.12054
Cycle_count =      110
=====> F^2 iteration change =        0.0000000
-------------------------------------------------------------------------------
Plasma geom. center  R0 (m) =       0.74969352
Vacuum toroidal B at R0 (T) =      -0.51921215
Aspect ratio                =        1.6891722
Boundary elongation         =        2.6840490
Elongation at axis          =        2.4510909
Upper triangularity         =       0.23480480
Lower triangularity         =       0.58534652
q(0)                        =        63.576869
q(95)                       =        63.658028
q(99)                       =        66.713064
q(min)                      =        62.900244
rho q(min)                  =       0.94794515
Internal inductance         =       0.17729884
beta-t (%)                  =      0.043287484
beta-N                      =      0.099848074
Stored energy          (MJ) =    0.00045117475
Ip                     (MA) =      0.099902721
ITF                    (MA) =       -1.9462499
beta-N     specified/actual =        1.0015216
Ip         specified/actual =        1.0009737
<J.B>      specified/actual =        1.0009737
-------------------------------------------------------------------------------
Rescaled equilibrium profiles: p' and <J.B>/<Bt/R2>
Computing new plasma Jphi...
Computing poloidal flux from new plasma Jphi...
Finding optimal coil currents for boundary match...
Found possible poloidal field O-point at R,Z (m) [1] =   0.82449  0.18163
-------------------------------------------------------------------------------
   Coil  Current (kA)      % Change
     OH     -0.000000       -0.2738
  PF1AU     -0.965946       -0.2248
   PF2U     -0.000002       -0.2240
   PF3U     -0.436215        0.0120
    PF5     -0.480000        0.0000
   PF3L     -1.294938       -0.0852
   PF2L     -0.000000       -0.3460
  PF1AL     -2.000000        0.0000
   PF1B      4.000000        0.0000
RMS change in coil currents (A) =       0.81068389
-------------------------------------------------------------------------------
===> Using x-point boundary <===
Found possible poloidal field O-point at R,Z (m) [1] =   0.82431  0.18186
   Iteration #, convergence error =   1,  1.605719e-01
   Iteration #, convergence error =   2,  2.866783e-04
   Iteration #, convergence error =   3,  1.448590e-05
  Changing theta coordinates to:  EQUAL-ARC...
Flux coordinates computed in 0.90306187 seconds.
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Finishing PostScript file creation and stopping ...

RMS boundary change during iteration (mm) =       0.18747216
RMS boundary error at this iteration (mm) =        248.26570
Cycle_count =      111
```
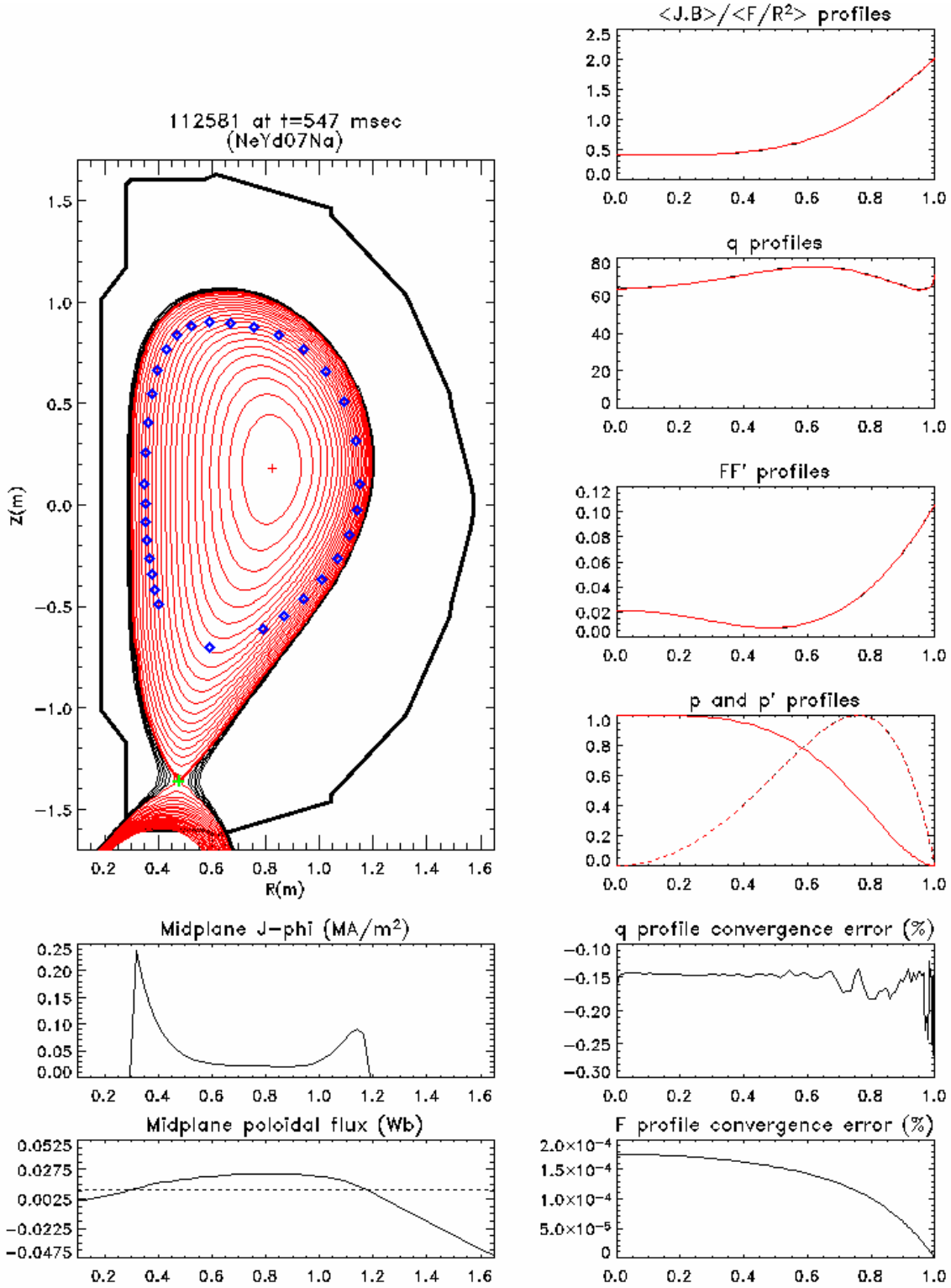
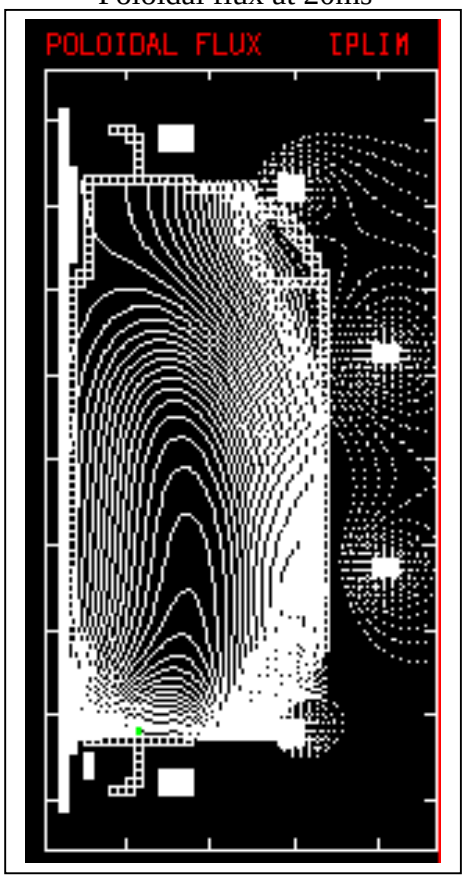

Case c

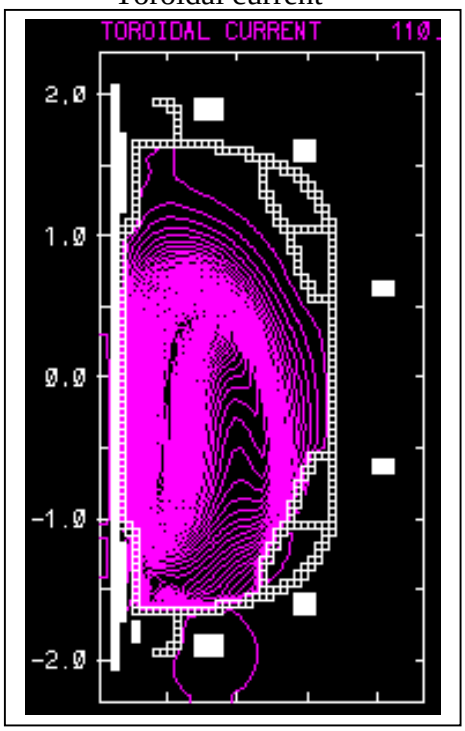

112581 at t=547 msec
(NeYd07Na)
Z(m)
R(m)
<J.B>/<F/R²> profiles
q profiles
FF' profiles
p and p' profiles
Midplane J-phi (MA/m²)
q profile convergence error (%)
Midplane poloidal flux (Wb)
F profile convergence error (%)

TSC run with PF1B at 8kA, PF2L at 2.2kA, PF1AL=0, PF3L=-1kA, PF3U=-0.511kA, PF2L=0.245kA, PF5=-0.48kA,PF1AU=0.143kA [April 1, 2005]

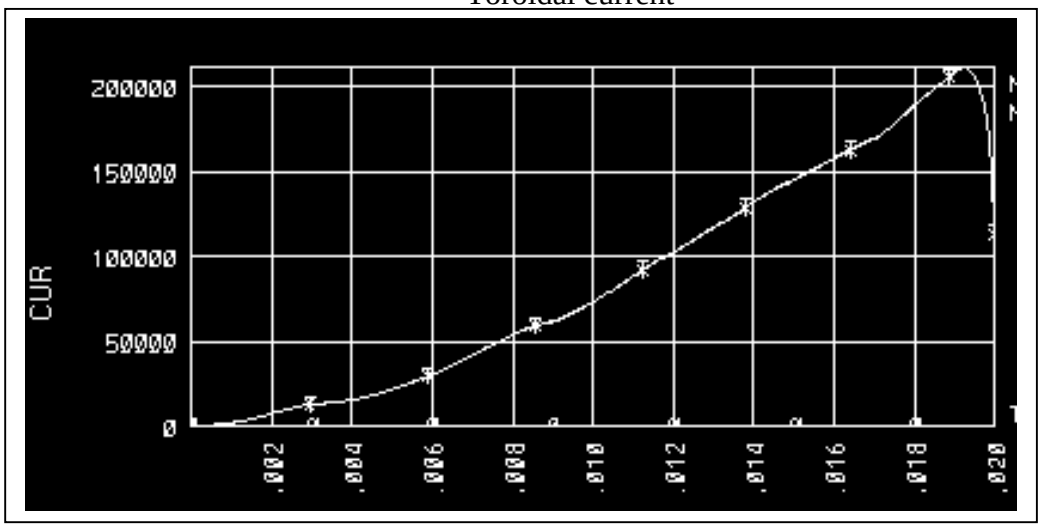
Poloidal flux at 20ms



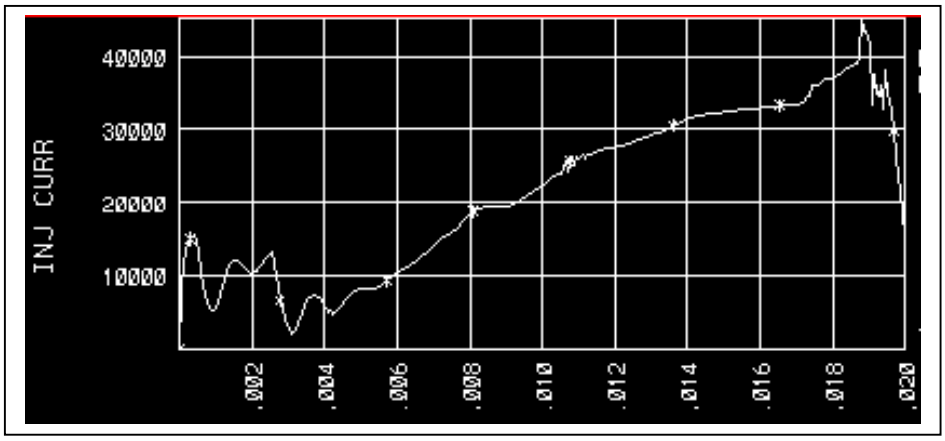
Toroidal current



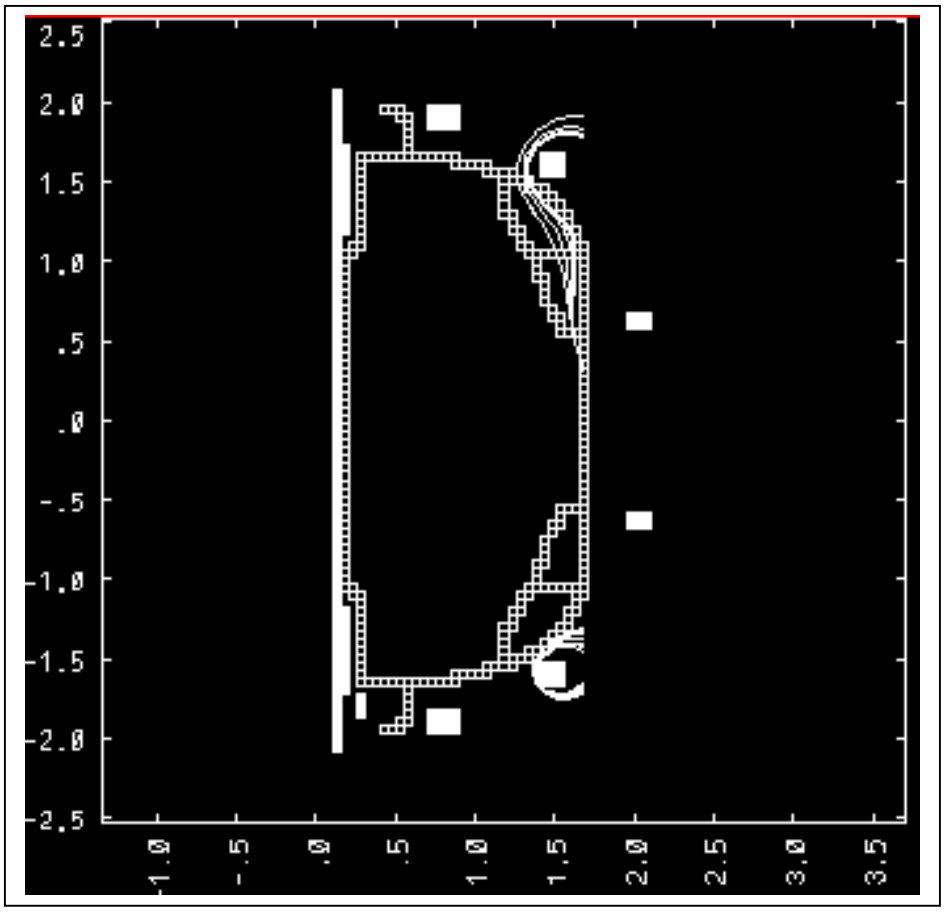
Toroidal current



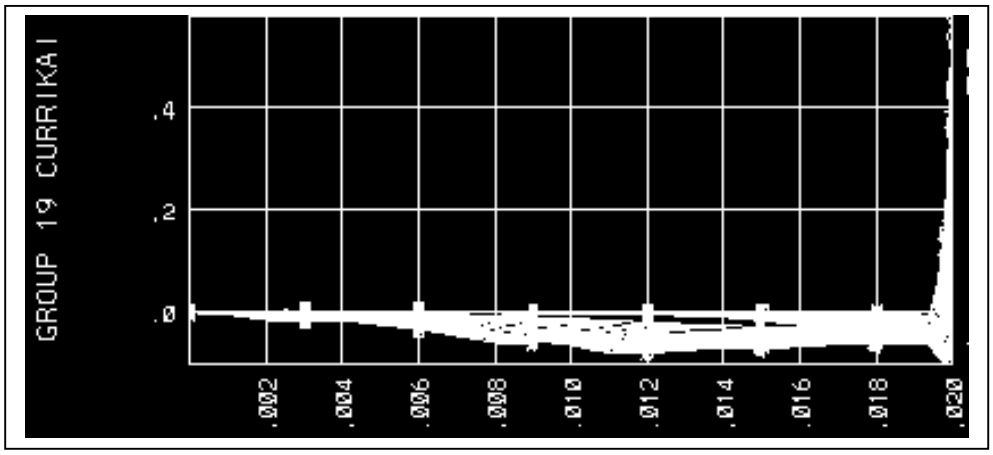
Injector current



Vessel elements in TSC



Currents in the Passive plates (about 50 to 100 amps x 30)



```
Cycle count =       45
=====> F^2 iteration change =        0.0000000
--------------------------------------------------------------------------------
Plasma geom. center  R0 (m) =       0.90980884
Vacuum toroidal B at R0 (T) =      -0.42783711
Aspect ratio                =        1.8171622
Boundary elongation         =        2.4227896
Elongation at axis          =        2.1920862
Upper triangularity         =       0.24318028
Lower triangularity         =       0.63905858
q(0)                        =        44.756262
q(95)                       =        39.558644
q(99)                       =        41.861814
q(min)                      =        39.158287
rho q(min)                  =       0.95441081
Internal inductance         =       0.18805220
beta-t (%)                  =      0.046600522
beta-N                      =      0.099973224
Stored energy          (MJ) =    0.00046521768
Ip                     (MA) =      0.099848603
ITF                    (MA) =       -1.9462499
beta-N     specified/actual =        1.0002678
Ip         specified/actual =        1.0015163
<J.B>      specified/actual =        1.0015164
--------------------------------------------------------------------------------
Rescaled equilibrium profiles: p' and <J.B>/<Bt/R2>
Computing new plasma Jphi...
Computing poloidal flux from new plasma Jphi...
Finding optimal coil currents for boundary match...
Found possible poloidal field O-point at R,Z (m) [1] =   0.97195  0.06608
--------------------------------------------------------------------------------
   Coil  Current (kA)      % Change
     OH     -0.000000        0.4826
  PF1AU      0.143256       -2.6907
   PF2U      0.244935       -6.1350
   PF3U     -0.510639       -0.6171
    PF5     -0.479718       -0.0844
   PF3L     -1.014207       -0.0730
   PF2L      0.000000        0.6892
  PF1AL     -2.000000        0.0000
   PF1B      4.000000        0.0000
RMS change in coil currents (A) =        5.0007015
--------------------------------------------------------------------------------
===> Using x-point boundary <===
Found possible poloidal field O-point at R,Z (m) [1] =   0.97189  0.06620
   Iteration #, convergence error =   1,  1.160205e-01
   Iteration #, convergence error =   2,  3.835859e-03
   Iteration #, convergence error =   3,  7.635122e-04
   Iteration #, convergence error =   4,  1.389260e-04
   Iteration #, convergence error =   5,  2.653383e-05
  Changing theta coordinates to:  EQUAL-ARC...
Flux coordinates computed in 1.1281750 seconds.
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RMS boundary change during iteration (mm) =        1.1808596
RMS boundary error at this iteration (mm) =        178.31878
Cycle count =       46
```
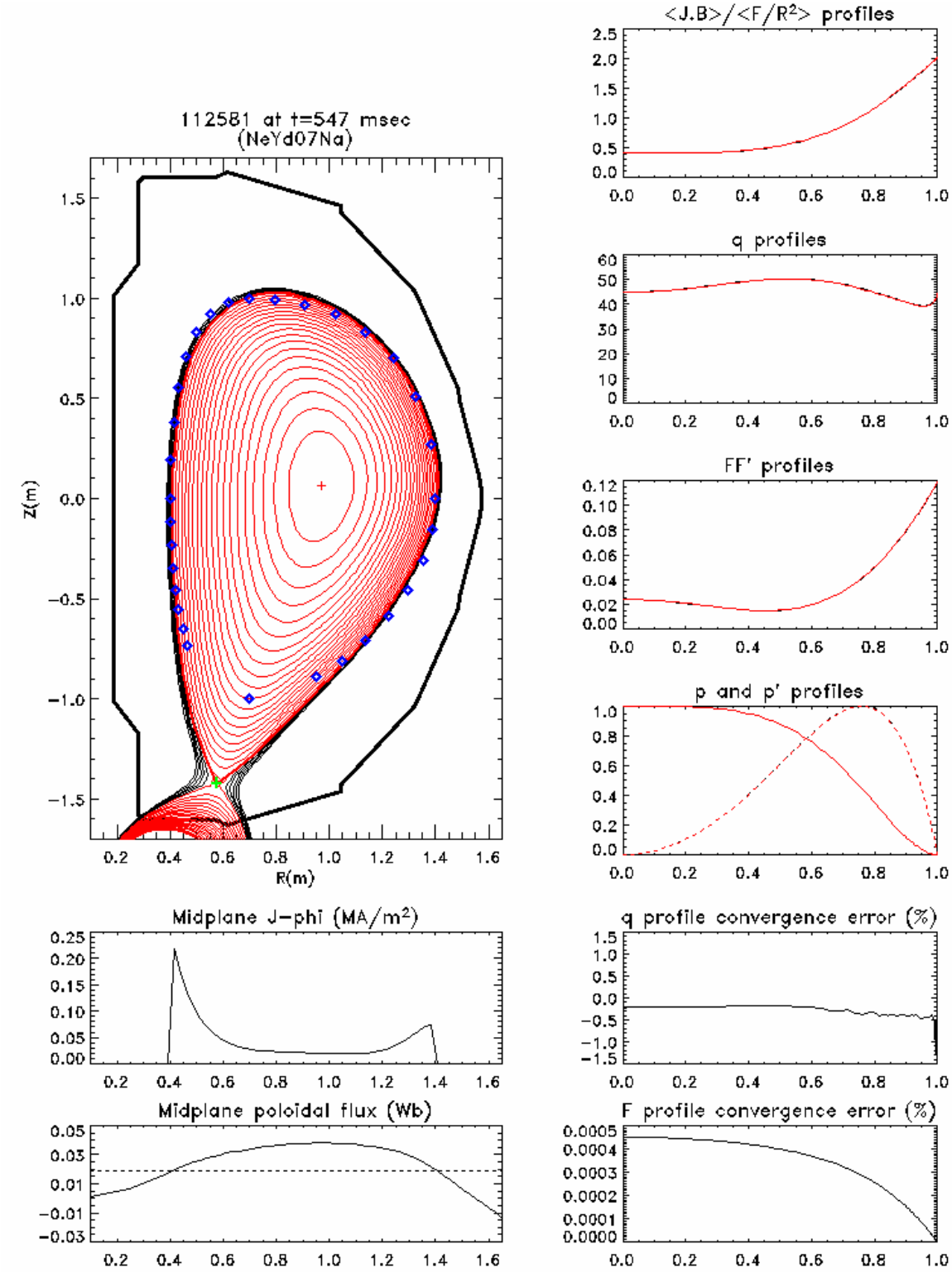

PF1AL = -2, PF1B = +4, PF2L=0, (R,Z) = (0.9,0), Ip=100kA, a =0.5, k=2, d=0.4
Hollowness parameter = 5



PF1AL = -2, PF1B = +4, PF2L=0, (R,Z) = (0.85,0), Ip=100kA, a =0.5, k=2, d=0.4
Hollowness parameter = 5

```
=====> F^2 iteration change =        0.0000000
--------------------------------------------------------------------------------
Plasma geom. center  R0 (m) =        0.86325151
Vacuum toroidal B at R0 (T) =       -0.45091144
Aspect ratio                =         1.7832422
Boundary elongation         =         2.4511238
Elongation at axis          =         2.1760303
Upper triangularity         =        0.22177931
Lower triangularity         =        0.64312711
q(0)                        =         47.017397
q(95)                       =         42.981856
q(99)                       =         45.842838
q(min)                      =         42.159544
rho q(min)                  =        0.94873600
Internal inductance         =        0.19068796
beta-t (%)                  =       0.045818259
beta-N                      =         0.10002770
Stored energy          (MJ) =     0.00045380919
Ip                     (MA) =       0.099985392
ITF                    (MA) =         -1.9462499
beta-N     specified/actual =        0.99972307
Ip         specified/actual =         1.0001461
<J.B>      specified/actual =         1.0001461
--------------------------------------------------------------------------------
Rescaled equilibrium profiles: p' and <J.B>/<Bt/R2>
Computing new plasma Jphi...
Computing poloidal flux from new plasma Jphi...
Finding optimal coil currents for boundary match...
Found possible poloidal field O-point at R,Z (m) [1] =   0.92617  0.07574
--------------------------------------------------------------------------------
   Coil  Current (kA)      % Change
     OH     -0.000000        0.7673
  PF1AU      0.156602       -0.6658
   PF2U      0.299475       -2.0672
   PF3U     -0.578565        0.3700
    PF5     -0.470780        0.7019
   PF3L     -1.175204        0.2924
   PF2L      0.000000        0.8944
  PF1AL     -2.000000        0.0000
   PF1B      4.000000        0.0000
RMS change in coil currents (A) =        2.6961942
--------------------------------------------------------------------------------
===> Using x-point boundary <===
Found possible poloidal field O-point at R,Z (m) [1] =   0.92620  0.07592
   Iteration #, convergence error =   1,  1.200500e-01
   Iteration #, convergence error =   2,  2.808406e-03
   Iteration #, convergence error =   3,  6.802841e-04
   Iteration #, convergence error =   4,  1.330243e-04
   Iteration #, convergence error =   5,  2.673078e-05
  Changing theta coordinates to:  EQUAL-ARC...
Flux coordinates computed in 1.1228840 seconds.
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===> DRSEP (cm) =       -11.406841
RMS boundary change during iteration (mm) =       0.35841687
RMS boundary error at this iteration (mm) =        178.14188
Cycle_count =       57
```
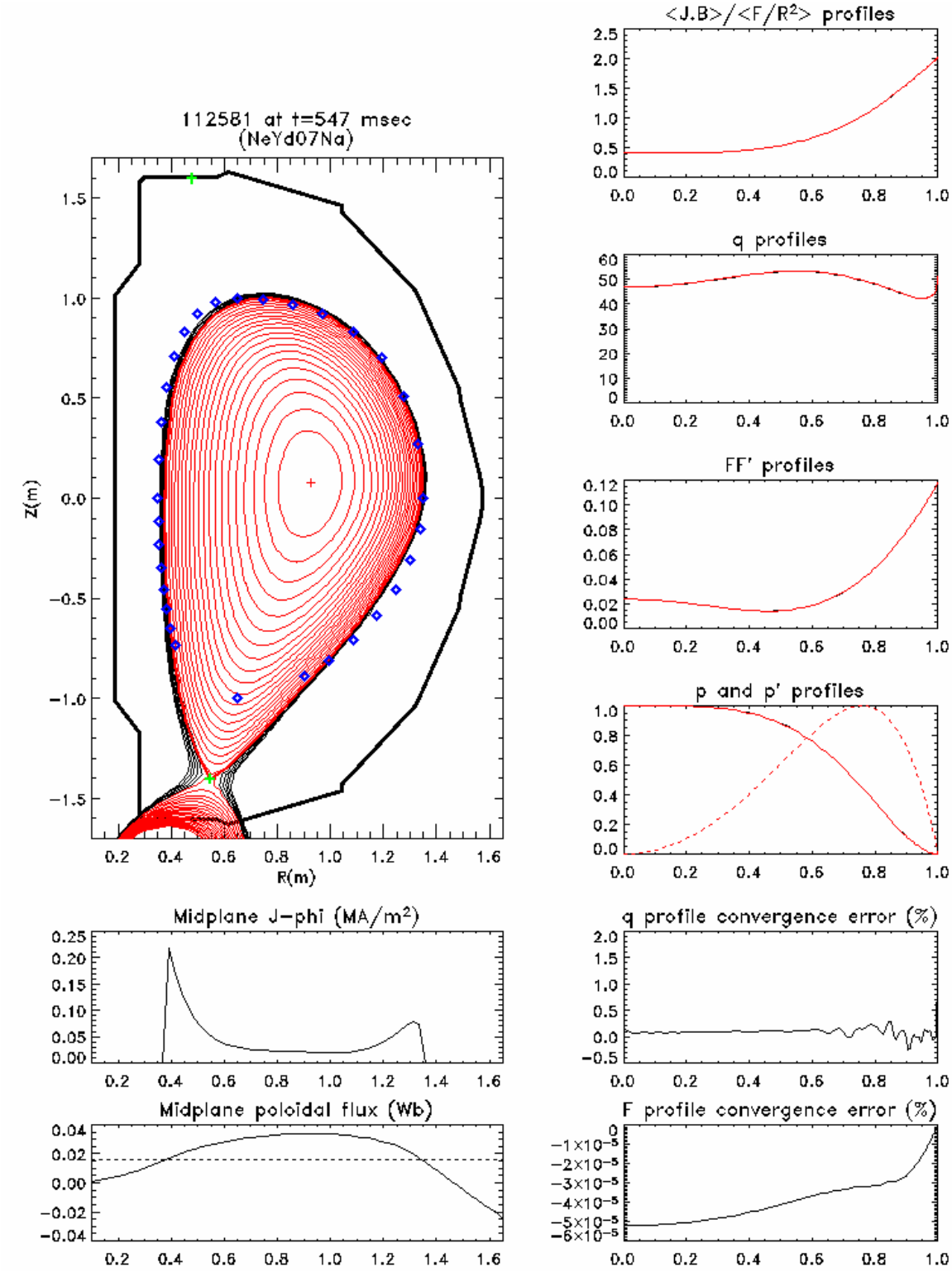

PF1AL = -2, PF1B = +4, PF2L=0, (R,Z) = (0.85,0), Ip=100kA, a =0.5, k=2, d=0.4
Hollowness parameter = 5



PF1AL = -2, PF1B = +4, PF2L=0, **(R,Z) = (0.80,0),** Ip=100kA, a =0.5, k=2, d=0.4
Hollowness parameter = 5

```
RMS boundary change during iteration (mm) =       0.30431974
RMS boundary error at this iteration (mm) =        176.26765
Cycle count =       67
=====> F^2 iteration change =        0.0000000
--------------------------------------------------------------------------------
Plasma geom. center  R0 (m) =       0.81536134
Vacuum toroidal B at R0 (T) =      -0.47739568
Aspect ratio                =        1.7039076
Boundary elongation         =        2.4472385
Elongation at axis          =        2.1544289
Upper triangularity         =       0.22955232
Lower triangularity         =       0.62513829
q(0)                        =        50.932082
q(95)                       =        48.925051
q(99)                       =        52.299162
q(min)                      =        48.472783
rho q(min)                  =       0.94710084
Internal inductance         =       0.18936577
beta-t (%)                  =      0.043811987
beta-N                      =       0.10008883
Stored energy          (MJ) =    0.00044295814
Ip                     (MA) =      0.099997668
ITF                    (MA) =       -1.9462499
beta-N     specified/actual =       0.99911246
Ip         specified/actual =        1.0000233
<J.B>      specified/actual =        1.0000234
--------------------------------------------------------------------------------
Rescaled equilibrium profiles: p' and <J.B>/<Bt/R2>
Computing new plasma Jphi...
Computing poloidal flux from new plasma Jphi...
Finding optimal coil currents for boundary match...
Found possible poloidal field O-point at R,Z (m) [1] =   0.88428  0.08544
--------------------------------------------------------------------------------
   Coil  Current (kA)      % Change
     OH     -0.000000        1.4324
  PF1AU      0.115055        0.1423
   PF2U      0.136594       -0.0205
   PF3U     -0.598031        0.6702
    PF5     -0.453486        0.6363
   PF3L     -1.267371        0.5855
   PF2L      0.000000        1.4421
  PF1AL     -2.000000        0.0000
   PF1B      4.000000        0.0000
RMS change in coil currents (A) =        2.9900626
--------------------------------------------------------------------------------
===> Using x-point boundary <===
Found possible poloidal field O-point at R,Z (m) [1] =   0.88416  0.08511
   Iteration #, convergence error =   1,  1.217003e-01
   Iteration #, convergence error =   2,  5.763205e-05
  Changing theta coordinates to:  EQUAL-ARC...
Flux coordinates computed in 0.72519088 seconds.
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Finishing PostScript file creation and stopping ...

RMS boundary change during iteration (mm) =       0.41466799
RMS boundary error at this iteration (mm) =        176.70022
Cycle count =       68
```
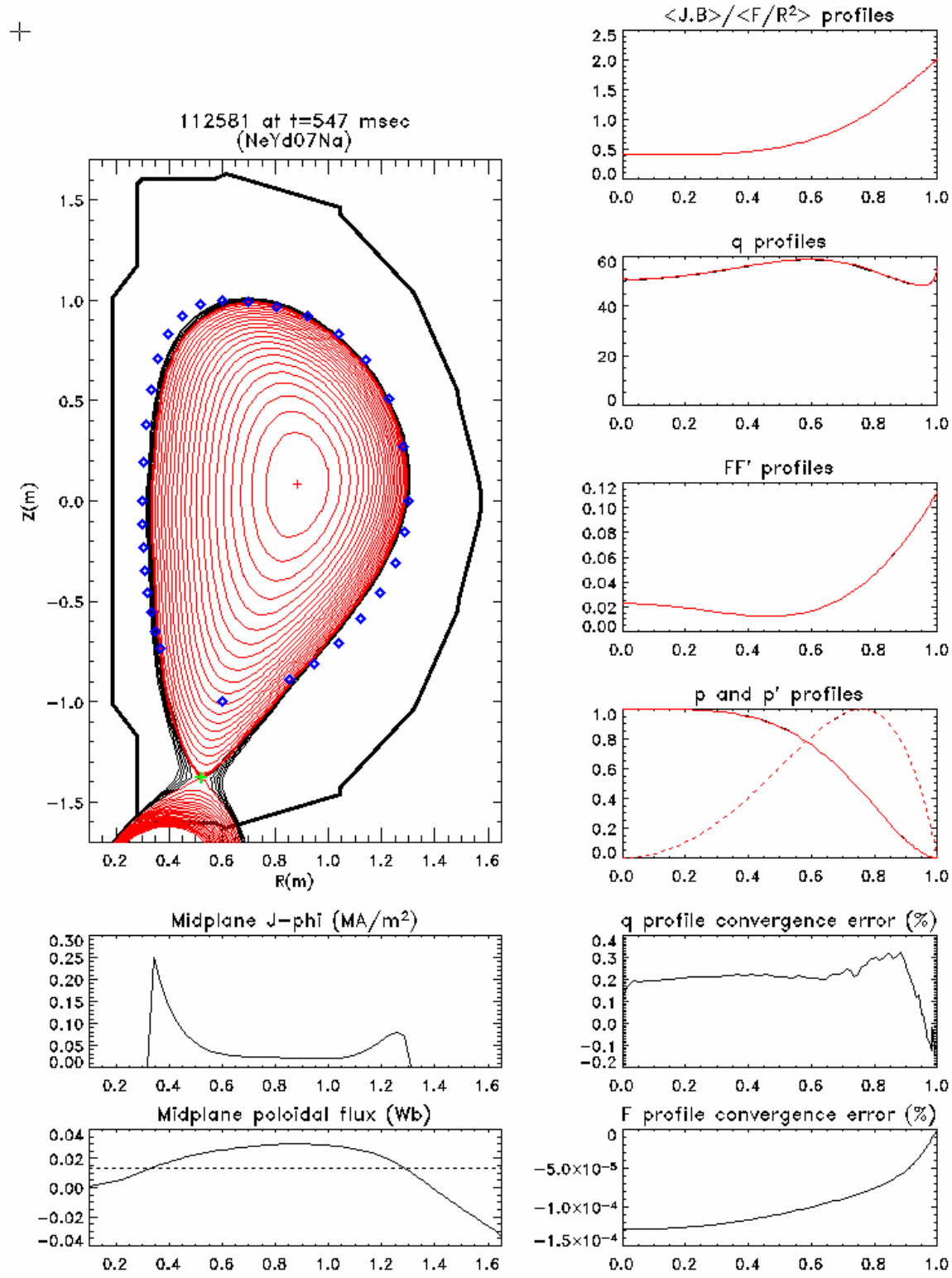

PF1AL = -2, PF1B = +4, PF2L=0, **(R,Z) = (0.80,0),** Ip=100kA, a =0.5, k=2, d=0.4
Hollowness parameter = 5



PF1AL = -2, PF1B = +4, PF2L=0, **(R,Z) = (0.75,0),** Ip=100kA, a =0.5, k=2, d=0.4
Hollowness parameter = 5

```
RMS boundary change during iteration (mm) =       0.53699322
RMS boundary error at this iteration (mm) =        174.64297
Cycle count =       78
=====> F^2 iteration change =        0.0000000
--------------------------------------------------------------------------------
Plasma geom. center  R0 (m) =       0.77327922
Vacuum toroidal B at R0 (T) =      -0.50337572
Aspect ratio                =        1.6557947
Boundary elongation         =        2.4758723
Elongation at axis          =        2.1610880
Upper triangularity         =       0.23489976
Lower triangularity         =       0.56042504
q(0)                        =        55.242767
q(95)                       =        58.074857
q(99)                       =        61.347932
q(min)                      =        55.242767
rho q(min)                  =        0.0000000
Internal inductance         =       0.18312467
beta-t (%)                  =      0.042562026
beta-N                      =       0.10021152
Stored energy          (MJ) =    0.00043417767
Ip                     (MA) =      0.099845095
ITF                    (MA) =       -1.9462499
beta-N     specified/actual =       0.99788924
Ip         specified/actual =        1.0015515
<J.B>      specified/actual =        1.0015517
--------------------------------------------------------------------------------
Rescaled equilibrium profiles: p' and <J.B>/<Bt/R2>
Computing new plasma Jphi...
Computing poloidal flux from new plasma Jphi...
Finding optimal coil currents for boundary match...
Found possible poloidal field O-point at R,Z (m) [1] =   0.84552  0.10127
--------------------------------------------------------------------------------
   Coil  Current (kA)      % Change
     OH     -0.000000        1.1431
  PF1AU      0.055462        0.7704
   PF2U     -0.007609       19.2108
   PF3U     -0.647325        0.6389
    PF5     -0.405780        0.8662
   PF3L     -1.385309        0.4904
   PF2L      0.000000        1.1487
  PF1AL     -2.000000        0.0000
   PF1B      4.000000        0.0000
RMS change in coil currents (A) =        2.9808403
--------------------------------------------------------------------------------
===> Using x-point boundary <===
Found possible poloidal field O-point at R,Z (m) [1] =   0.84536  0.10116
   Iteration #, convergence error =   1,  1.340252e-01
   Iteration #, convergence error =   2,  5.779159e-04
   Iteration #, convergence error =   3,  9.074039e-05
  Changing theta coordinates to:  EQUAL-ARC...
Flux coordinates computed in 0.85956216 seconds.
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Finishing PostScript file creation and stopping ...

RMS boundary change during iteration (mm) =       0.30714741
RMS boundary error at this iteration (mm) =        174.81469
Cycle_count =       79
```
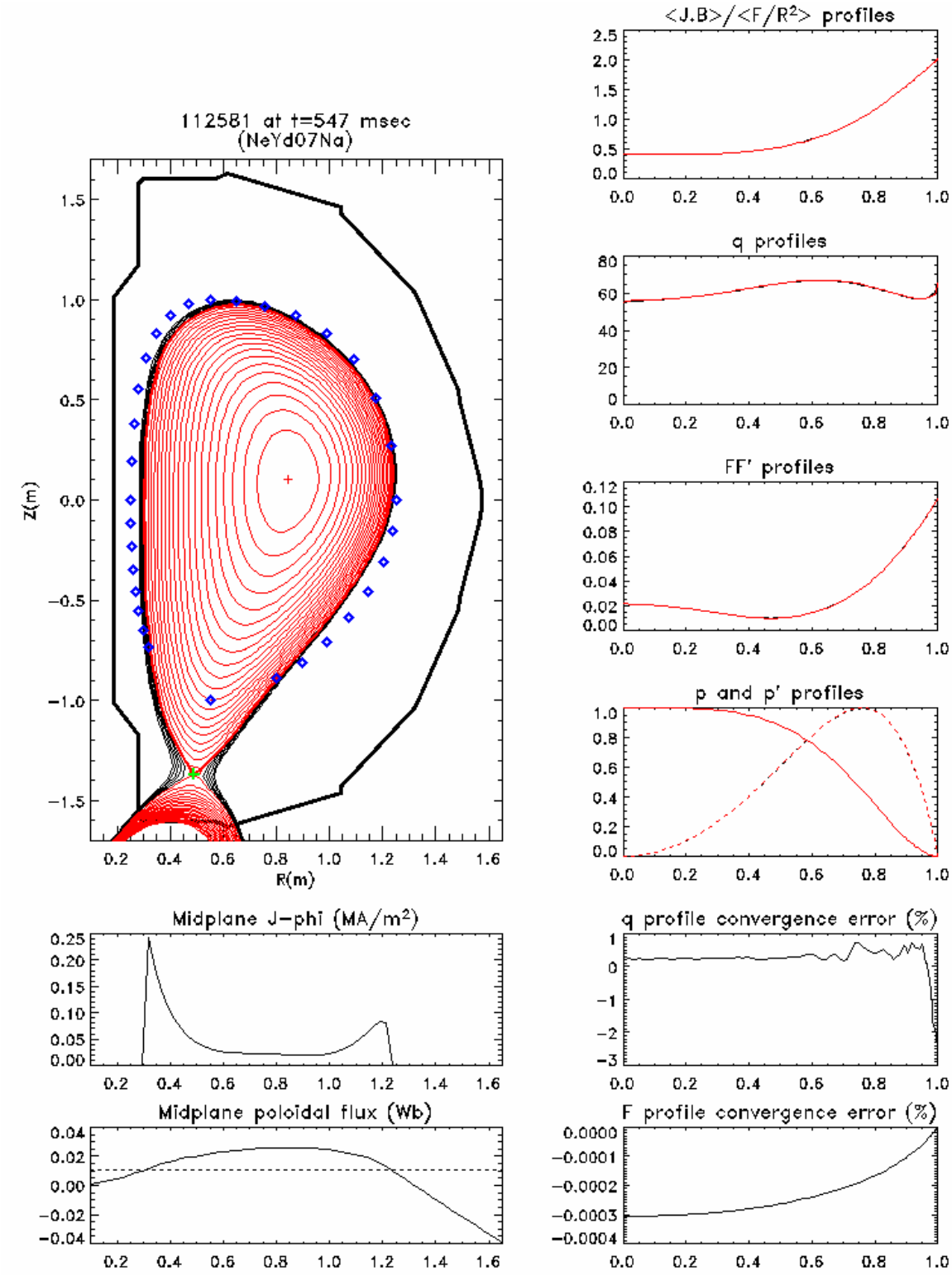

PF1AL = -2, PF1B = +4, PF2L=0, **(R,Z) = (0.75,0),** Ip=100kA, a =0.5, k=2, d=0.4
Hollowness parameter = 5



PF1AL = -2, PF1B = +4, PF2L=0, (R,Z) = (0.75,0), Ip=100kA, **a =0.4**, k=2, d=0.4
Hollowness parameter = 5

```
RMS boundary change during iteration (mm) =       1.3364901
RMS boundary error at this iteration (mm) =       224.47659
Cycle count =       89
=====> F^2 iteration change =       0.0000000
--------------------------------------------------------------------------------
Plasma geom. center  R0 (m) =       0.74856861
Vacuum toroidal B at R0 (T) =      -0.51999239
Aspect ratio                =       1.6819786
Boundary elongation         =       2.4979616
Elongation at axis          =       2.2001693
Upper triangularity         =       0.24961679
Lower triangularity         =       0.55194361
q(0)                        =       56.759627
q(95)                       =       58.072013
q(99)                       =       61.828676
q(min)                      =       56.386818
rho q(min)                  =      0.034641016
Internal inductance         =       0.17490542
beta-t (%)                  =      0.043051578
beta-N                      =       0.10000857
Stored energy          (MJ) =    0.00041660699
Ip                     (MA) =      0.099623092
ITF                    (MA) =       -1.9462499
beta-N     specified/actual =       0.99991436
Ip         specified/actual =        1.0037833
<J.B>      specified/actual =        1.0037836
--------------------------------------------------------------------------------
Rescaled equilibrium profiles: p' and <J.B>/<Bt/R2>
Computing new plasma Jphi...
Computing poloidal flux from new plasma Jphi...
Finding optimal coil currents for boundary match...
Found possible poloidal field O-point at R,Z (m) [1] =   0.81741  0.06512
--------------------------------------------------------------------------------
   Coil  Current (kA)      % Change
     OH     -0.000000       -0.7675
  PF1AU     -0.041685        8.2928
   PF2U     -0.405866        3.9089
   PF3U     -0.553281        0.5747
    PF5     -0.423977        0.6067
   PF3L     -1.408530       -0.3102
   PF2L      0.000000       -0.0653
  PF1AL     -2.000000        0.0000
   PF1B      4.000000        0.0000
RMS change in coil currents (A) =       5.9878136
--------------------------------------------------------------------------------
===> Using x-point boundary <===
Found possible poloidal field O-point at R,Z (m) [1] =   0.81744  0.06531
   Iteration #, convergence error =   1,  1.254971e-01
   Iteration #, convergence error =   2,  4.130469e-04
   Iteration #, convergence error =   3,  3.798285e-05
  Changing theta coordinates to:  EQUAL-ARC...
Flux coordinates computed in 0.86539412 seconds.
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Finishing PostScript file creation and stopping ...

RMS boundary change during iteration (mm) =       0.78675995
RMS boundary error at this iteration (mm) =       224.48482
Cycle count =       90
```
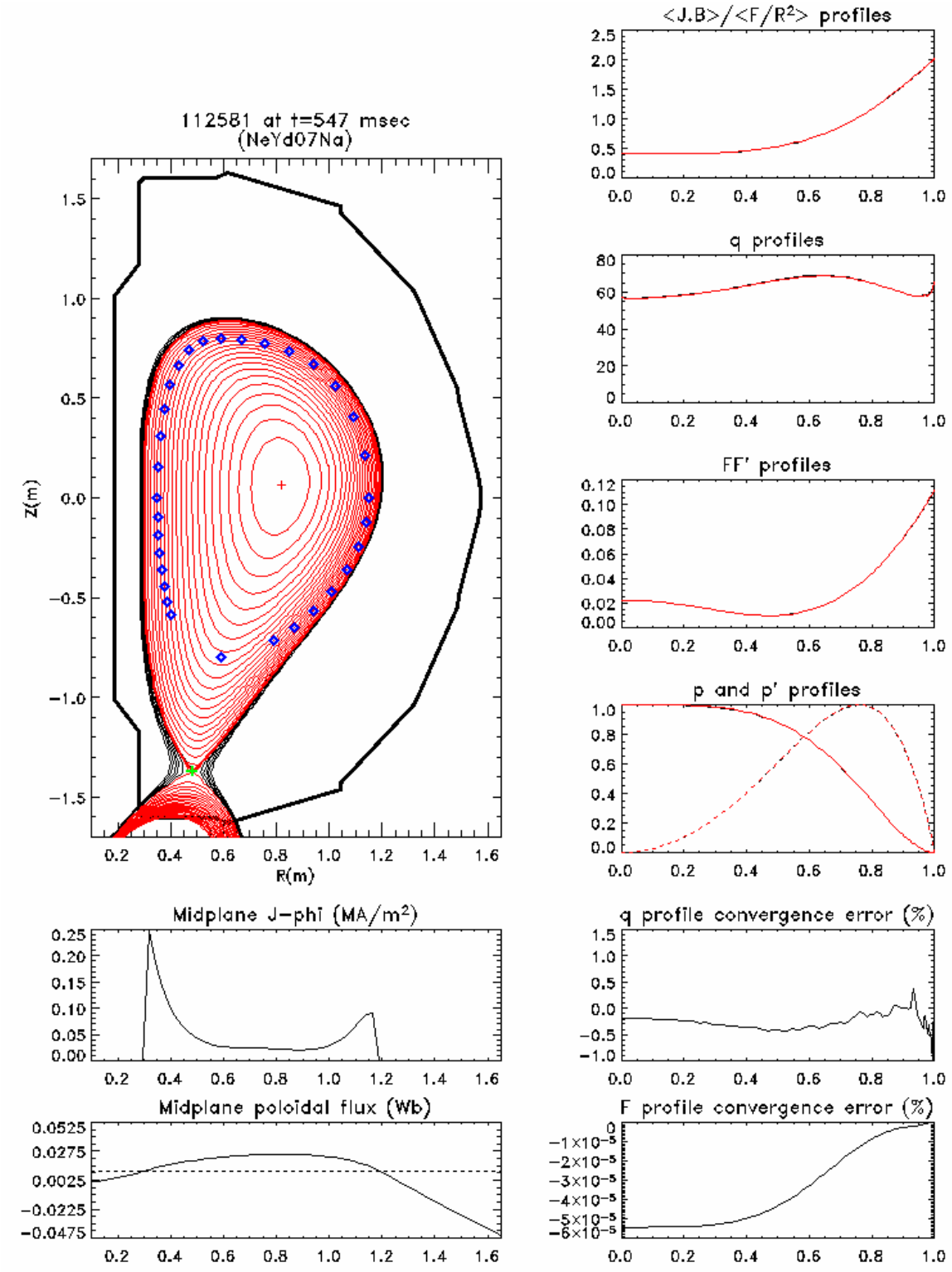
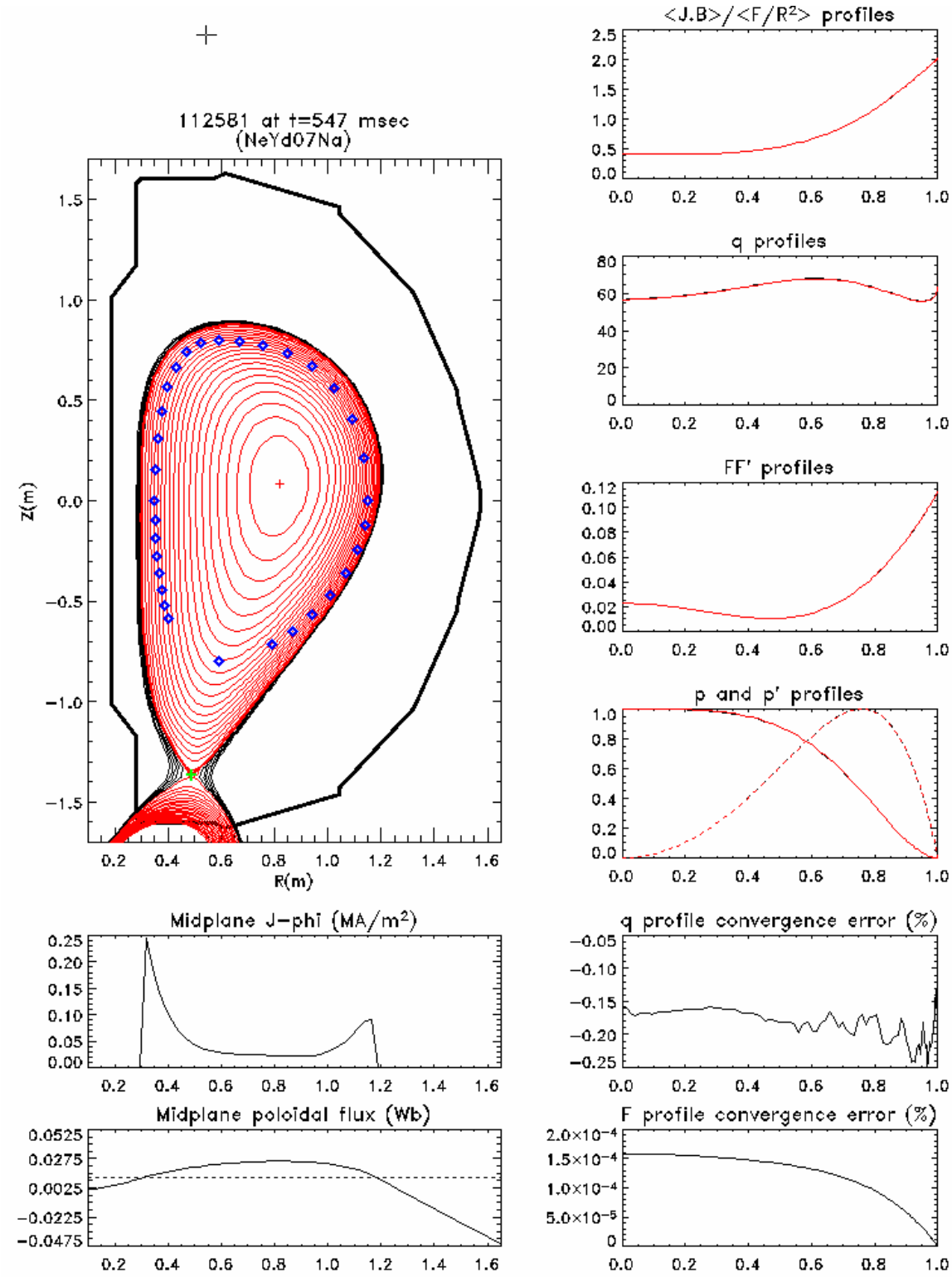

PF1AL = -2, PF1B = +4, PF2L=0, (R,Z) = (0.75,0), Ip=100kA, **a =0.4**, k=2, d=0.4
Hollowness parameter = 5



PF1AL = -2, PF1B = +4, PF2L=0, (R,Z) = (0.75,0), Ip=100 kA, a =0.4, k =2, d=0.4, Fix PF5 at -0.48, Hollowness parameter = 5

```
RMS boundary error at this iteration (mm) =       226.34748
Cycle count =       55
=====> F^2 iteration change =        0.0000000
--------------------------------------------------------------------------------
Plasma geom. center  R0 (m) =       0.74856968
Vacuum toroidal B at R0 (T) =      -0.51999164
Aspect ratio                =       1.6756486
Boundary elongation         =       2.4819649
Elongation at axis          =       2.2379935
Upper triangularity         =       0.17321937
Lower triangularity         =       0.58139289
q(0)                        =        56.511414
q(95)                       =        56.355537
q(99)                       =        59.534667
q(min)                      =        55.712042
rho q(min)                  =       0.94583297
Internal inductance         =       0.17798133
beta-t (%)                  =      0.043016853
beta-N                      =      0.099946188
Stored energy          (MJ) =    0.00042316405
Ip                     (MA) =      0.099981134
ITF                    (MA) =       -1.9462499
beta-N     specified/actual =        1.0005384
Ip         specified/actual =        1.0001887
<J.B>      specified/actual =        1.0001887
--------------------------------------------------------------------------------
Rescaled equilibrium profiles: p' and <J.B>/<Bt/R2>
Computing new plasma Jphi...
Computing poloidal flux from new plasma Jphi...
Finding optimal coil currents for boundary match...
Found possible poloidal field O-point at R,Z (m) [1] =   0.81855  0.08381
--------------------------------------------------------------------------------
   Coil  Current (kA)      % Change
     OH     -0.000000       -0.1465
  PF1AU     -0.120670       -0.0970
   PF2U     -1.063009       -0.1215
   PF3U     -0.164494       -1.2942
    PF5     -0.480000        0.0000
   PF3L     -1.332423       -0.1233
   PF2L      0.000000       -0.5130
  PF1AL     -2.000000        0.0000
   PF1B      4.000000        0.0000
RMS change in coil currents (A) =       0.98811174
--------------------------------------------------------------------------------
===> Using x-point boundary <===
Found possible poloidal field O-point at R,Z (m) [1] =   0.81867  0.08350
   Iteration #, convergence error =   1,  1.340209e-01
   Iteration #, convergence error =   2,  2.335893e-03
   Iteration #, convergence error =   3,  3.278034e-04
   Iteration #, convergence error =   4,  2.634547e-05
  Changing theta coordinates to:  EQUAL-ARC...
Flux coordinates computed in 0.99097300 seconds.
Sized PostScript image...

Finishing PostScript file creation and stopping ...

RMS boundary change during iteration (mm) =       0.15256899
RMS boundary error at this iteration (mm) =        226.49132
Cycle count =       56
```

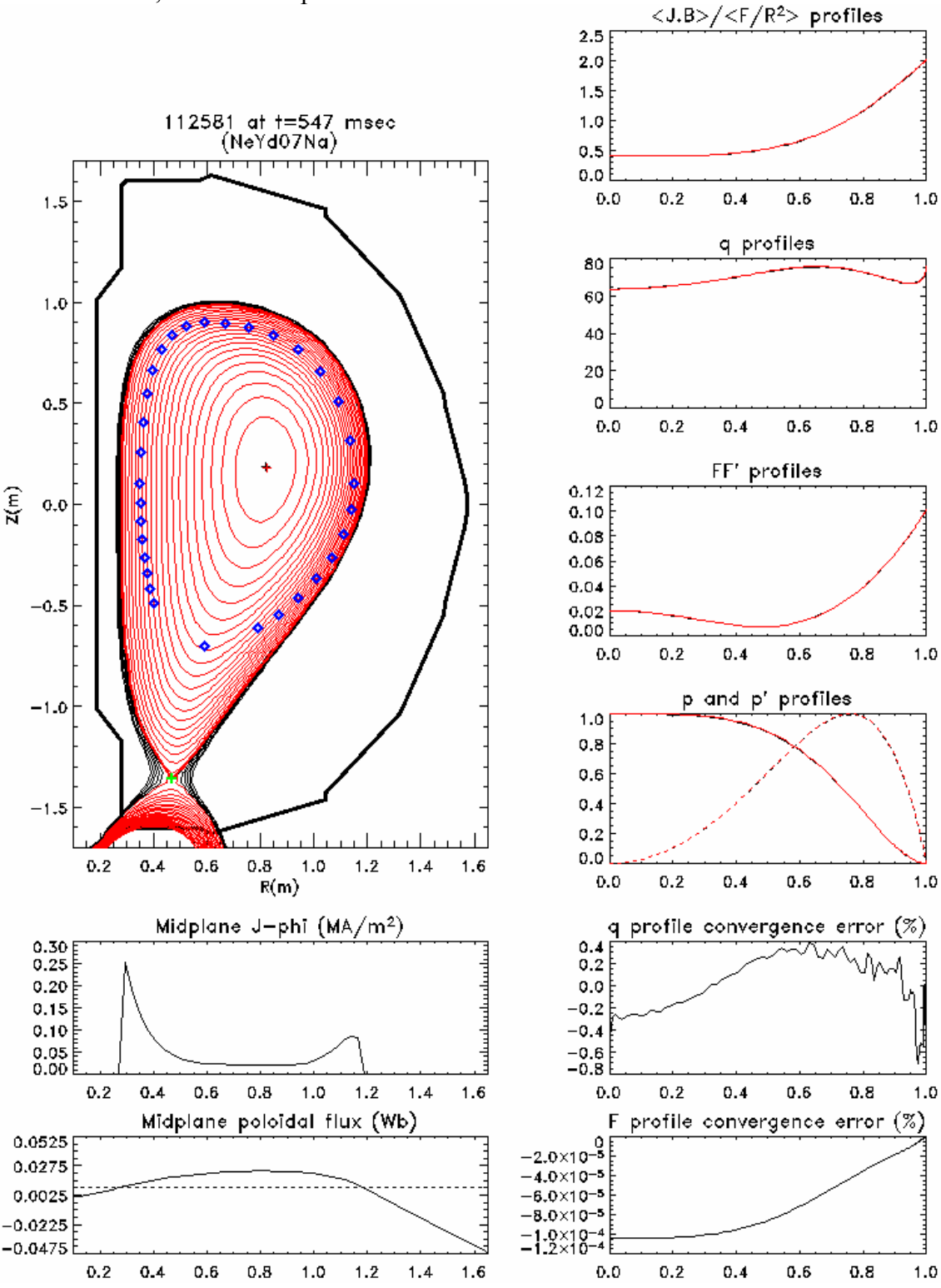
PF1AL = -2, PF1B = +4, PF2L=0, (R,Z) = (0.75,0), Ip=100 kA, a =0.4, k =2, d=0.4,
Fix PF5 at -0.48, Hollowness parameter = 5



PF1AL = -2, PF1B = +4, PF2L=0, (R,Z) = **(0.75,+0.1),** Ip=100 kA, a =0.4, k =2, d=0.4, Fix PF5 at -0.48, Hollowness parameter = 5

```
RMS boundary error at this iteration (mm) =       262.73088
Cycle count =       66
=====> F^2 iteration change =        0.0000000
--------------------------------------------------------------------------------
Plasma geom. center  R0 (m) =       0.74205024
Vacuum toroidal B at R0 (T) =      -0.52456014
Aspect ratio                =        1.6202133
Boundary elongation         =        2.5304768
Elongation at axis          =        2.3063052
Upper triangularity         =       0.15735327
Lower triangularity         =       0.60273850
q(0)                        =        63.198396
q(95)                       =        67.323253
q(99)                       =        70.880195
q(min)                      =        63.198396
rho q(min)                  =        0.0000000
Internal inductance         =       0.17486558
beta-t (%)                  =      0.041530282
beta-N                      =       0.10002395
Stored energy          (MJ) =    0.00043841478
Ip                     (MA) =      0.099751006
ITF                    (MA) =       -1.9462499
beta-N     specified/actual =       0.99976056
Ip         specified/actual =        1.0024962
<J.B>      specified/actual =        1.0024963
--------------------------------------------------------------------------------
Rescaled equilibrium profiles: p' and <J.B>/<Bt/R2>
Computing new plasma Jphi...
Computing poloidal flux from new plasma Jphi...
Finding optimal coil currents for boundary match...
Found possible poloidal field O-point at R,Z (m) [1] =   0.82199  0.18295
--------------------------------------------------------------------------------
   Coil  Current (kA)      % Change
     OH     -0.000000       -0.3872
  PF1AU     -0.078249       -9.8819
   PF2U     -0.990322       -4.3820
   PF3U     -0.053346        7.0973
    PF5     -0.480000        0.0000
   PF3L     -1.400795        0.5061
   PF2L      0.000000        7.3644
  PF1AL     -2.000000        0.0000
   PF1B      4.000000        0.0000
RMS change in coil currents (A) =        14.318967
--------------------------------------------------------------------------------
===> Using x-point boundary <===
Found possible poloidal field O-point at R,Z (m) [1] =   0.82222  0.18338
   Iteration #, convergence error =   1,  1.607708e-01
   Iteration #, convergence error =   2,  2.303212e-03
   Iteration #, convergence error =   3,  3.786998e-04
   Iteration #, convergence error =   4,  5.805077e-05
  Changing theta coordinates to:  EQUAL-ARC...
Flux coordinates computed in 1.0005369 seconds.
Sized PostScript image...

Finishing PostScript file creation and stopping ...

RMS boundary change during iteration (mm) =       0.71155170
RMS boundary error at this iteration (mm) =        262.68357
Cycle count =       67
```

PF1AL = -2, PF1B = +4, PF2L=0, (R,Z) = **(0.75,+0.1)**, Ip=100 kA, a =0.4, k =2, d=0.4, Fix PF5 at -0.48, Hollowness parameter = 5



PF1AL = -2, PF1B = +4, PF2L=0, (R,Z) = **(0.75,+0.2)**, Ip=100 kA, a =0.4, k =2, d=0.4, Fix PF5 at -0.48, Hollowness parameter = 5

```
RMS boundary change during iteration (mm) =       0.90608722
RMS boundary error at this iteration (mm) =        298.84404
Cycle count =       77
=====> F^2 iteration change =        0.0000000
--------------------------------------------------------------------------------
Plasma geom. center  R0 (m) =       0.73405365
Vacuum toroidal B at R0 (T) =      -0.53027456
Aspect ratio                =        1.5526002
Boundary elongation         =        2.5544387
Elongation at axis          =        2.3127758
Upper triangularity         =       0.14267120
Lower triangularity         =       0.59812414
q(0)                        =        70.836319
q(95)                       =        79.702815
q(99)                       =        84.283993
q(min)                      =        70.255663
rho q(min)                  =      0.017320508
Internal inductance         =       0.17161291
beta-t (%)                  =      0.040055351
beta-N                      =       0.10024891
Stored energy          (MJ) =    0.00045643194
Ip                     (MA) =       0.10017281
ITF                    (MA) =       -1.9462499
beta-N     specified/actual =       0.99751712
Ip         specified/actual =       0.99827488
<J.B>      specified/actual =       0.99827493
--------------------------------------------------------------------------------
Rescaled equilibrium profiles: p' and <J.B>/<Bt/R2>
Computing new plasma Jphi...
Computing poloidal flux from new plasma Jphi...
Finding optimal coil currents for boundary match...
Found possible poloidal field O-point at R,Z (m) [1] =   0.82771  0.29357
--------------------------------------------------------------------------------
   Coil  Current (kA)      % Change
     OH     -0.000000       -0.1167
  PF1AU      0.001581       67.4835
   PF2U     -0.940915       -1.5643
   PF3U     -0.003272     -195.5303
    PF5     -0.480000        0.0000
   PF3L     -1.409682        0.9789
   PF2L      0.000000       87.7035
  PF1AL     -2.000000        0.0000
   PF1B      4.000000        0.0000
RMS change in coil currents (A) =        6.8287141
--------------------------------------------------------------------------------
===> Using x-point boundary <===
Found possible poloidal field O-point at R,Z (m) [1] =   0.82749  0.29333
   Iteration #, convergence error =   1,  1.806135e+00
   Iteration #, convergence error =   2,  8.112376e-04
   Iteration #, convergence error =   3,  1.335320e-05
  Changing theta coordinates to:  EQUAL-ARC...
Flux coordinates computed in 0.85794902 seconds.
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Finishing PostScript file creation and stopping ...

RMS boundary change during iteration (mm) =       0.80960481
RMS boundary error at this iteration (mm) =        298.69772
Cycle count =       78
```
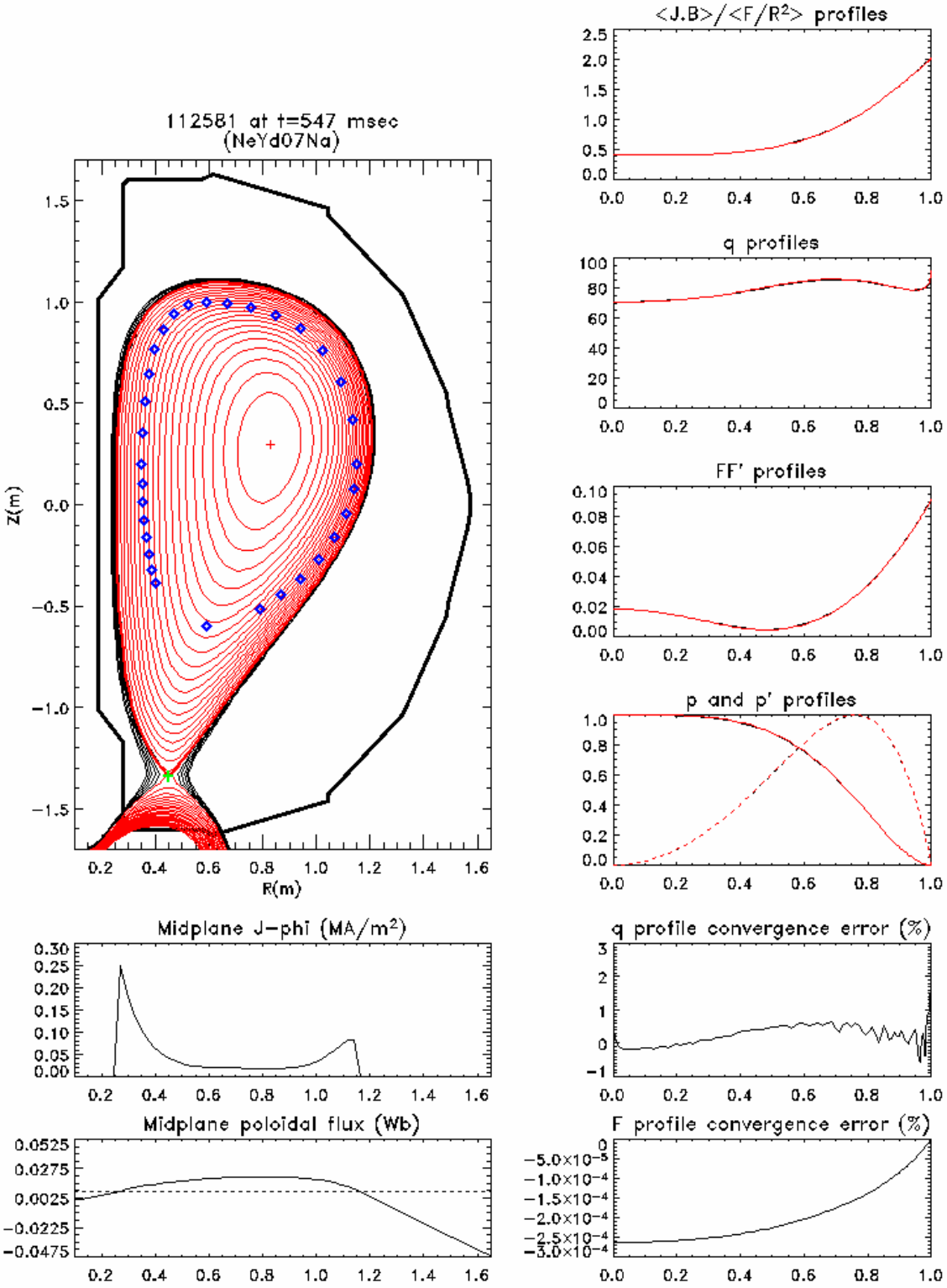

PF1AL = -2, PF1B = +4, PF2L=0, (R,Z) = **(0.75,+0.2)**, Ip=100 kA, a =0.4, k =2, d=0.4, Fix PF5 at -0.48, Hollowness parameter = 5



PF1AL = -2, PF1B = +4, PF2L=0, (R,Z) = **(0.75,+0.3),** Ip=100 kA, a =0.4, k =2, d=0.4, Fix PF5 at -0.48, Hollowness parameter = 5

```
RMS boundary error at this iteration (mm) =       332.28936
Cycle count =       99
=====> F^2 iteration change =        0.0000000
--------------------------------------------------------------------------------
Plasma geom. center  R0 (m) =       0.72646917
Vacuum toroidal B at R0 (T) =      -0.53581073
Aspect ratio                =        1.4771026
Boundary elongation         =        2.5267121
Elongation at axis          =        2.3077122
Upper triangularity         =       0.25320815
Lower triangularity         =       0.62921577
q(0)                        =        80.171453
q(95)                       =        101.88295
q(99)                       =        110.58817
q(min)                      =        80.171453
rho q(min)                  =        0.0000000
Internal inductance         =       0.15656301
beta-t (%)                  =      0.037940998
beta-N                      =       0.10006558
Stored energy          (MJ) =    0.00046600901
Ip                     (MA) =      0.099917602
ITF                    (MA) =       -1.9462499
beta-N     specified/actual =       0.99934468
Ip         specified/actual =        1.0008247
<J.B>      specified/actual =        1.0008247
--------------------------------------------------------------------------------
Rescaled equilibrium profiles: p' and <J.B>/<Bt/R2>
Computing new plasma Jphi...
Computing poloidal flux from new plasma Jphi...
Finding optimal coil currents for boundary match...
Found possible poloidal field O-point at R,Z (m) [1] =   0.83693  0.40479
--------------------------------------------------------------------------------
   Coil  Current (kA)      % Change
     OH     -0.000000        0.3155
  PF1AU      0.044458        0.9343
   PF2U     -0.952387        0.3052
   PF3U      0.012891       13.6245
    PF5     -0.480000        0.0000
   PF3L     -1.348455        0.2027
   PF2L     -0.000000       -1.0269
  PF1AL     -2.000000        0.0000
   PF1B      4.000000        0.0000
RMS change in coil currents (A) =        1.5022608
--------------------------------------------------------------------------------
===> Using x-point boundary <===
Found possible poloidal field O-point at R,Z (m) [1] =   0.83692  0.40457
   Iteration #, convergence error =   1,  2.472935e+00
   Iteration #, convergence error =   2,  1.460779e-03
   Iteration #, convergence error =   3,  1.896660e-04
   Iteration #, convergence error =   4,  2.455926e-05
  Changing theta coordinates to:  EQUAL-ARC...
Flux coordinates computed in 0.98704004 seconds.
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Finishing PostScript file creation and stopping ...

RMS boundary change during iteration (mm) =       0.21355383
RMS boundary error at this iteration (mm) =       332.14664
Cycle count =      100
```
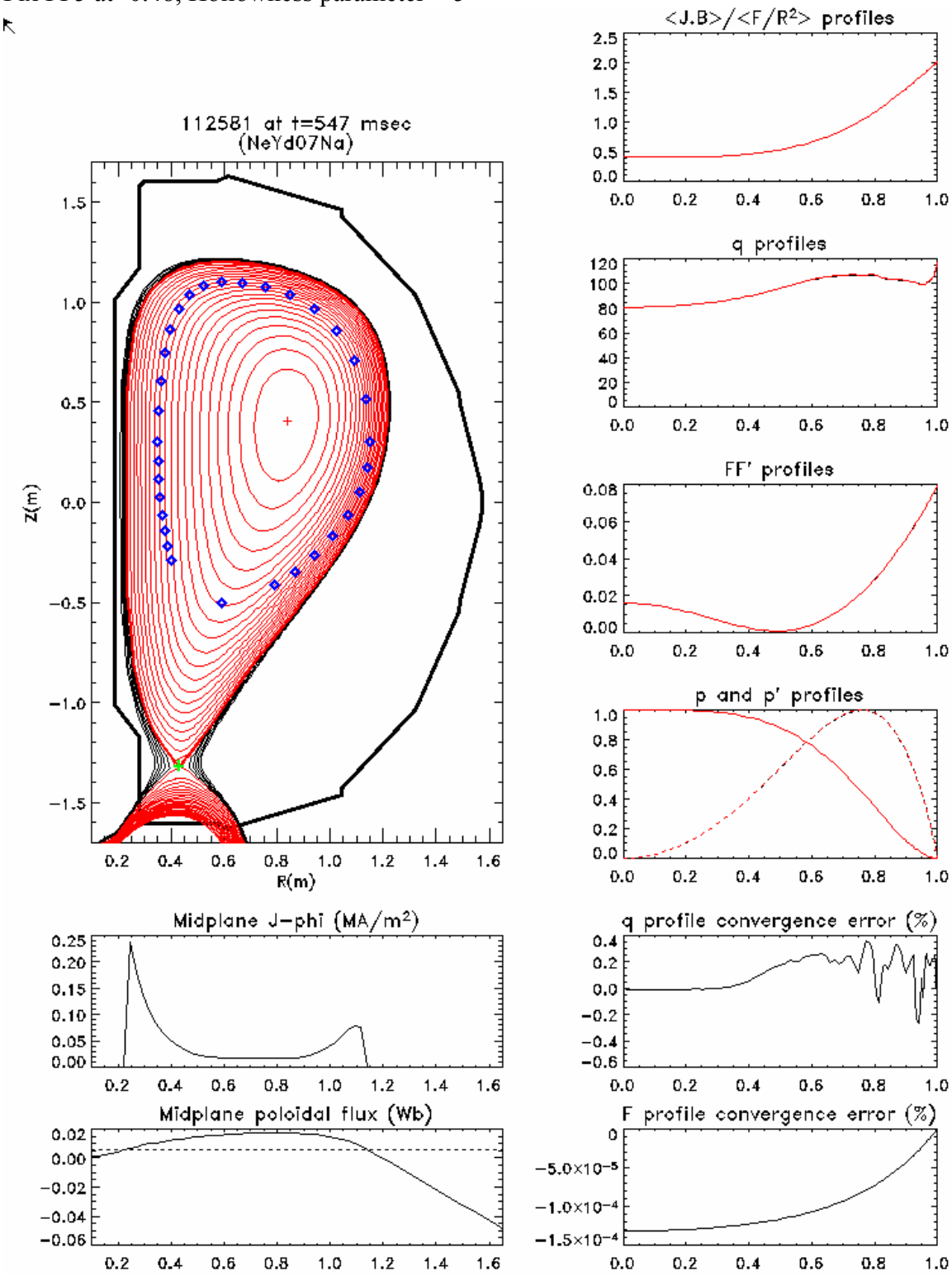

PF1AL = -2, PF1B = +4, PF2L=0, (R,Z) = **(0.75,+0.3),** Ip=100 kA, a =0.4, k =2, d=0.4, Fix PF5 at -0.48, Hollowness parameter = 5



PF1AL = -2, PF1B = +4, PF2L=0, (R,Z) = **(0.75,+0.4),** Ip=100 kA, a =0.4, k =2, d=0.4, Fix PF5 at -0.48, Hollowness parameter = 5

```
RMS boundary change during iteration (mm) =       0.16015043
RMS boundary error at this iteration (mm) =        365.89673
Cycle count =      121
=====> F^2 iteration change =        0.0000000
--------------------------------------------------------------------------------
Plasma geom. center  R0 (m) =       0.71986711
Vacuum toroidal B at R0 (T) =      -0.54072477
Aspect ratio                =        1.4277019
Boundary elongation         =        2.5378243
Elongation at axis          =        2.2949707
Upper triangularity         =       0.35792562
Lower triangularity         =       0.67517147
q(0)                        =        86.320514
q(95)                       =        124.01066
q(99)                       =        132.70573
q(min)                      =        86.320514
rho q(min)                  =        0.0000000
Internal inductance         =       0.14671002
beta-t (%)                  =      0.036671606
beta-N                      =       0.10002667
Stored energy          (MJ) =    0.00047288045
Ip                     (MA) =      0.099955151
ITF                    (MA) =       -1.9462499
beta-N     specified/actual =       0.99973341
Ip         specified/actual =        1.0004487
<J.B>      specified/actual =        1.0004487
--------------------------------------------------------------------------------
Rescaled equilibrium profiles: p' and <J.B>/<Bt/R2>
Computing new plasma Jphi...
Computing poloidal flux from new plasma Jphi...
Finding optimal coil currents for boundary match...
Found possible poloidal field O-point at R,Z (m) [1] =   0.84651  0.52012
--------------------------------------------------------------------------------
   Coil  Current (kA)      % Change
     OH     -0.000000       -0.2337
  PF1AU      0.125197        0.0243
   PF2U     -0.803362       -0.1748
   PF3U     -0.003713       -6.3831
    PF5     -0.480000        0.0000
   PF3L     -1.346856        0.0690
   PF2L     -0.000000       -0.1713
  PF1AL     -2.000000        0.0000
   PF1B      4.000000        0.0000
RMS change in coil currents (A) =       0.56596511
--------------------------------------------------------------------------------
===> Using x-point boundary <===
Found possible poloidal field O-point at R,Z (m) [1] =   0.84672  0.51967
   Iteration #, convergence error =   1,  7.898798e-01
   Iteration #, convergence error =   2,  1.923973e-03
   Iteration #, convergence error =   3,  5.695269e-05
  Changing theta coordinates to:  EQUAL-ARC...
Flux coordinates computed in 0.86307383 seconds.
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Finishing PostScript file creation and stopping ...

RMS boundary change during iteration (mm) =       0.13007822
RMS boundary error at this iteration (mm) =        365.86233
Cycle_count =      122
```

PF1AL = -2, PF1B = +4, PF2L=0, (R,Z) = **(0.75,+0.4),** Ip=100 kA, a =0.4, k =2, d=0.4, Fix PF5 at -0.48, Hollowness parameter = 5