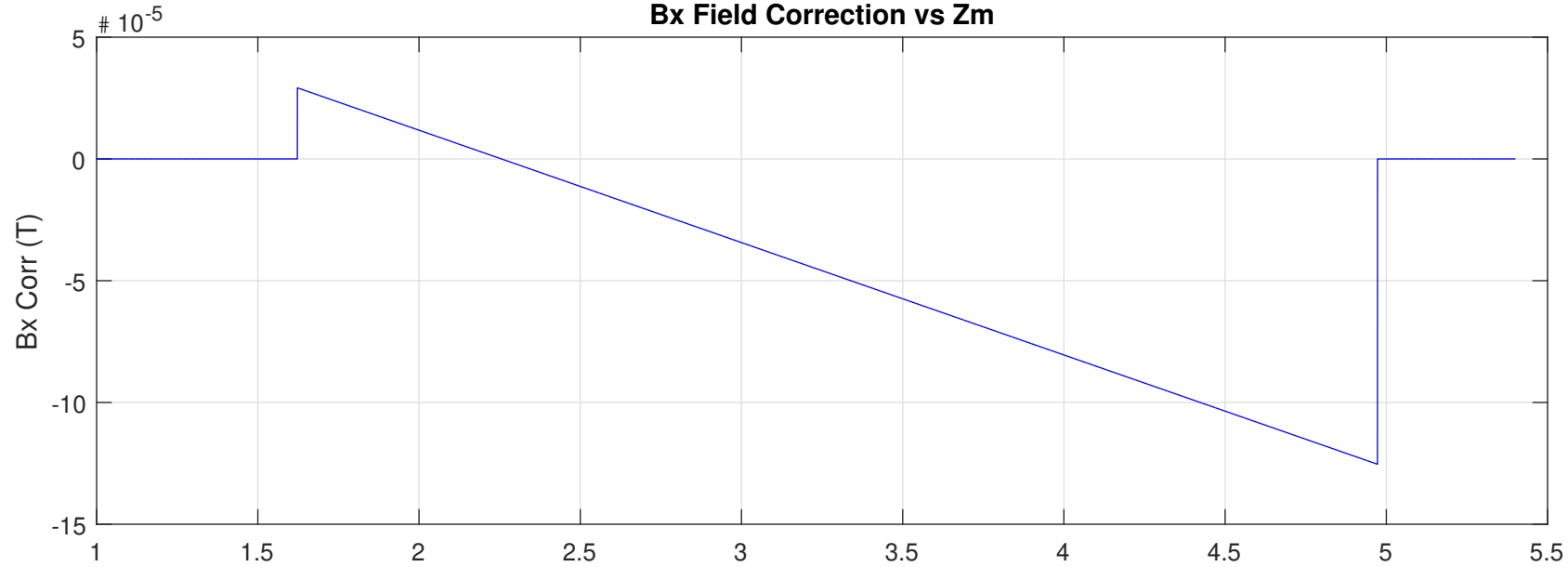
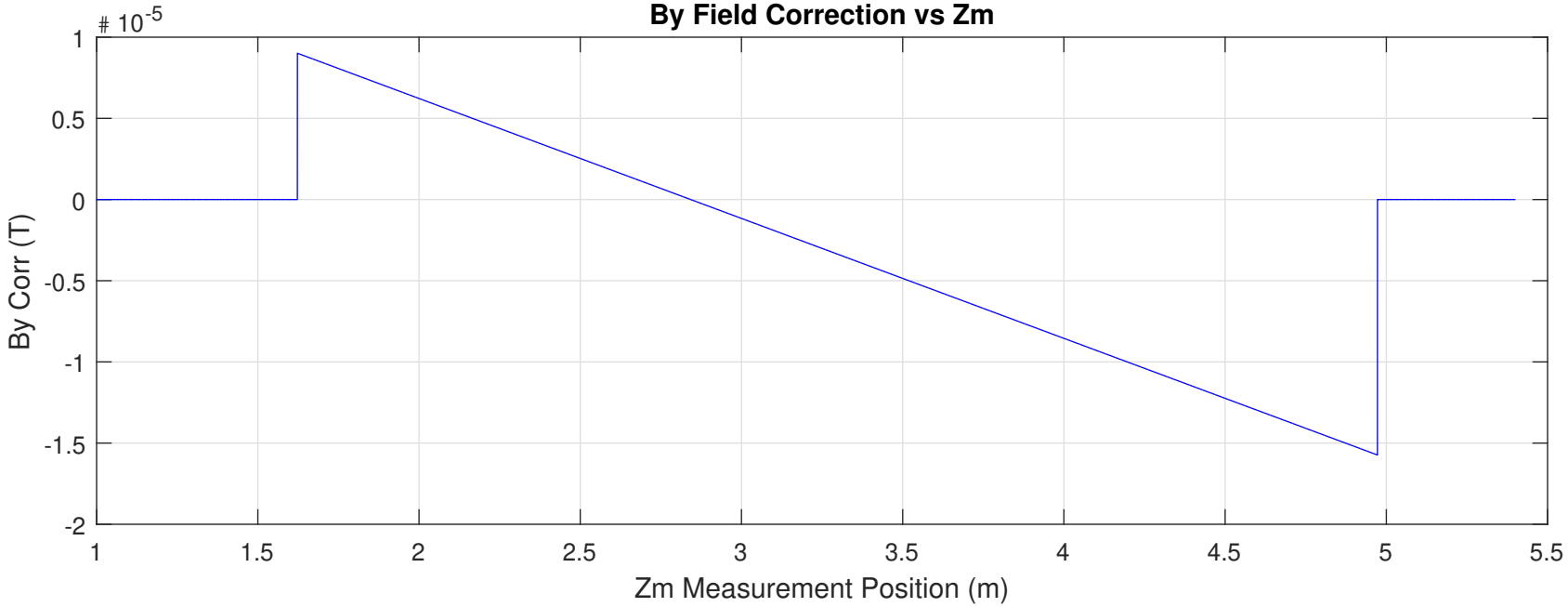
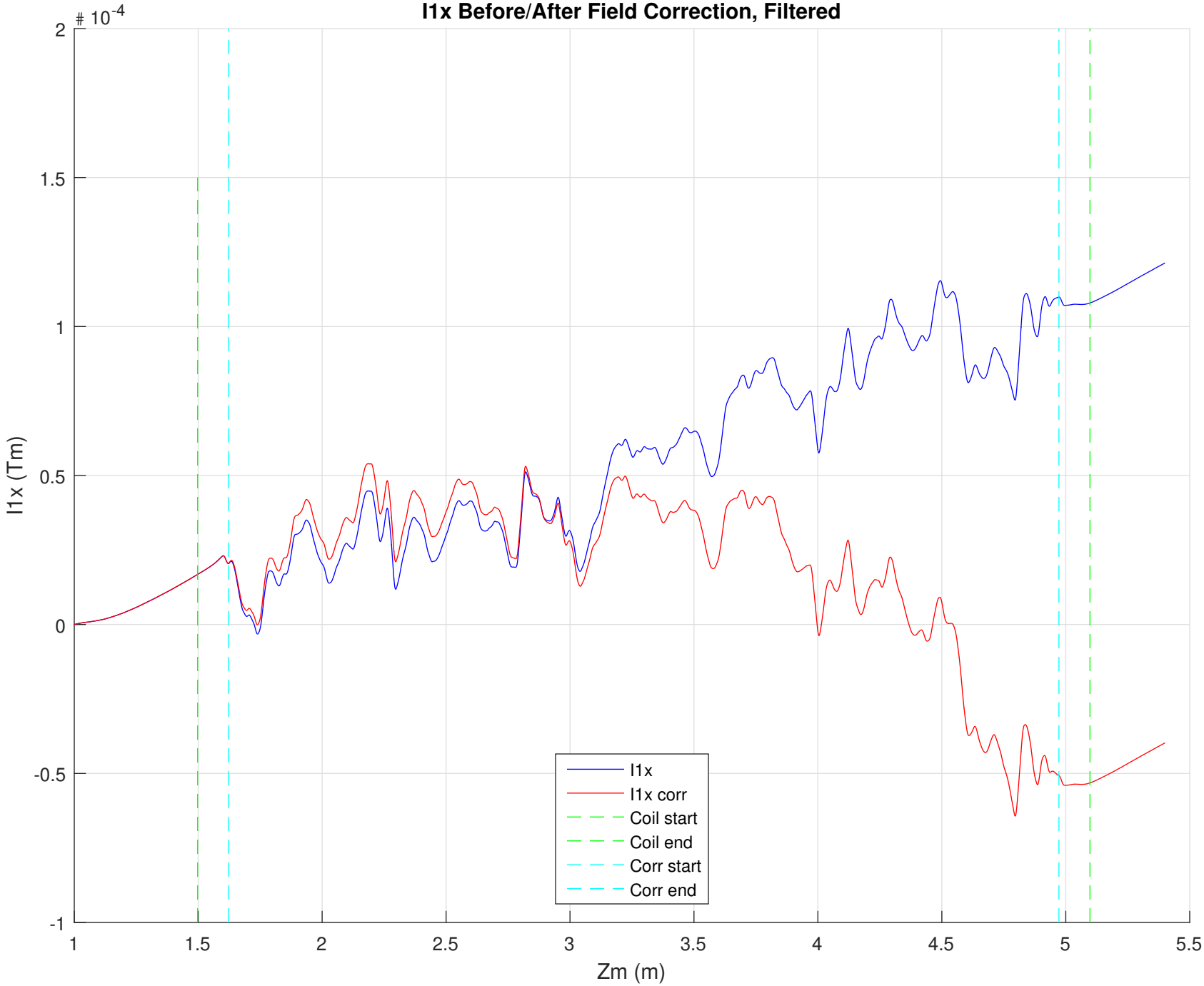
SLAC Magnetic Measurements

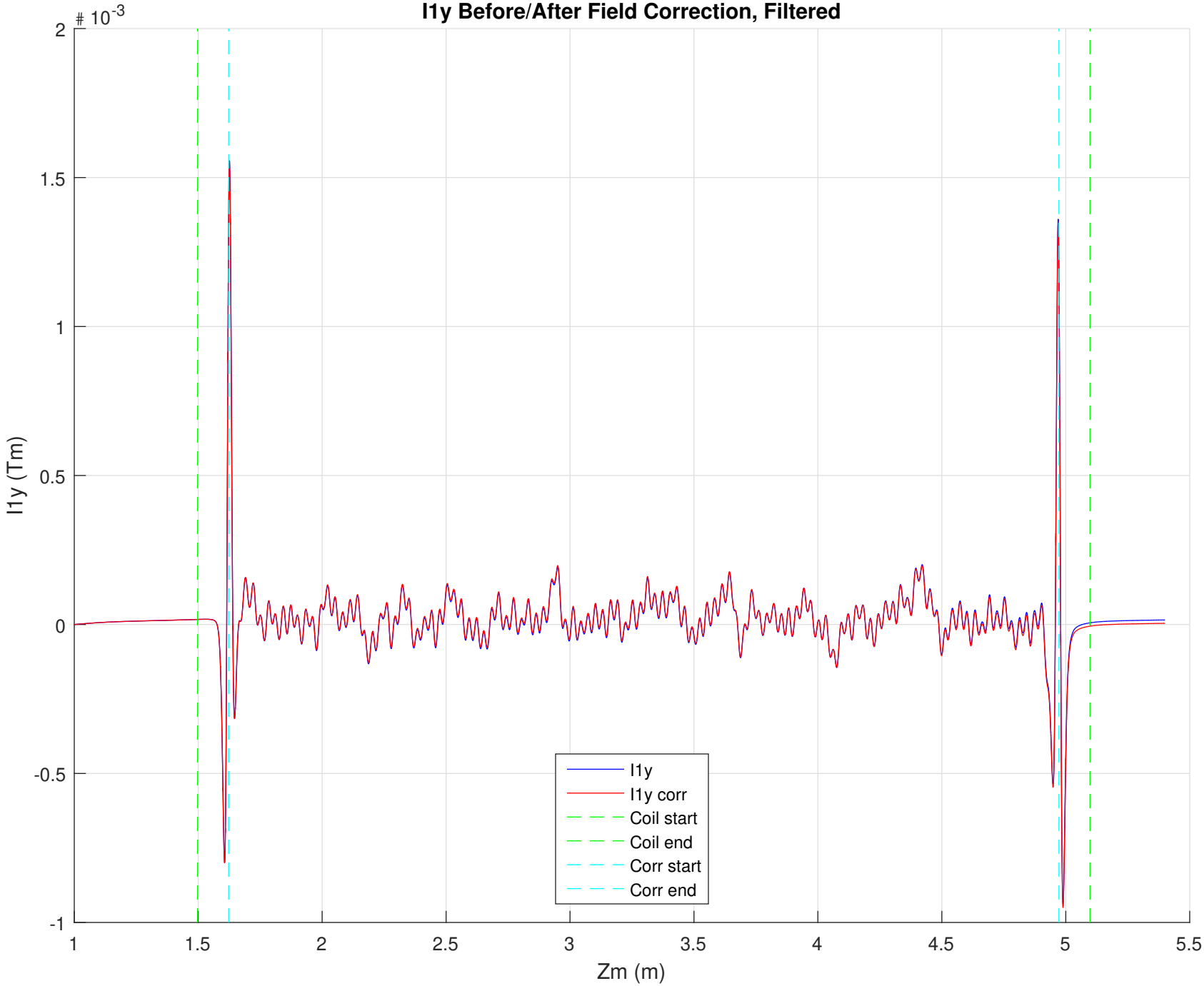
Planar Insertion Device Analysis

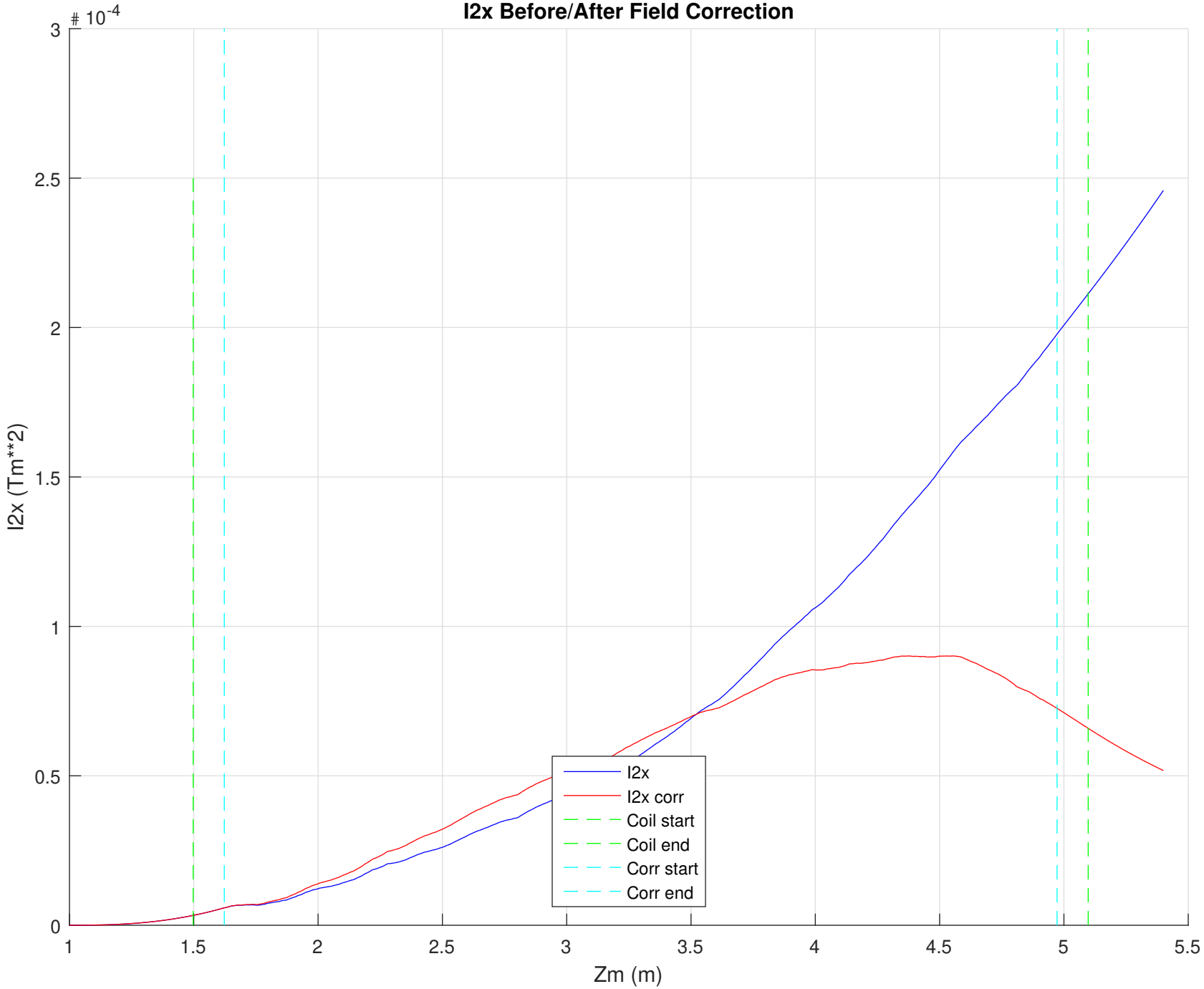
Parameters:
INPUT-FILE-DIR =S:\magdata\LCLS-II\Undulator\HXR-REFERENCE\DATASET0001\Tuning\Z Scans\Run 001\
INPUT-FILE-NAME =\x+00000-y+000-bscanz.dat
INPUT-FILE-TYPE =ZVXYBXYH
CORR-REQUIRED =0
GAMMA =26689
NOM-LAMBDA-U =0.03
NOM-K-VALUE =3.377
NOM-LAMBDA-R =1.4114e-10
NUM-POLES =226
NUM-END-POLES =4
CELL-LENGTH =4.4

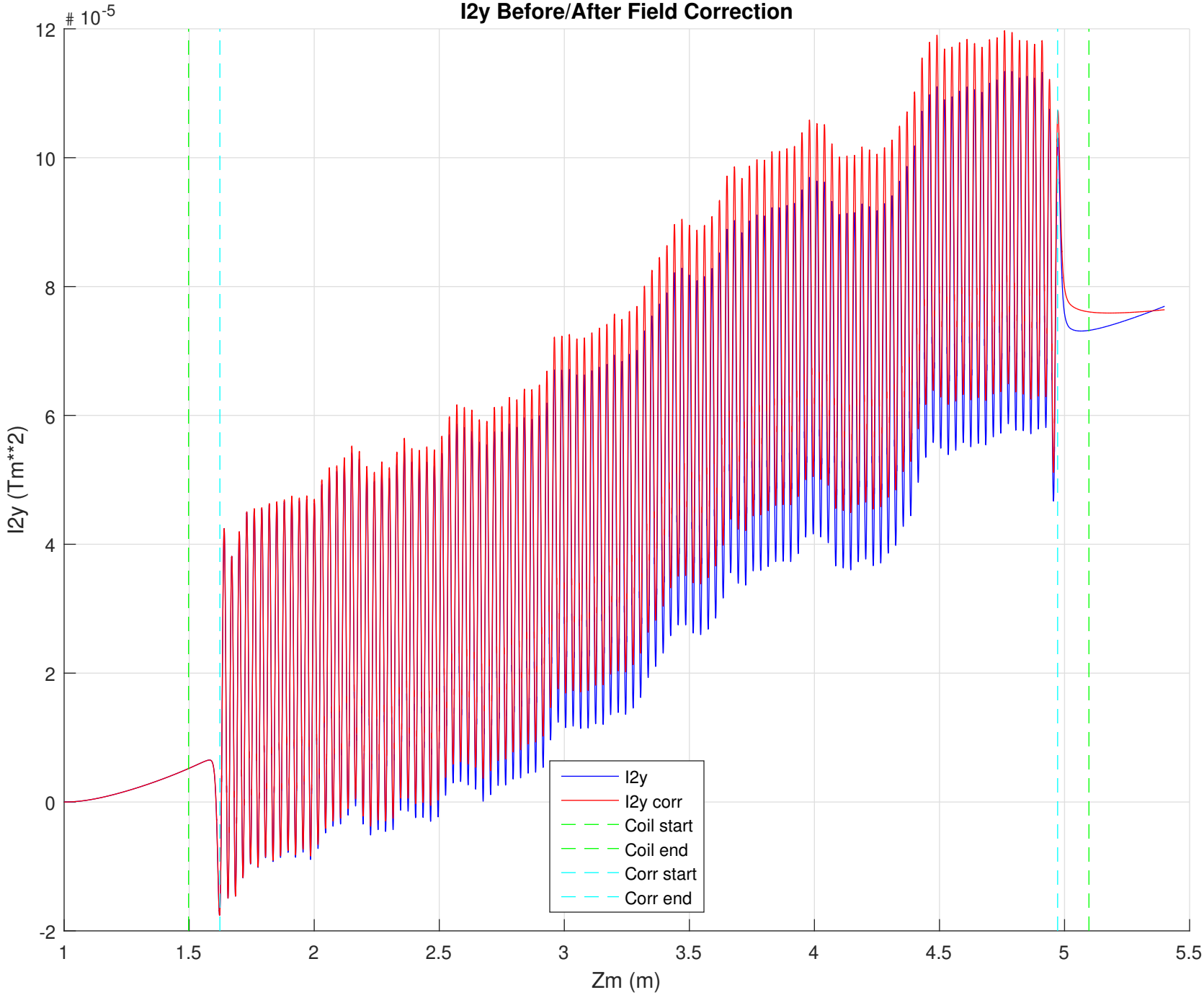

Bx Field Correction vs Zm
10^-5
Bx Corr (T)
5
0
-5
-10
-15
1
1.5
2
2.5
3
3.5
4
4.5
5
5.5

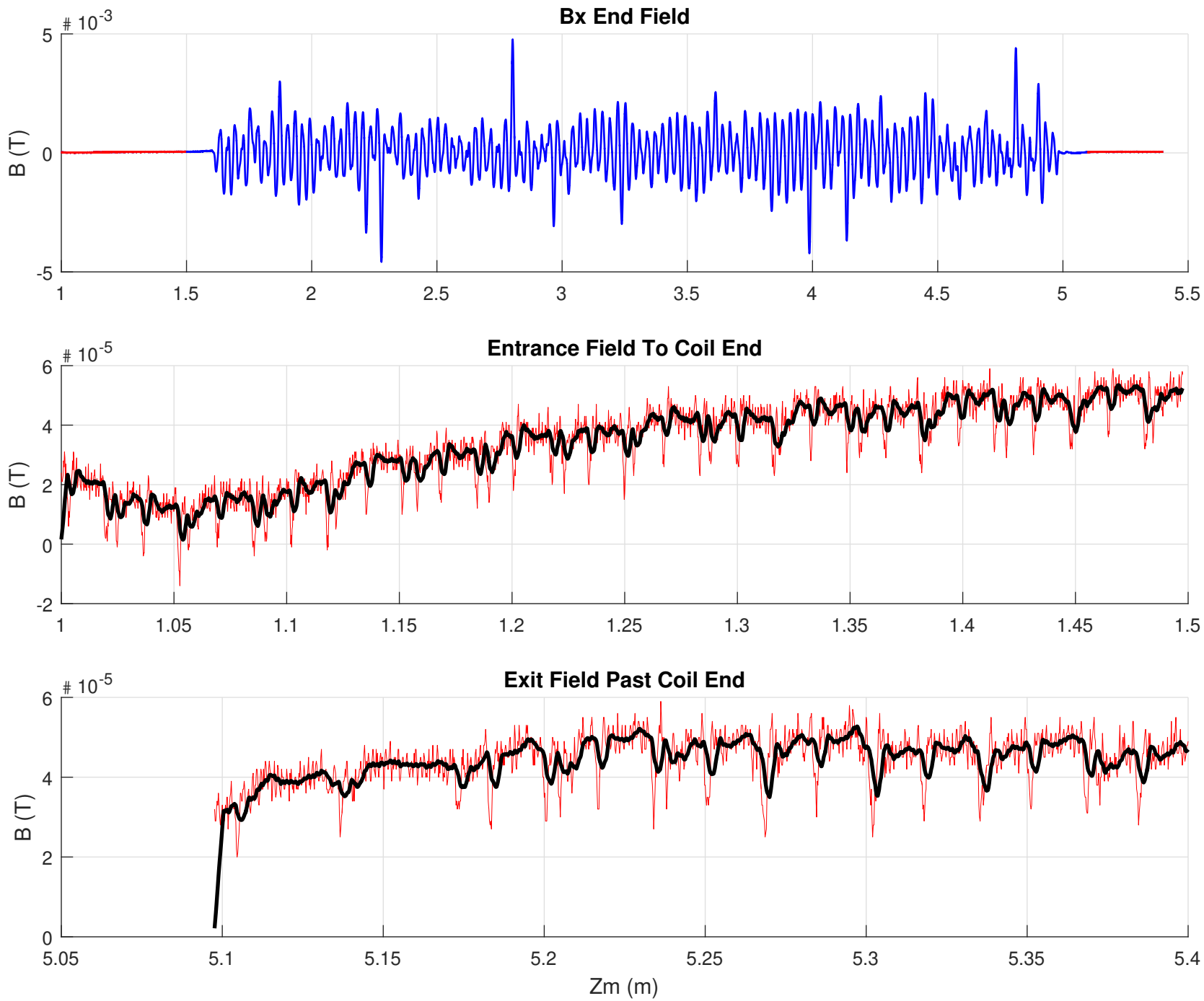

By Field Correction vs Zm
10^-5
By Corr (T)
1
0.5
0
-0.5
-1
-1.5
-2
1
1.5
2
2.5
3
3.5
4
4.5
5
5.5
Zm Measurement Position (m)

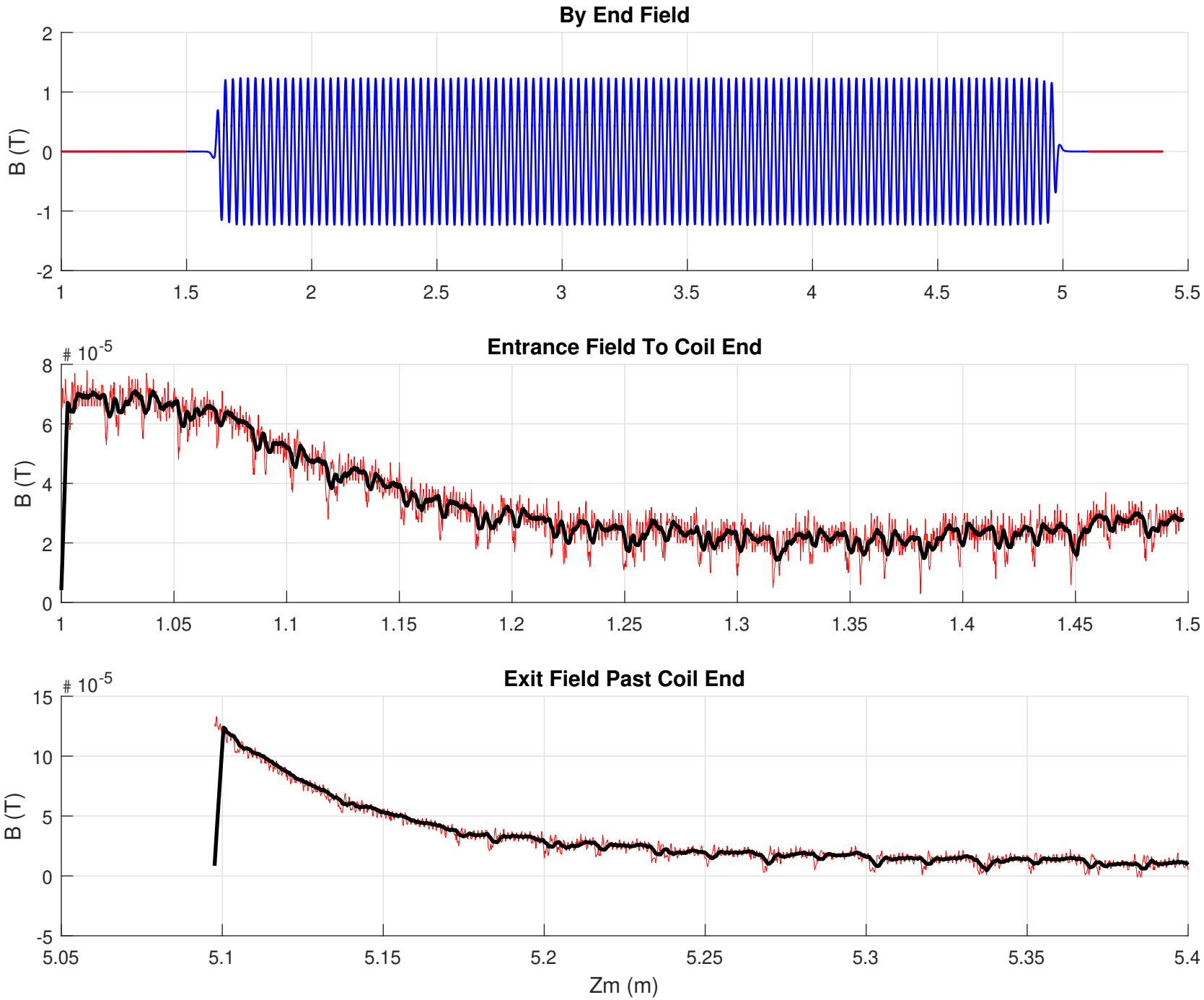

I1x Before/After Field Correction, Filtered
10^-4
2
1.5
1
0.5
0
-0.5
-1
I1x (Tm)
1
1.5
2
2.5
3
3.5
4
4.5
5
5.5
Zm (m)
I1x
I1x corr
Coil start
Coil end
Corr start
Corr end

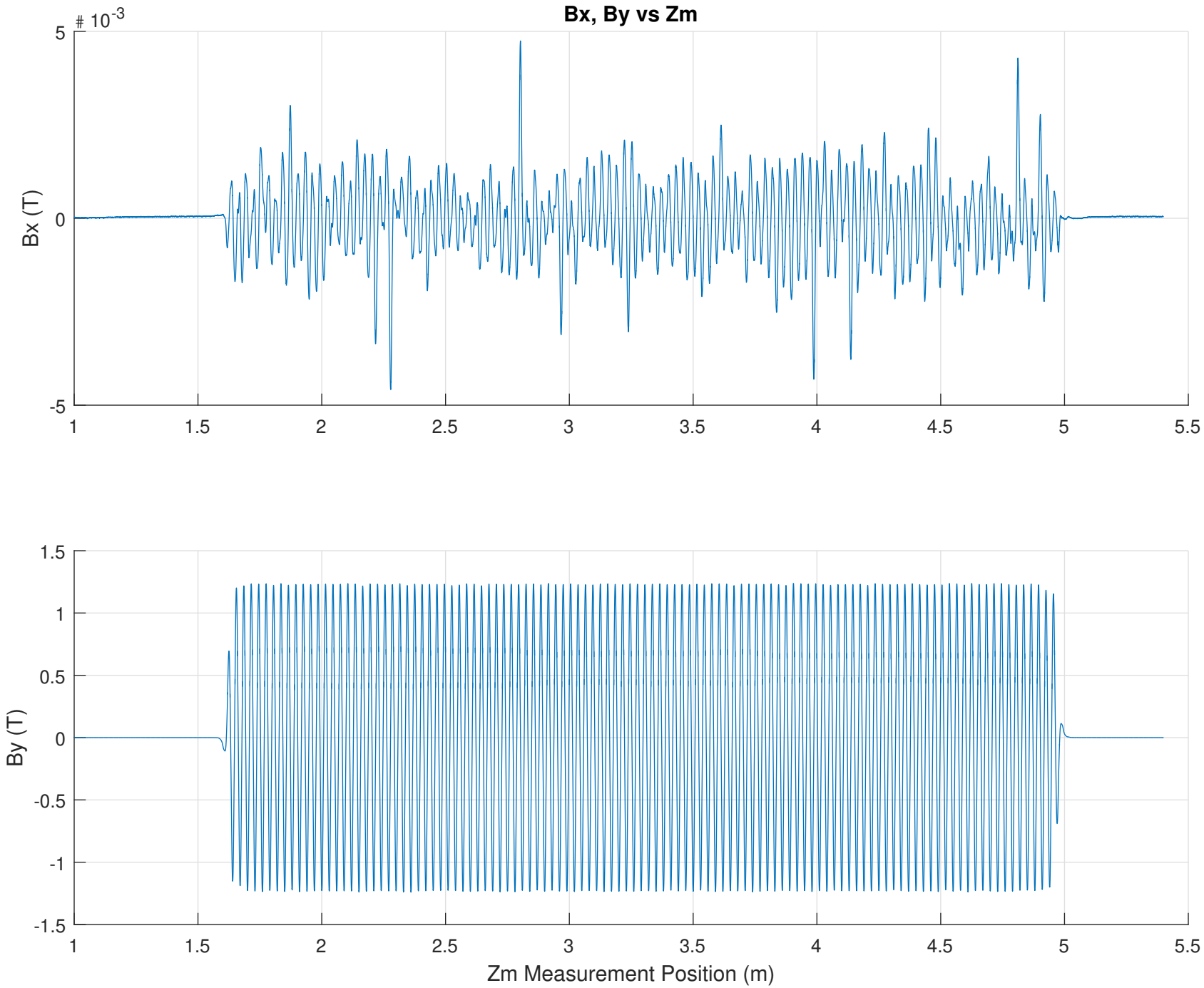

I1y Before/After Field Correction, Filtered
10^-3
2
1.5
1
0.5
0
-0.5
-1
I1y (Tm)
1
1.5
2
2.5
3
3.5
4
4.5
5
5.5
Zm (m)
I1y
I1y corr
Coil start
Coil end
Corr start
Corr end

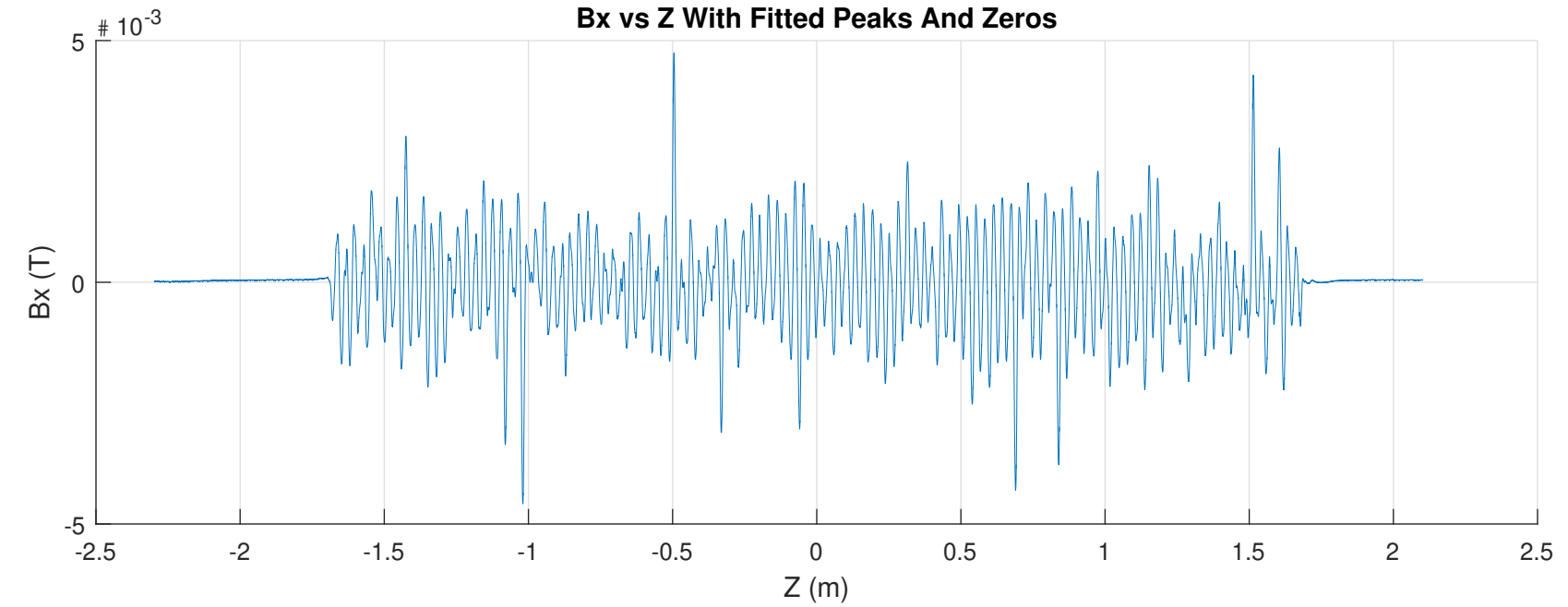

I2x Before/After Field Correction
10^-4
3
2.5
2
1.5
1
0.5
0
I2x (Tm**2)
1
1.5
2
2.5
3
3.5
4
4.5
5
5.5
Zm (m)
I2x
I2x corr
Coil start
Coil end
Corr start
Corr end

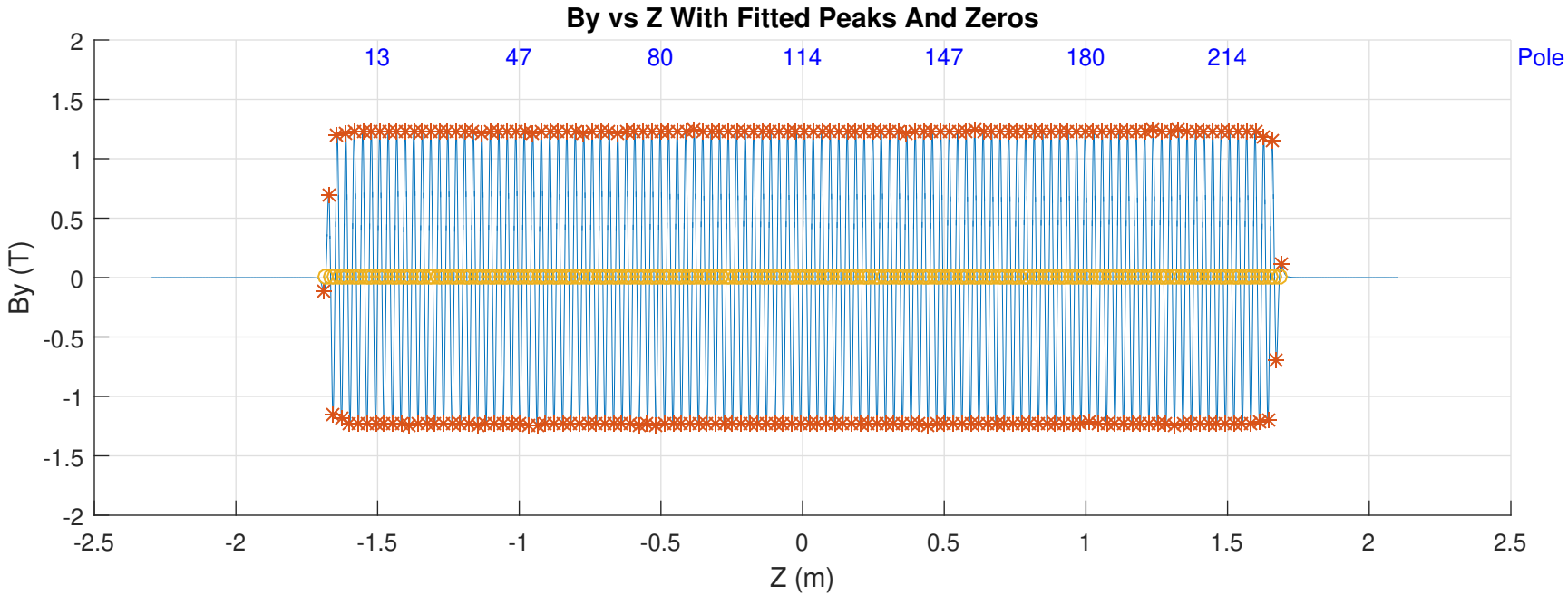

I2y Before/After Field Correction
10^-5
12
10
8
6
4
2
0
-2
I2y (Tm**2)
1
1.5
2
2.5
3
3.5
4
4.5
5
5.5
Zm (m)
I2y
I2y corr
Coil start
Coil end
Corr start
Corr end

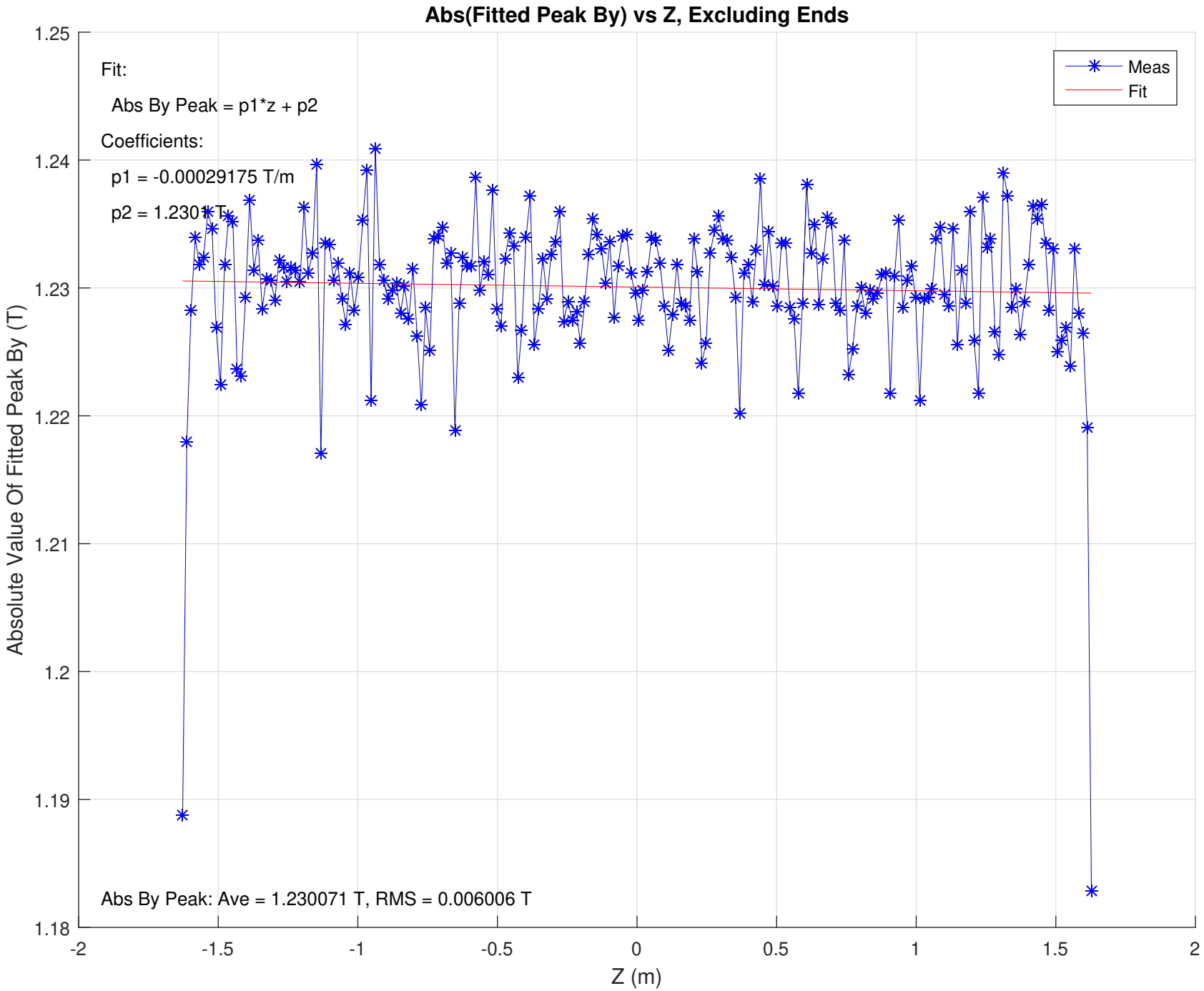

Bx End Field
10^-3
B (T)
5
0
-5
1
1.5
2
2.5
3
3.5
4
4.5
5
5.5
Entrance Field To Coil End
10^-5
B (T)
6
4
2
0
-2
1
1.05
1.1
1.15
1.2
1.25
1.3
1.35
1.4
1.45
1.5
Exit Field Past Coil End
10^-5
B (T)
6
4
2
0
5.05
5.1
5.15
5.2
5.25
5.3
5.35
5.4
Zm (m)

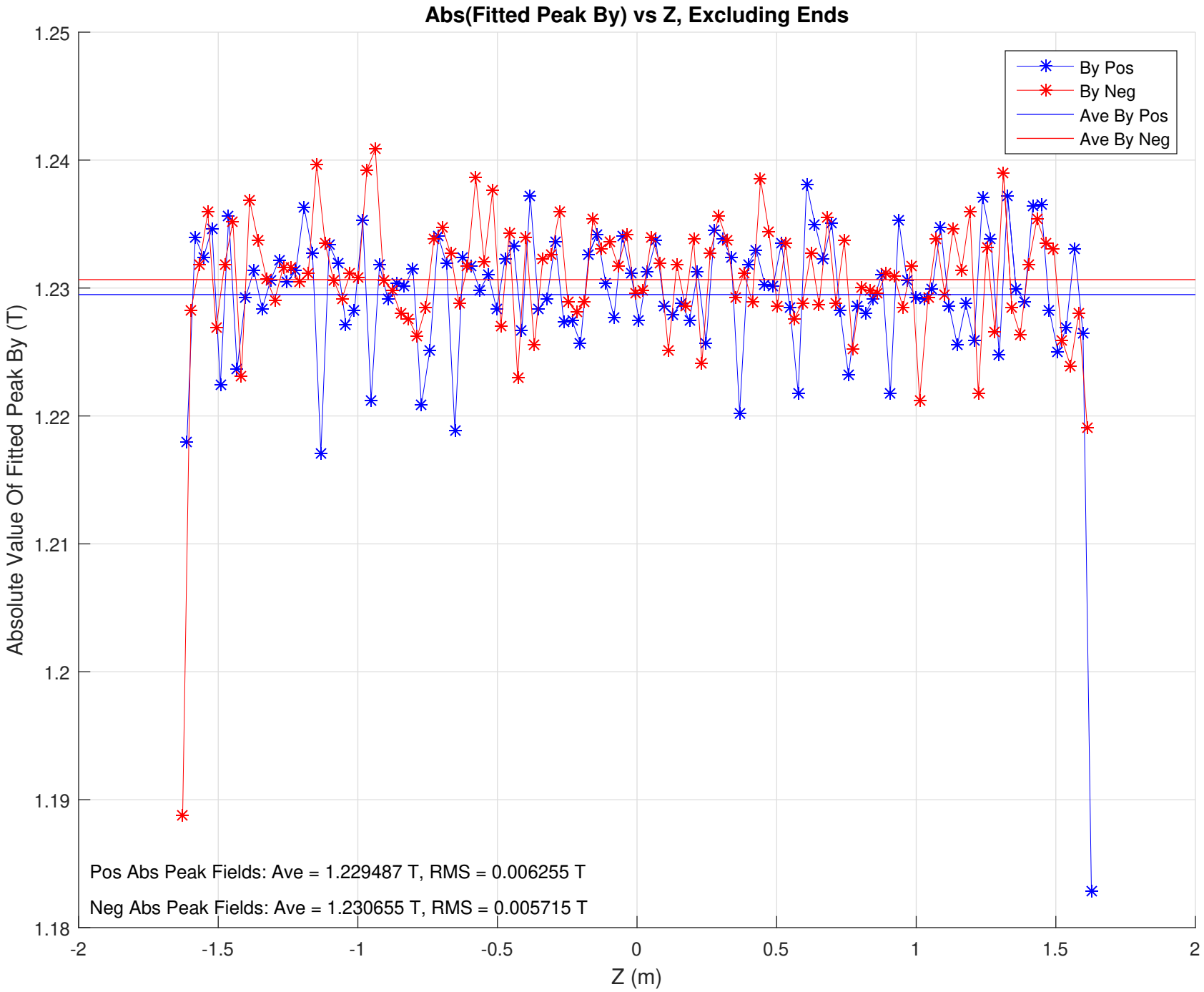

By End Field
B (T)
2
1
0
-1
-2
1
1.5
2
2.5
3
3.5
4
4.5
5
5.5
Entrance Field To Coil End
10^-5
B (T)
8
6
4
2
0
1
1.05
1.1
1.15
1.2
1.25
1.3
1.35
1.4
1.45
1.5
Exit Field Past Coil End
10^-5
B (T)
15
10
5
0
-5
5.05
5.1
5.15
5.2
5.25
5.3
5.35
5.4
Zm (m)

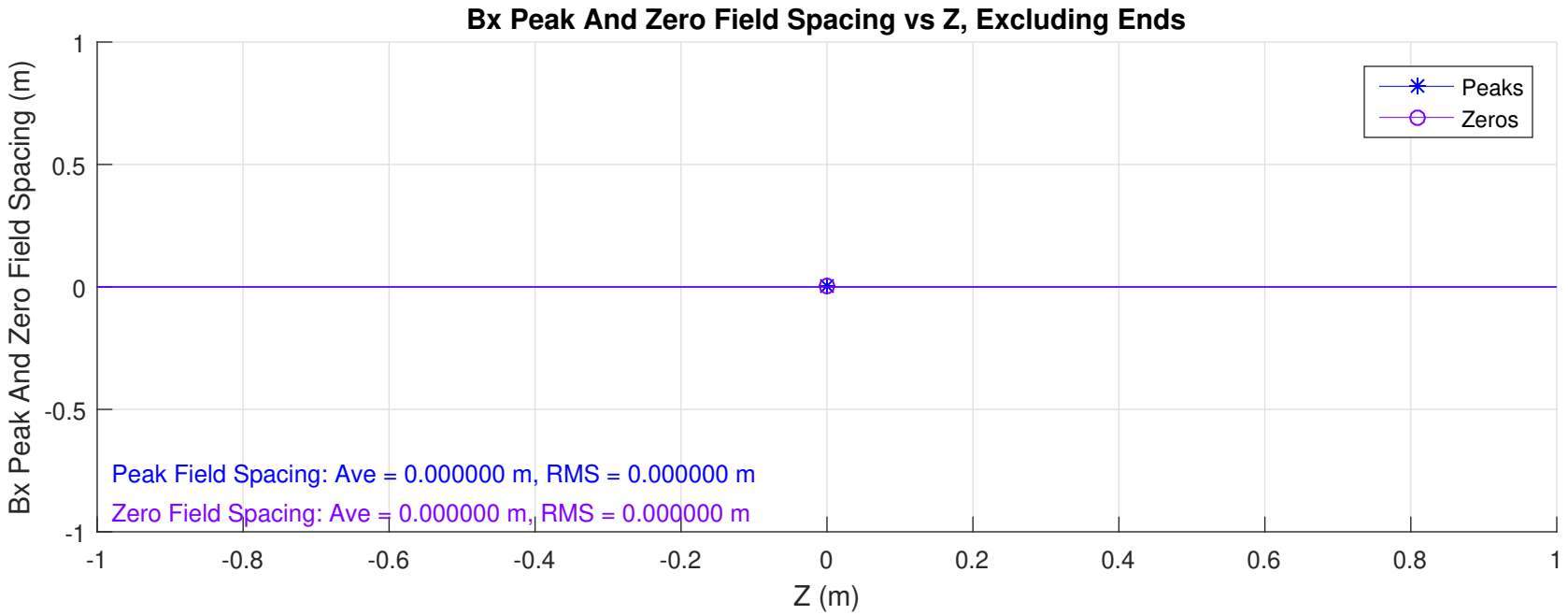

Bx, By vs Zm
10^-3
Bx (T)
By (T)
Zm Measurement Position (m)

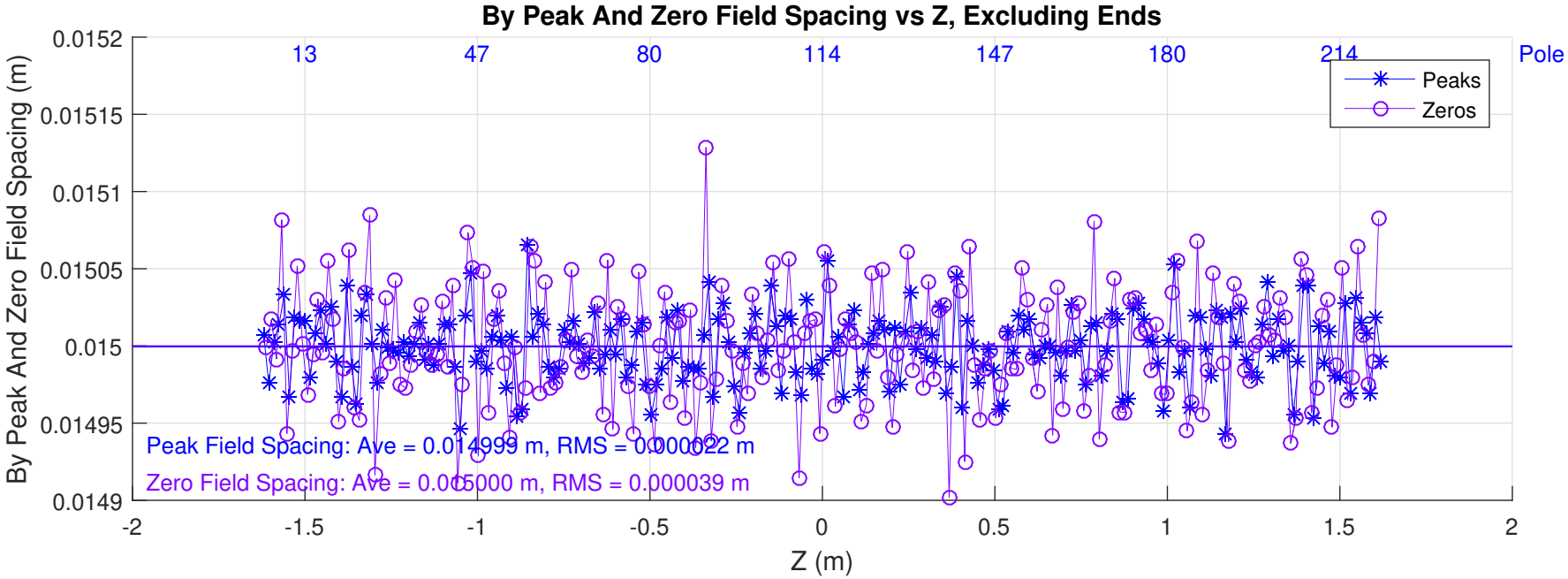

Bx vs Z With Fitted Peaks And Zeros
10^-3
5
0
-5
Bx (T)
-2.5
-2
-1.5
-1
-0.5
0
0.5
1
1.5
2
2.5
Z (m)

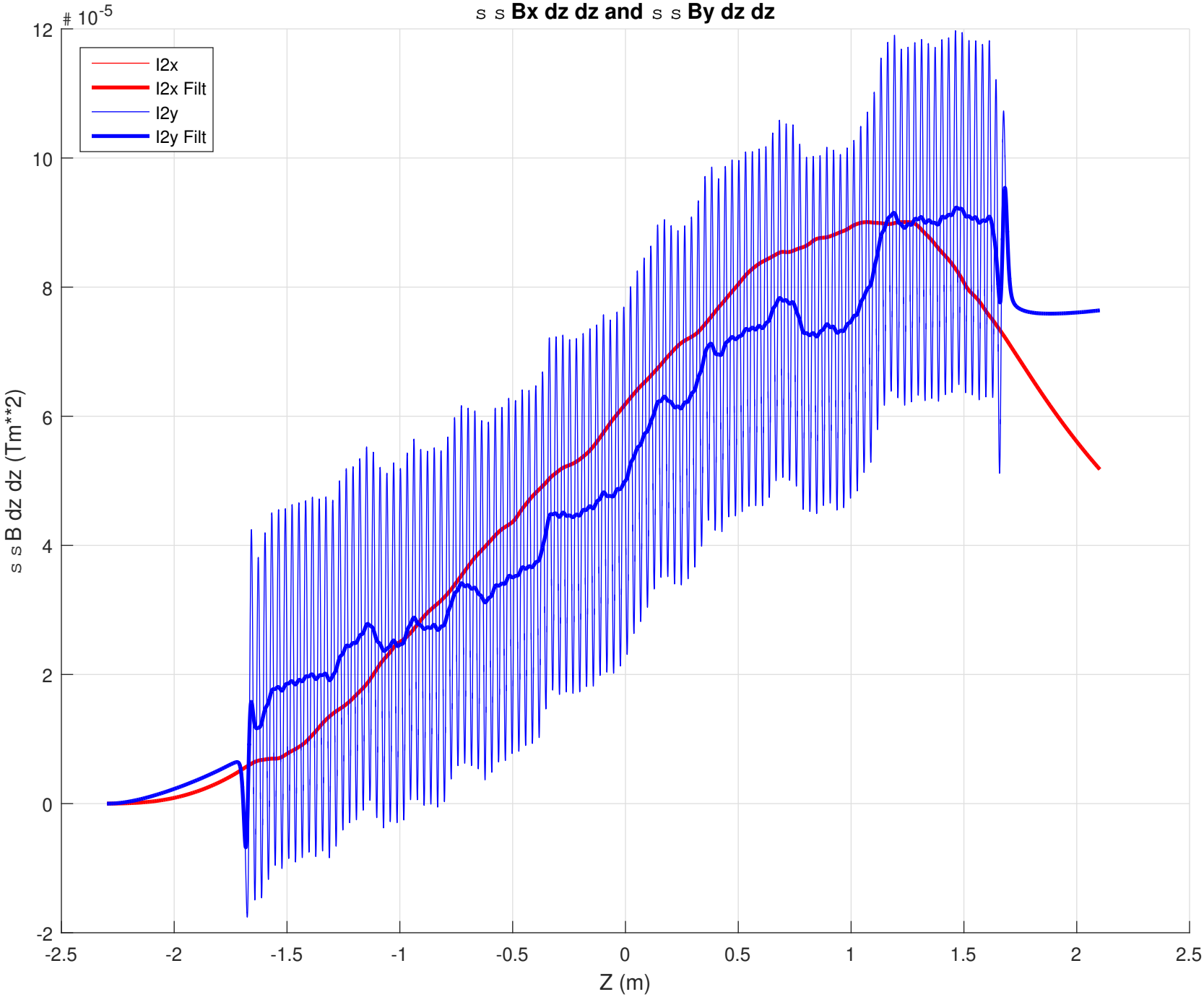

By vs Z With Fitted Peaks And Zeros
13
47
80
114
147
180
214
Pole
2
1.5
1
0.5
0
-0.5
-1
-1.5
-2
By (T)
-2.5
-2
-1.5
-1
-0.5
0
0.5
1
1.5
2
2.5
Z (m)

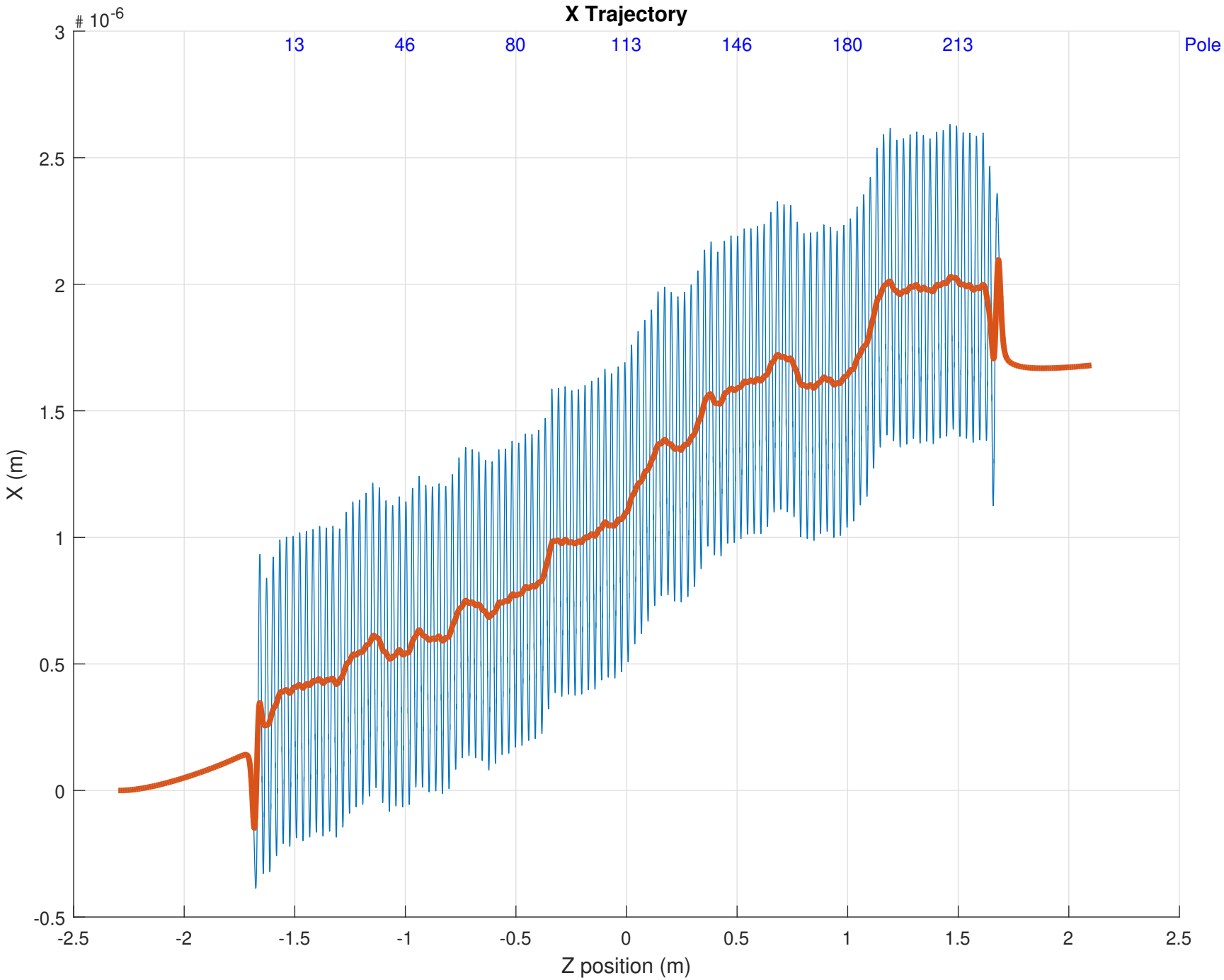

Abs(Fitted Peak By) vs Z, Excluding Ends
Fit:
Abs By Peak = p1*z + p2
Coefficients:
p1 = -0.00029175 T/m
p2 = 1.2301 T
Meas
Fit
Abs By Peak: Ave = 1.230071 T, RMS = 0.006006 T
Absolute Value Of Fitted Peak By (T)
Z (m)
1.25
1.24
1.23
1.22
1.21
1.2
1.19
1.18
-2
-1.5
-1
-0.5
0
0.5
1
1.5
2

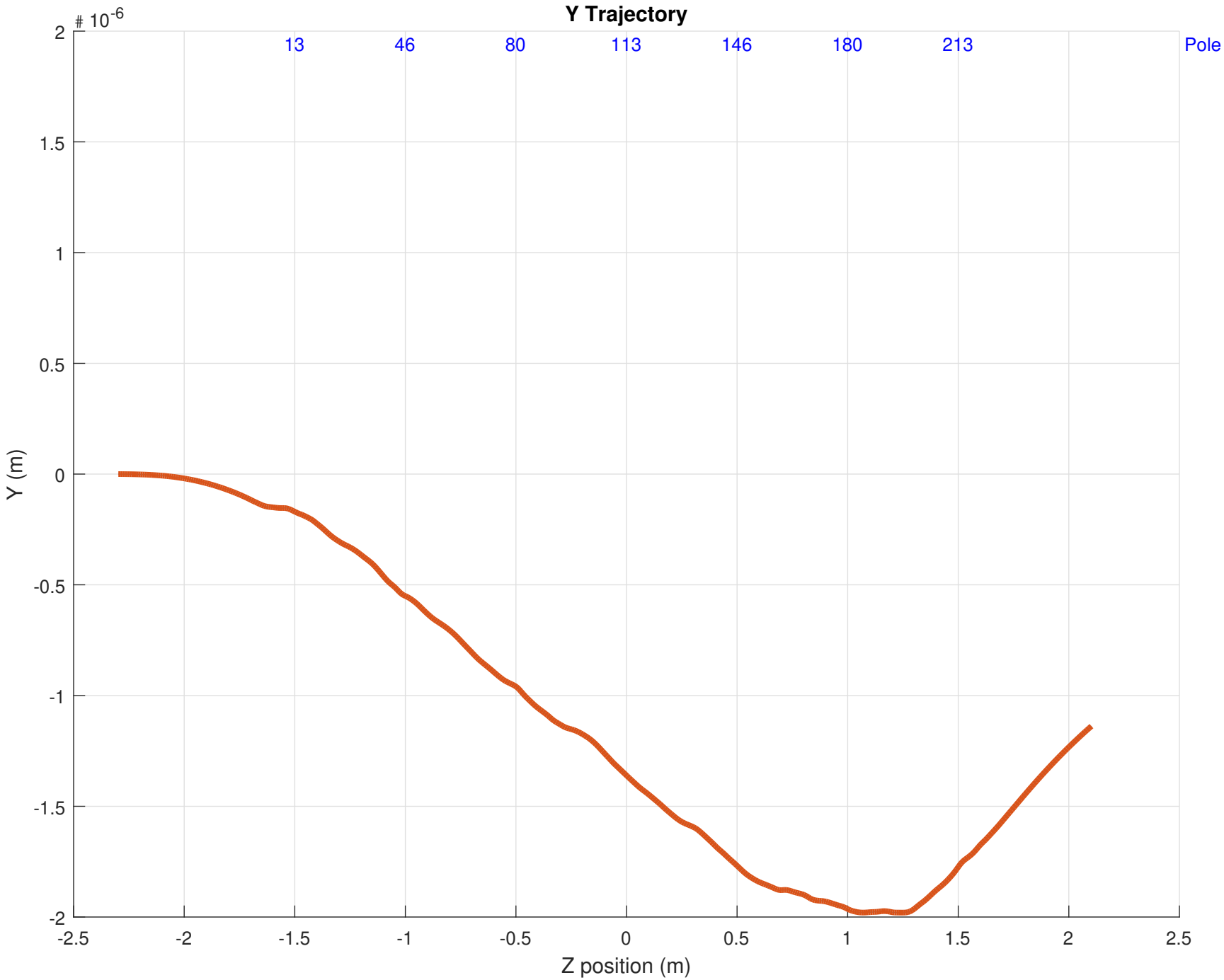

Abs(Fitted Peak By) vs Z, Excluding Ends
By Pos
By Neg
Ave By Pos
Ave By Neg
Absolute Value Of Fitted Peak By (T)
Z (m)
1.25
1.24
1.23
1.22
1.21
1.2
1.19
1.18
-2
-1.5
-1
-0.5
0
0.5
1
1.5
2
Pos Abs Peak Fields: Ave = 1.229487 T, RMS = 0.006255 T
Neg Abs Peak Fields: Ave = 1.230655 T, RMS = 0.005715 T

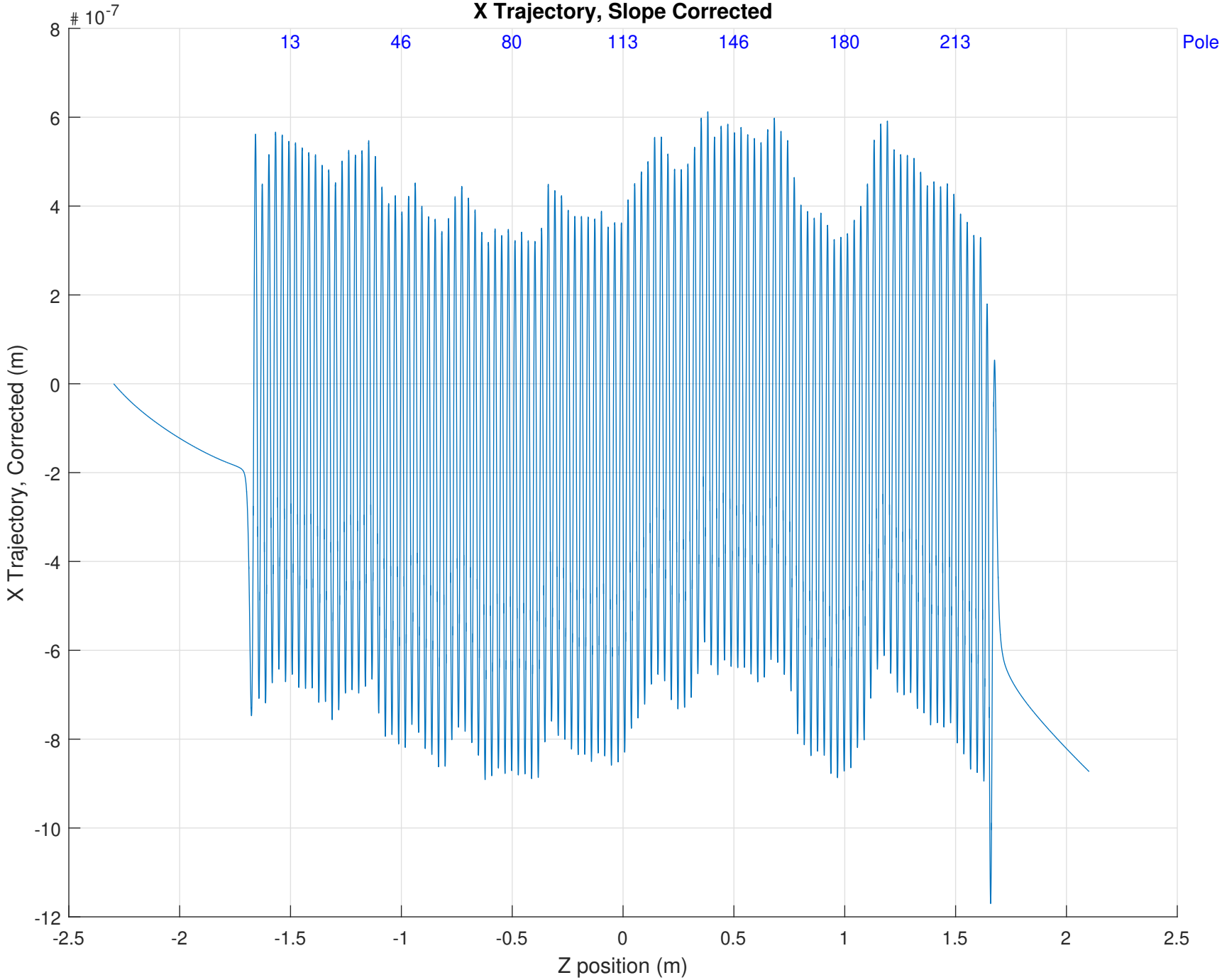

Bx Peak And Zero Field Spacing vs Z, Excluding Ends
Bx Peak And Zero Field Spacing (m)
Z (m)
Peaks
Zeros
Peak Field Spacing: Ave = 0.000000 m, RMS = 0.000000 m
Zero Field Spacing: Ave = 0.000000 m, RMS = 0.000000 m

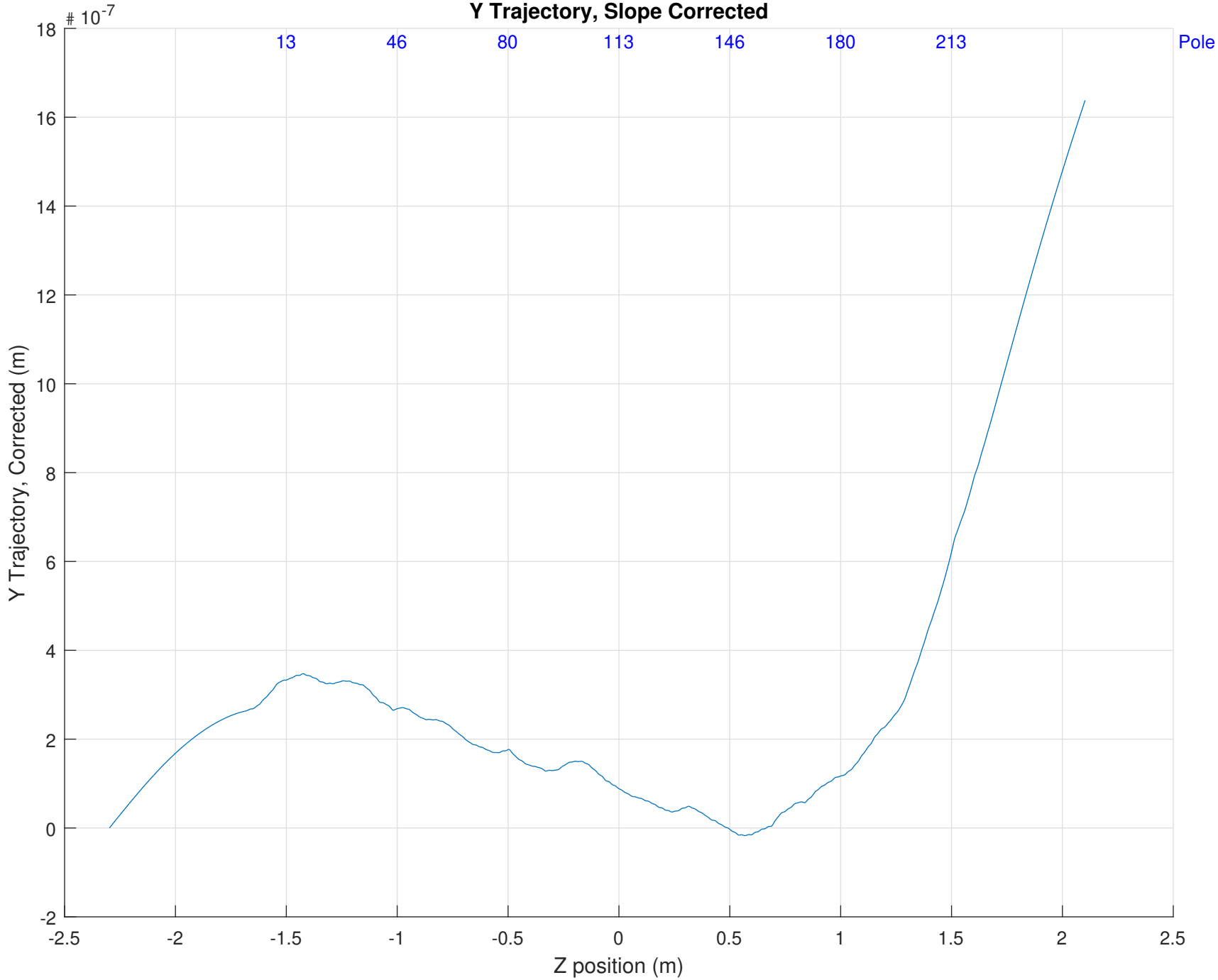

By Peak And Zero Field Spacing vs Z, Excluding Ends
By Peak And Zero Field Spacing (m)
Z (m)
13
47
80
114
147
180
214
Pole
Peaks
Zeros
Peak Field Spacing: Ave = 0.014999 m, RMS = 0.000022 m
Zero Field Spacing: Ave = 0.015000 m, RMS = 0.000039 m

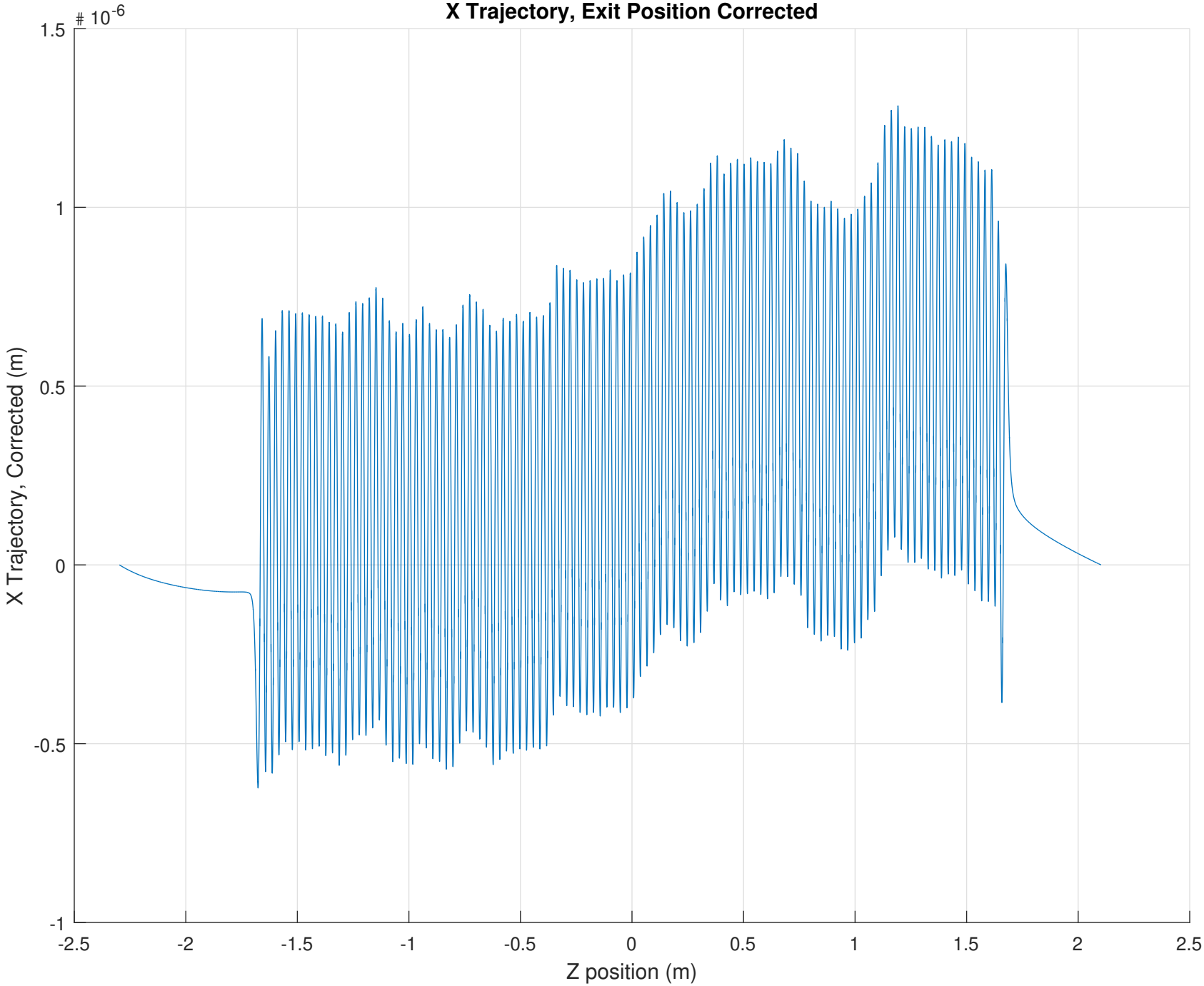

s s Bx dz dz and s s By dz dz
10^-5
12
10
8
6
4
2
0
-2
-2.5
-2
-1.5
-1
-0.5
0
0.5
1
1.5
2
2.5
Z (m)
s s B dz dz (Tm**2)
I2x
I2x Filt
I2y
I2y Filt

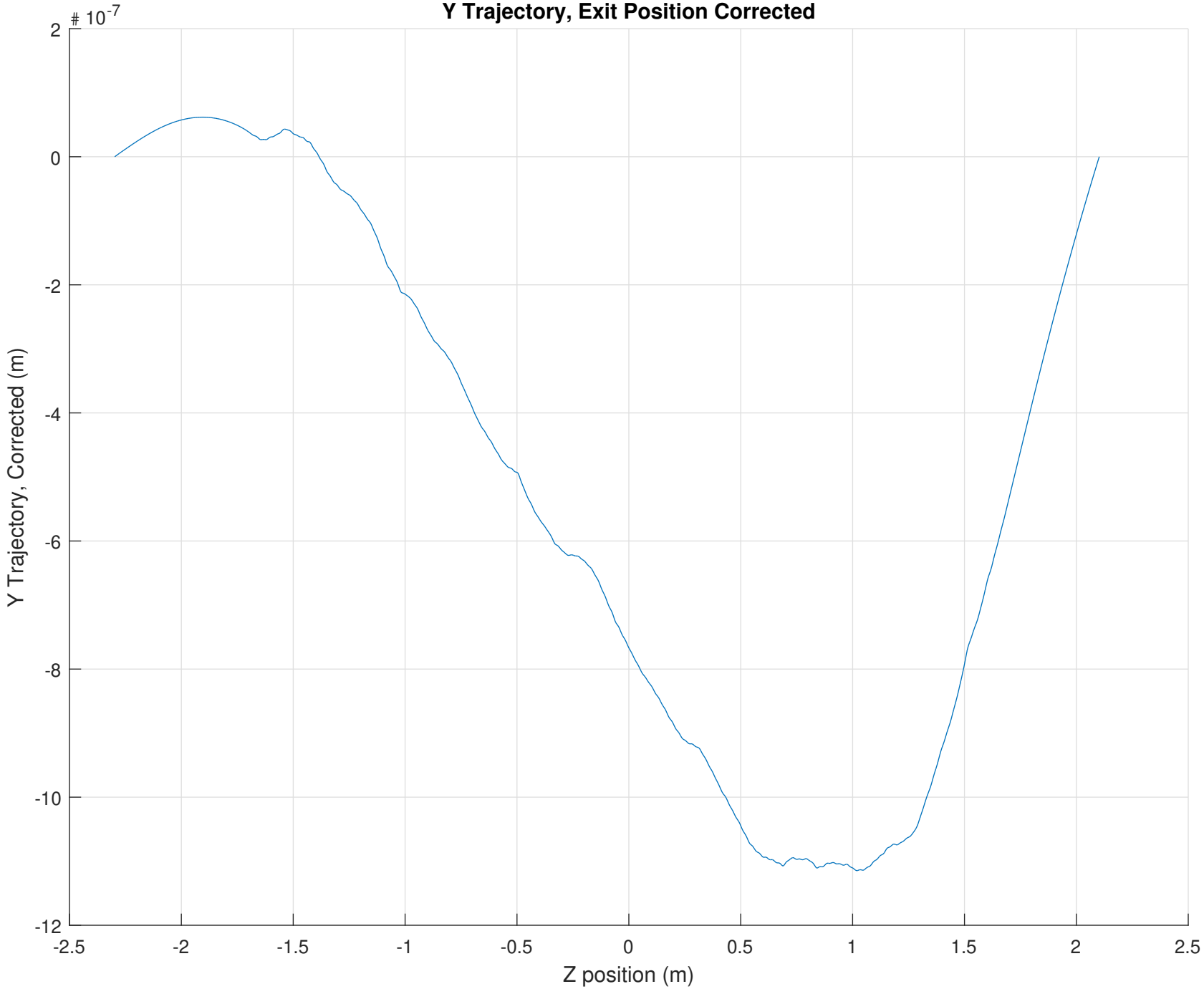

X Trajectory
10^-6
13
46
80
113
146
180
213
Pole
3
2.5
2
1.5
1
0.5
0
-0.5
X (m)
-2.5
-2
-1.5
-1
-0.5
0
0.5
1
1.5
2
2.5
Z position (m)

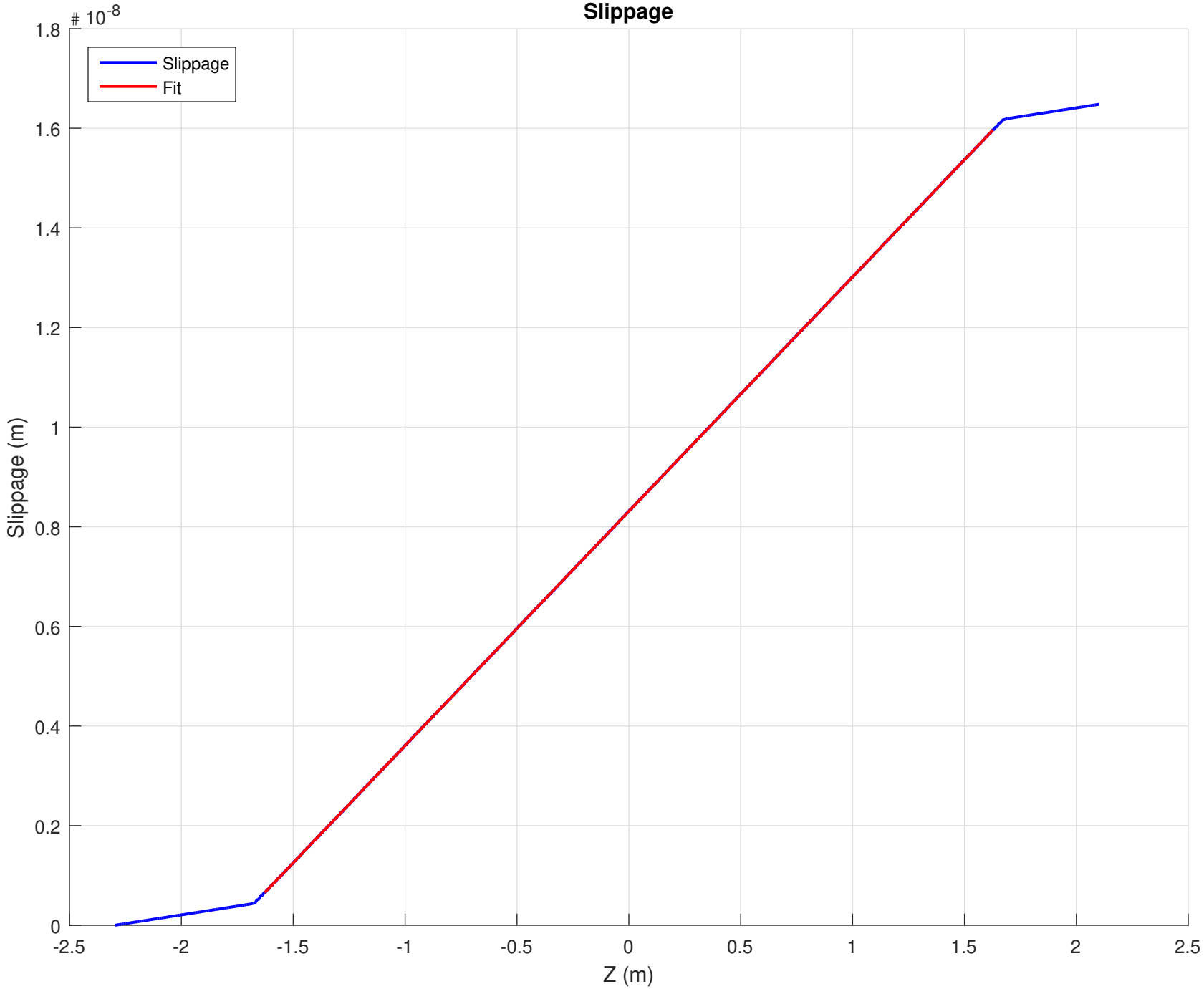

Y Trajectory
10^-6
13
46
80
113
146
180
213
Pole
2
1.5
1
0.5
0
-0.5
-1
-1.5
-2
Y (m)
-2.5
-2
-1.5
-1
-0.5
0
0.5
1
1.5
2
2.5
Z position (m)

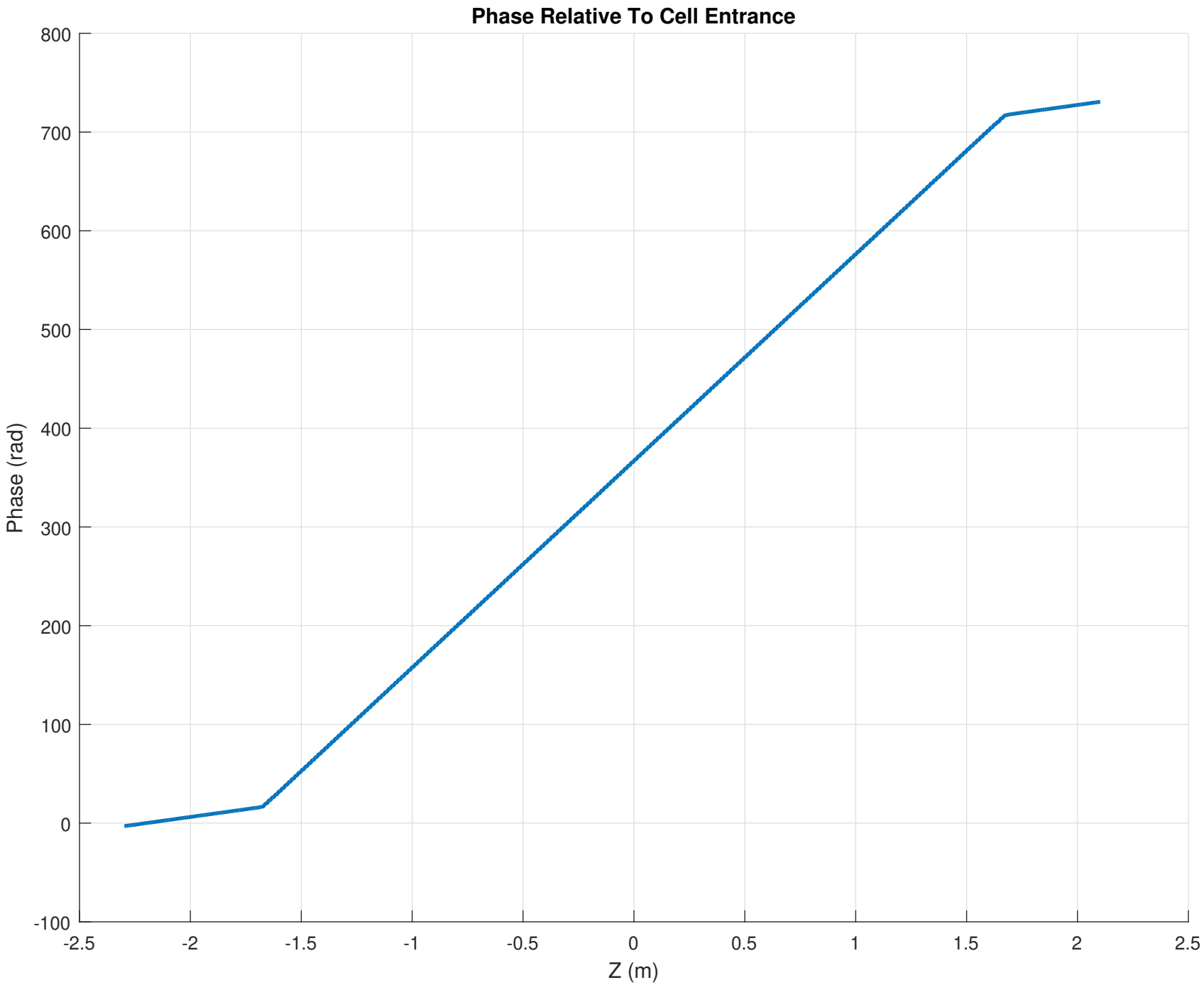

X Trajectory, Slope Corrected
10^-7
13
46
80
113
146
180
213
Pole
X Trajectory, Corrected (m)
Z position (m)
8
6
4
2
0
-2
-4
-6
-8
-10
-12
-2.5
-2
-1.5
-1
-0.5
0
0.5
1
1.5
2
2.5

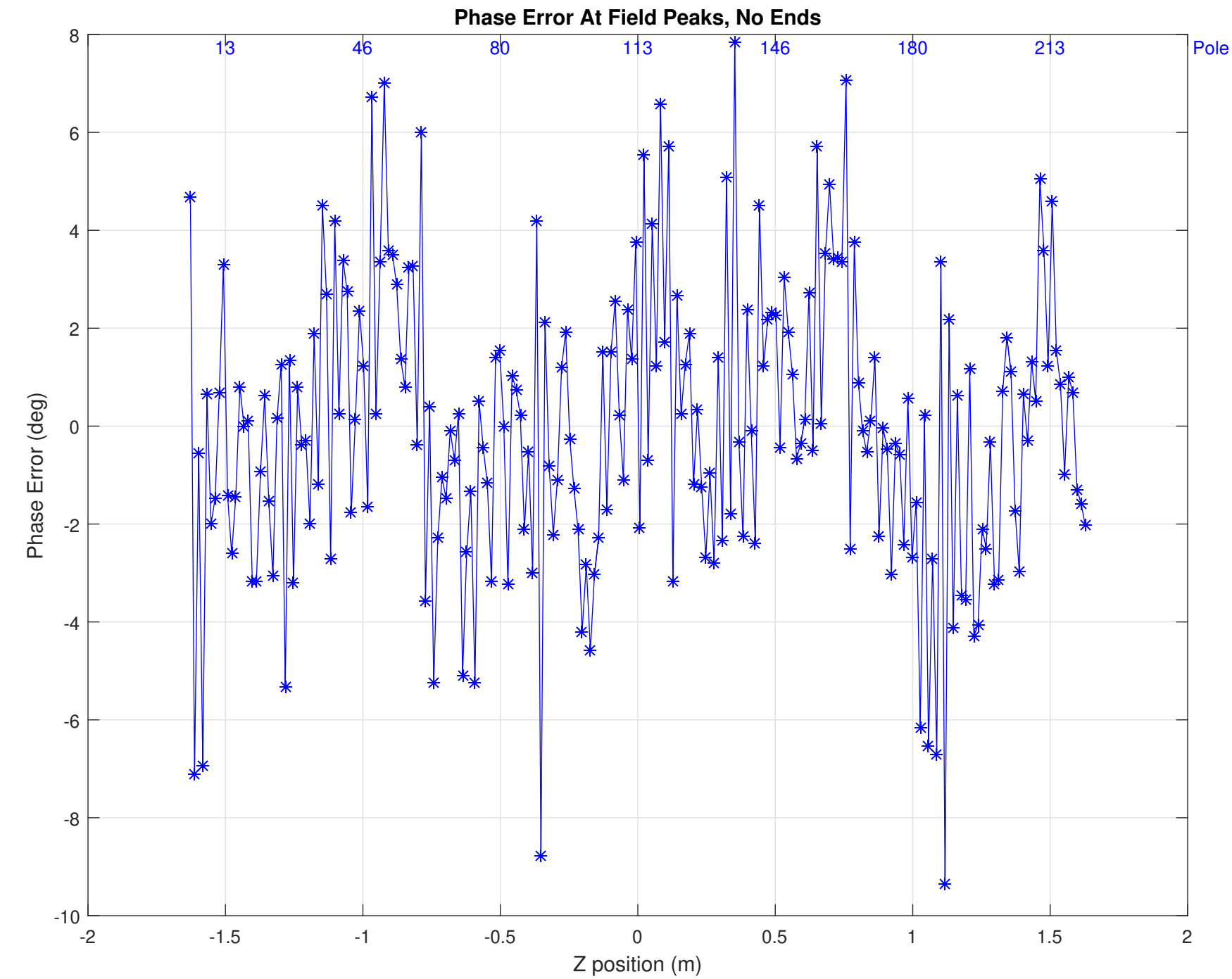

Y Trajectory, Slope Corrected
10^-7
13
46
80
113
146
180
213
Pole
Y Trajectory, Corrected (m)
Z position (m)
18
16
14
12
10
8
6
4
2
0
-2
-2.5
-2
-1.5
-1
-0.5
0
0.5
1
1.5
2
2.5


X Trajectory, Exit Position Corrected
10^-6
1.5
1
0.5
0
-0.5
-1
X Trajectory, Corrected (m)
-2.5
-2
-1.5
-1
-0.5
0
0.5
1
1.5
2
2.5
Z position (m)

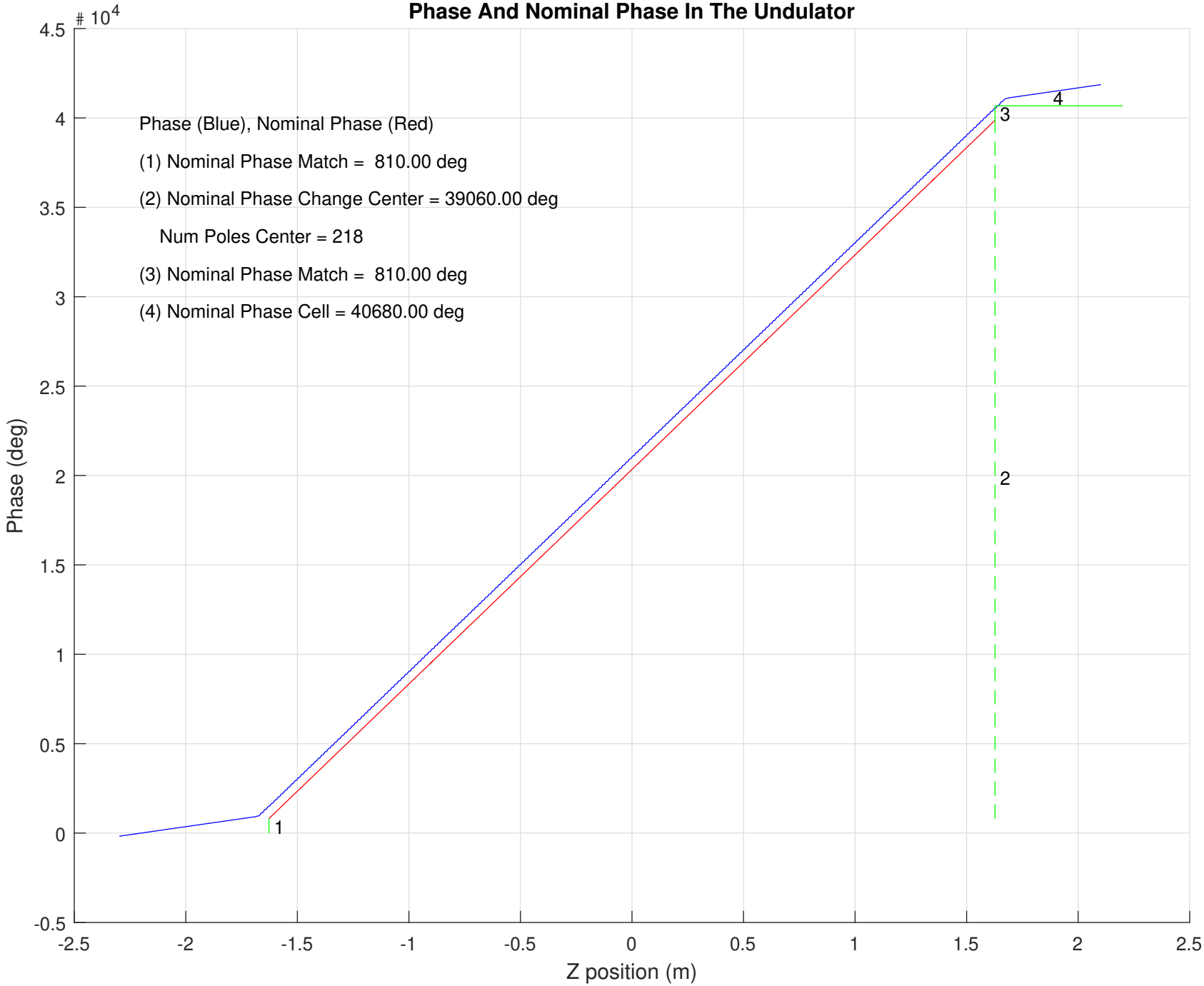

Y Trajectory, Exit Position Corrected
10^-7
2
0
-2
-4
-6
-8
-10
-12
Y Trajectory, Corrected (m)
-2.5
-2
-1.5
-1
-0.5
0
0.5
1
1.5
2
2.5
Z position (m)

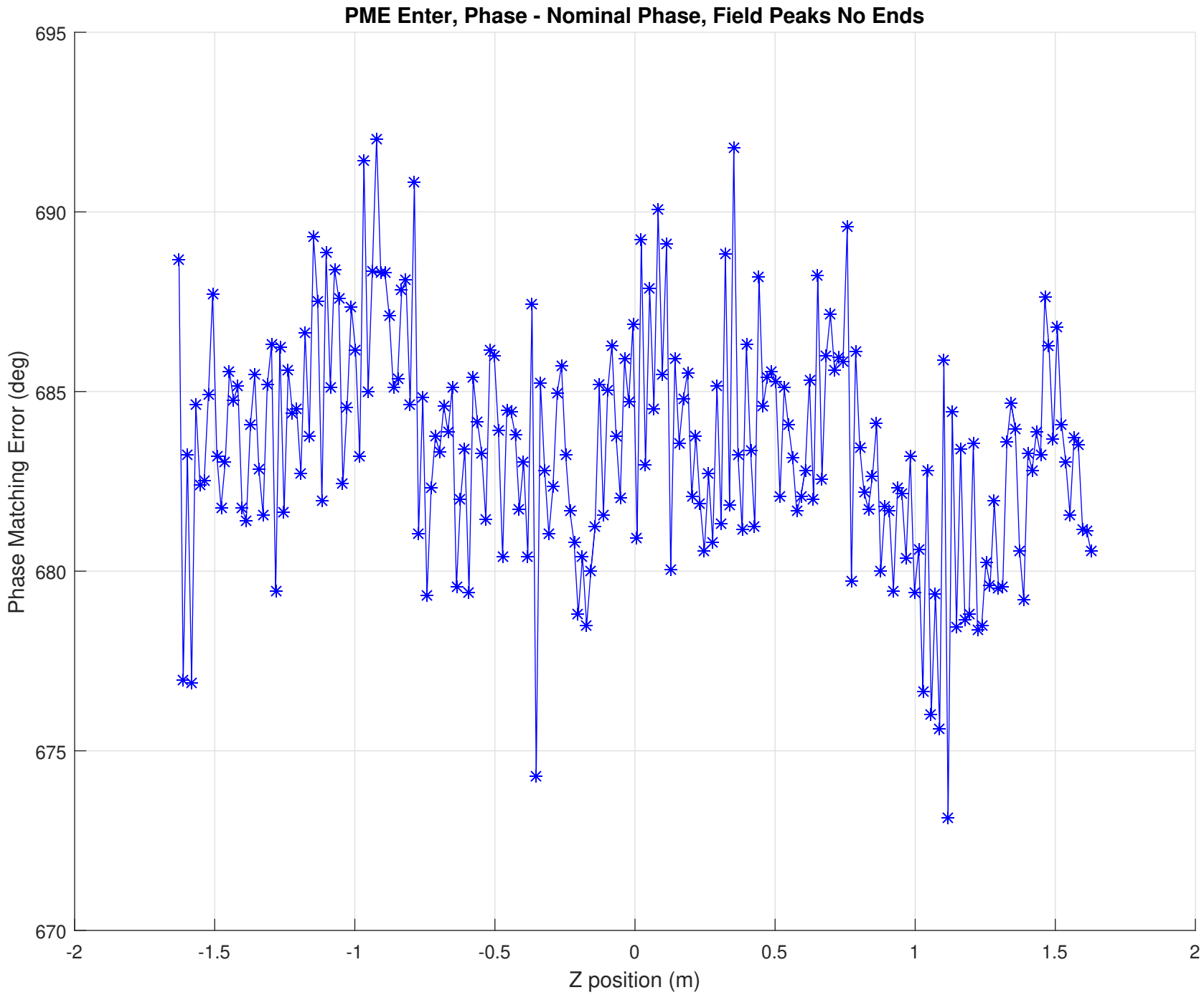

Slippage
10^-8
Slippage
Fit
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
Slippage (m)
-2.5
-2
-1.5
-1
-0.5
0
0.5
1
1.5
2
2.5
Z (m)


Phase Relative To Cell Entrance
800
700
600
500
400
300
200
100
0
-100
Phase (rad)
-2.5
-2
-1.5
-1
-0.5
0
0.5
1
1.5
2
2.5
Z (m)

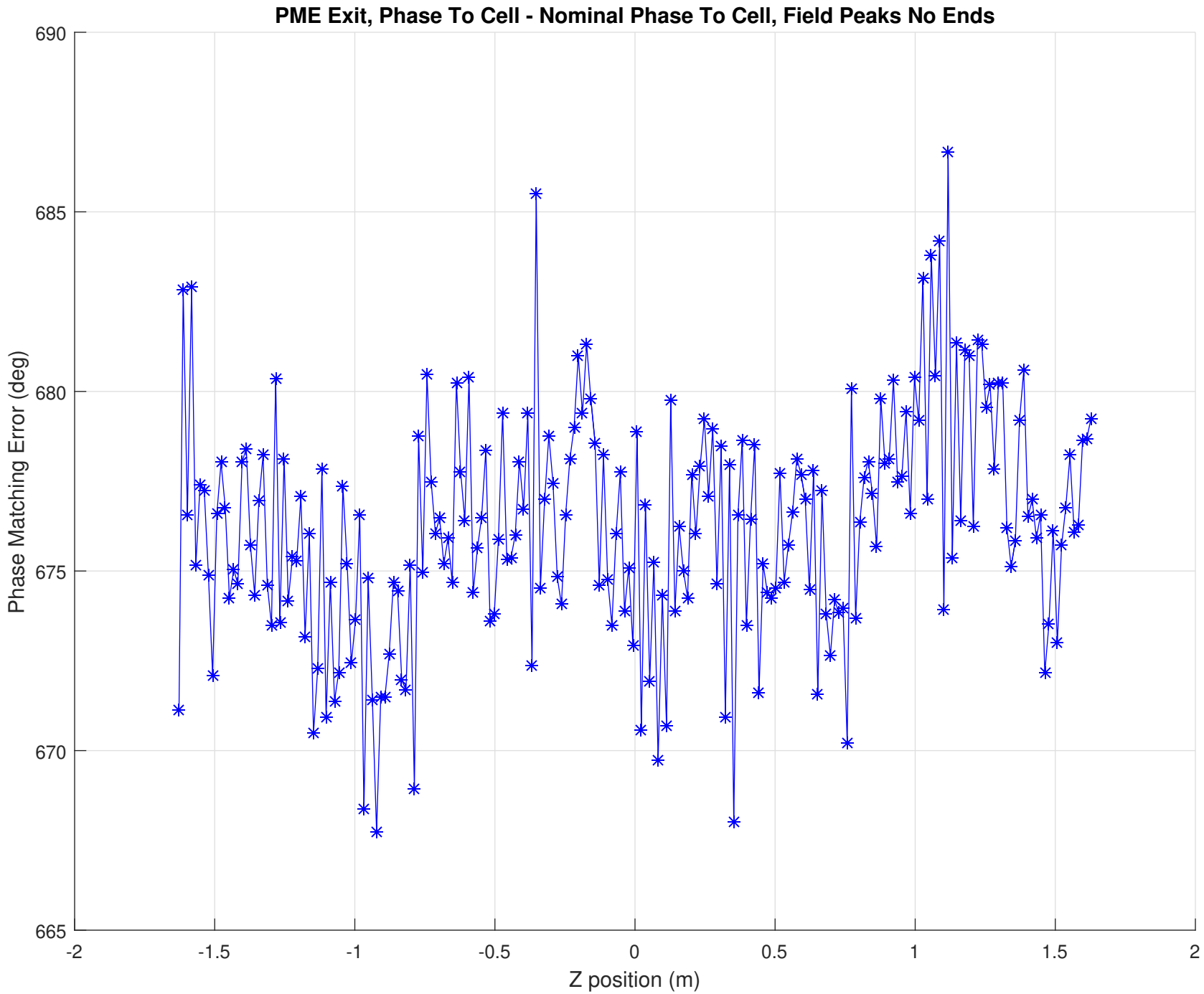


Phase Error: Ave = 0.000000 deg, RMS = 2.946686 deg


Phase And Nominal Phase In The Undulator
10^4
Phase (Blue), Nominal Phase (Red)
(1) Nominal Phase Match = 810.00 deg
(2) Nominal Phase Change Center = 39060.00 deg
Num Poles Center = 218
(3) Nominal Phase Match = 810.00 deg
(4) Nominal Phase Cell = 40680.00 deg
Phase (deg)
Z position (m)
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
-0.5
-2.5
-2
-1.5
-1
-0.5
0
0.5
1
1.5
2
2.5
1
2
3
4



Phase Match Error: Ave = 683.527557 deg, RMS = 3.158389 deg



Phase Match Error: Ave = 676.268794 deg, RMS = 3.158389 deg