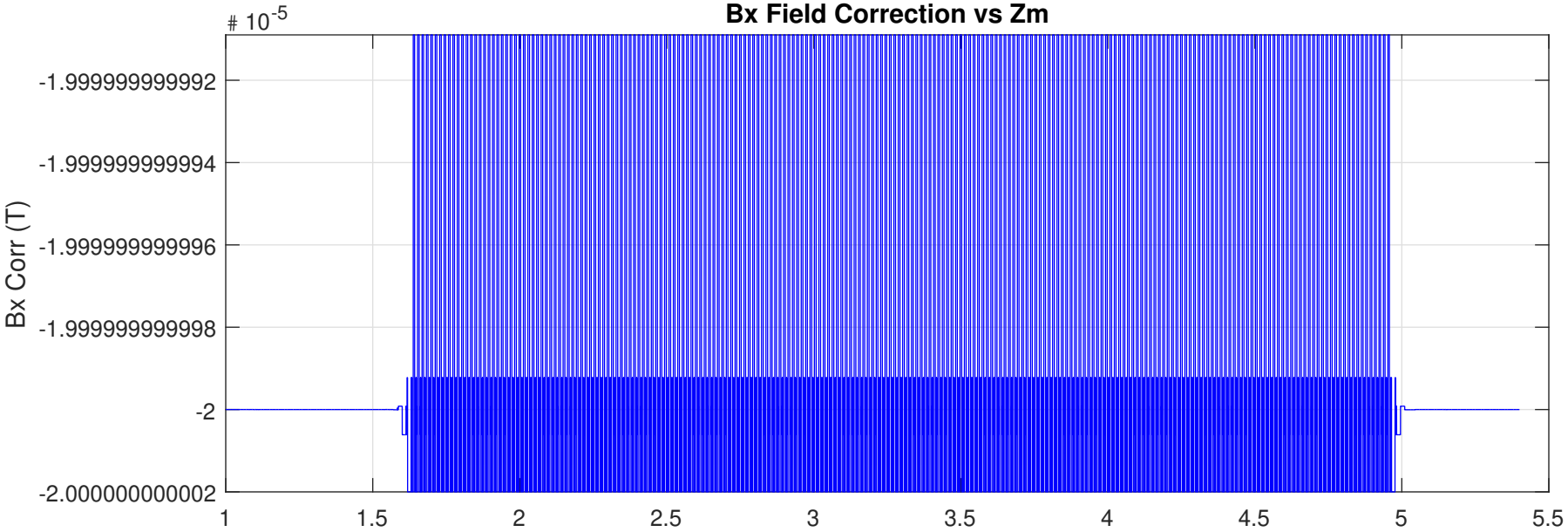
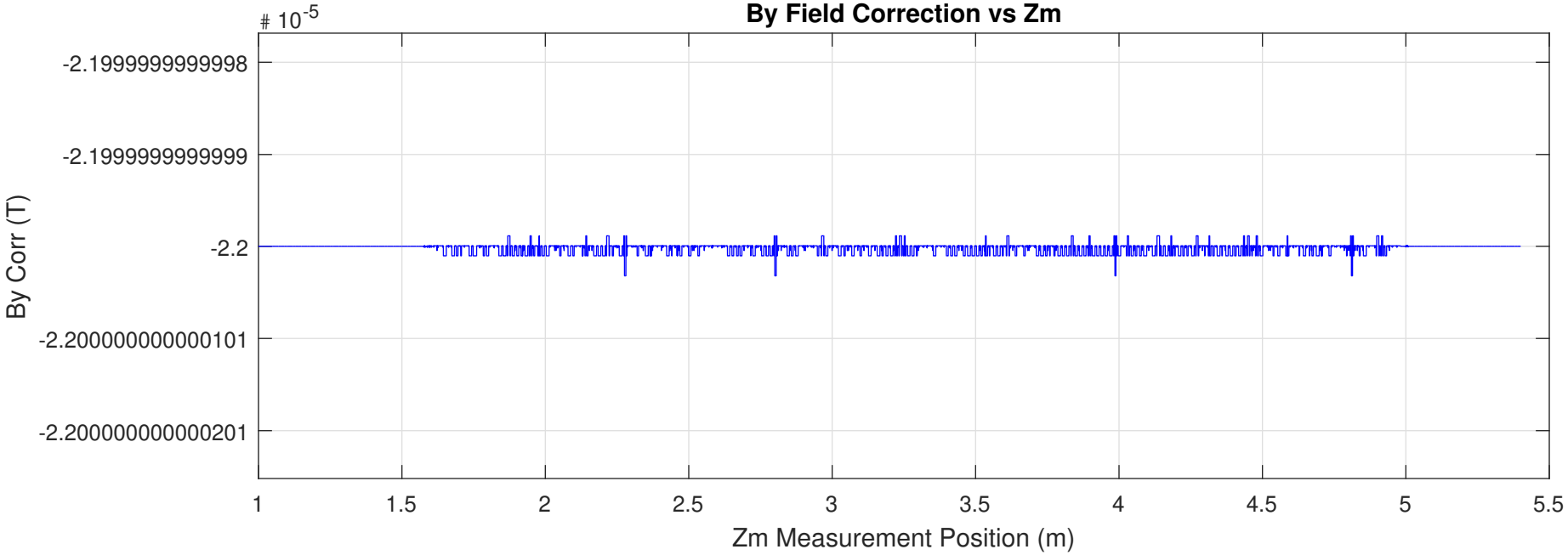
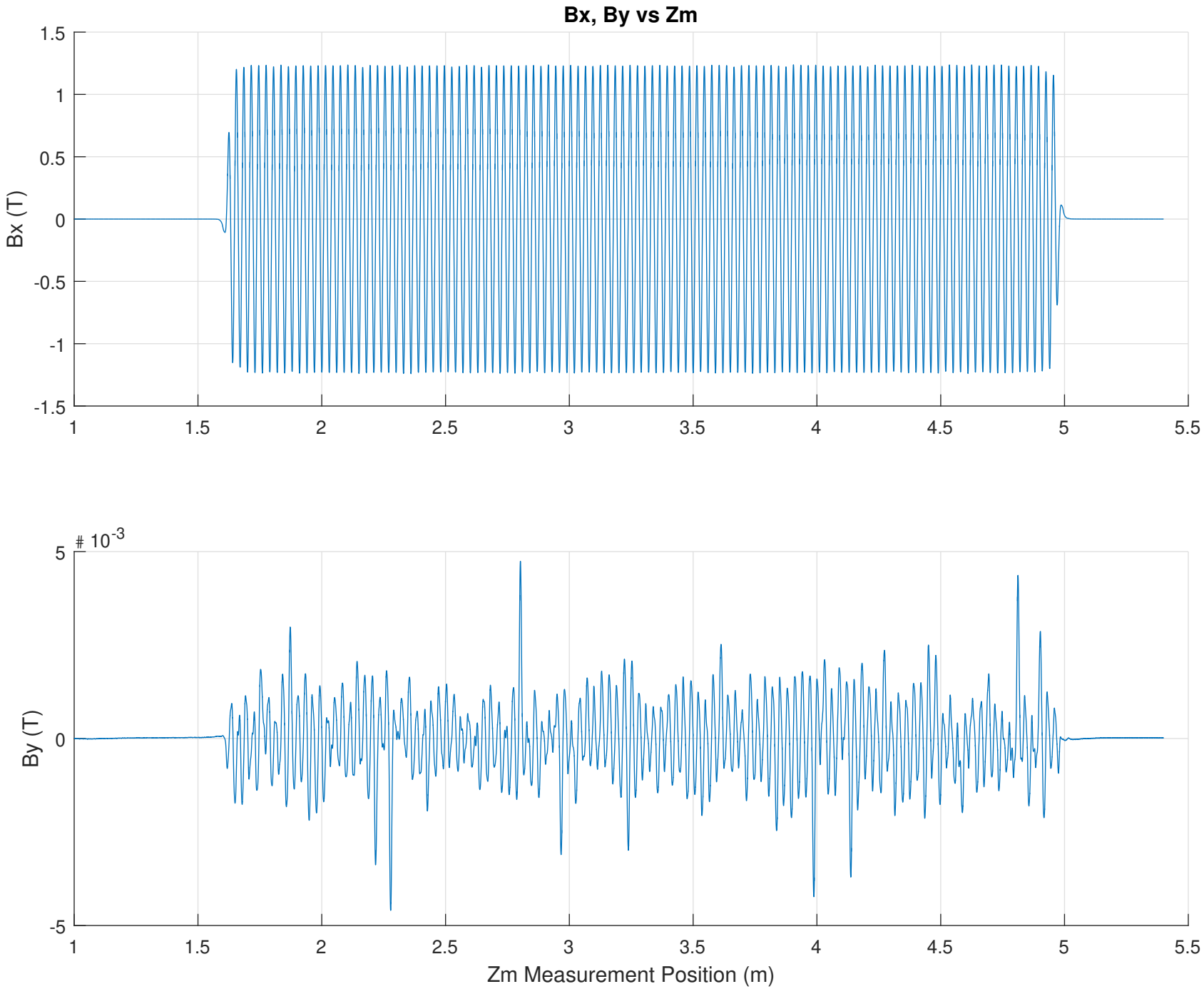
SLAC Magnetic Measurements

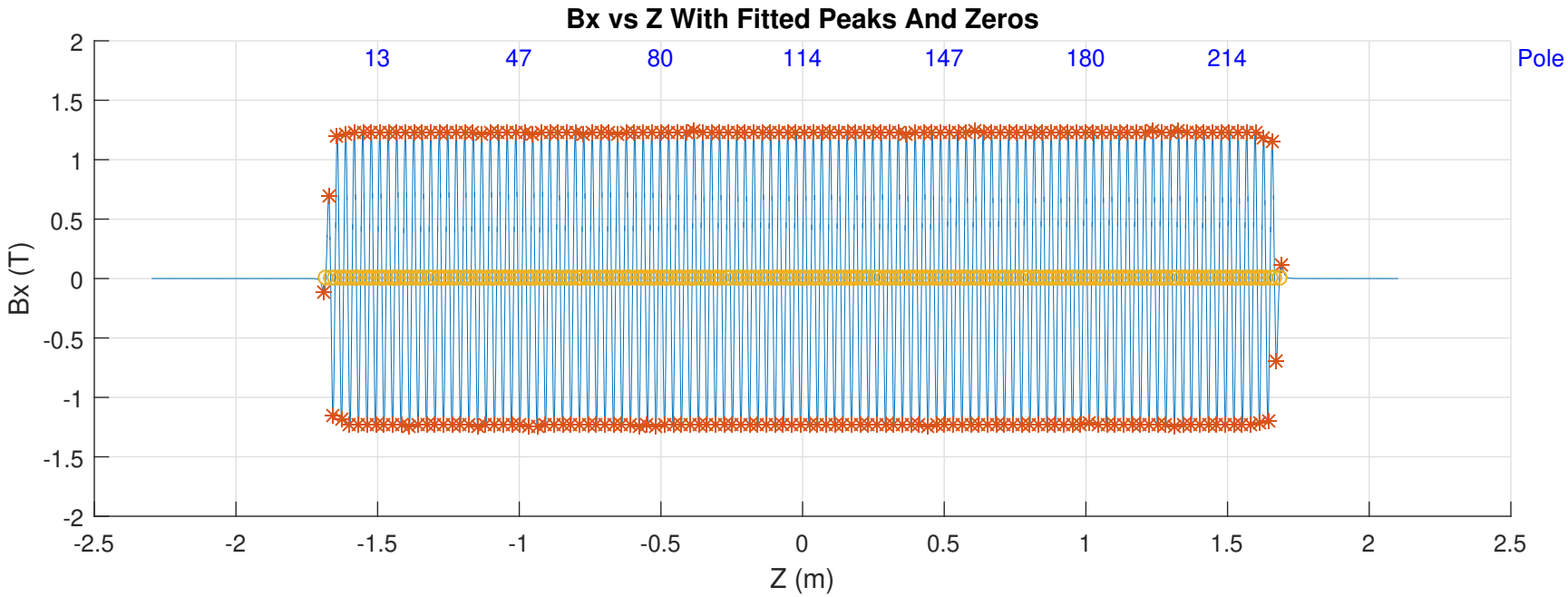
Planar Insertion Device Analysis

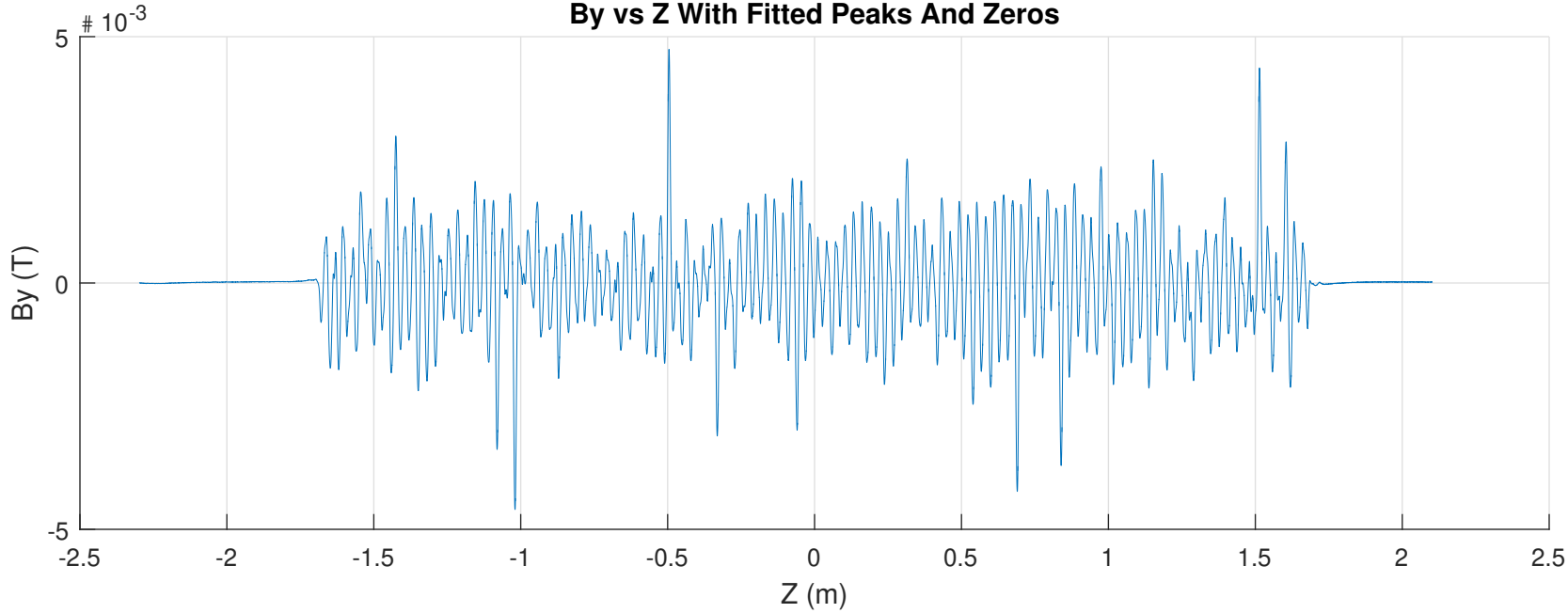
Parameters:
INPUT-FILE-DIR =S:\magdata\LCLS-II\Undulator\HXR-REFERENCE\DATASET0001\Tuning\Z Scans\Run 002\
INPUT-FILE-NAME =\x+00000-y+000-bscanz.dat
INPUT-FILE-TYPE =ZVXYBXYH
CORR-REQUIRED =1
GAMMA =26689
NOM-LAMBDA-U =0.03
NOM-K-VALUE =3.377
NOM-LAMBDA-R =1.4114e-10
NUM-POLES =226
NUM-END-POLES =4
CELL-LENGTH =4.4

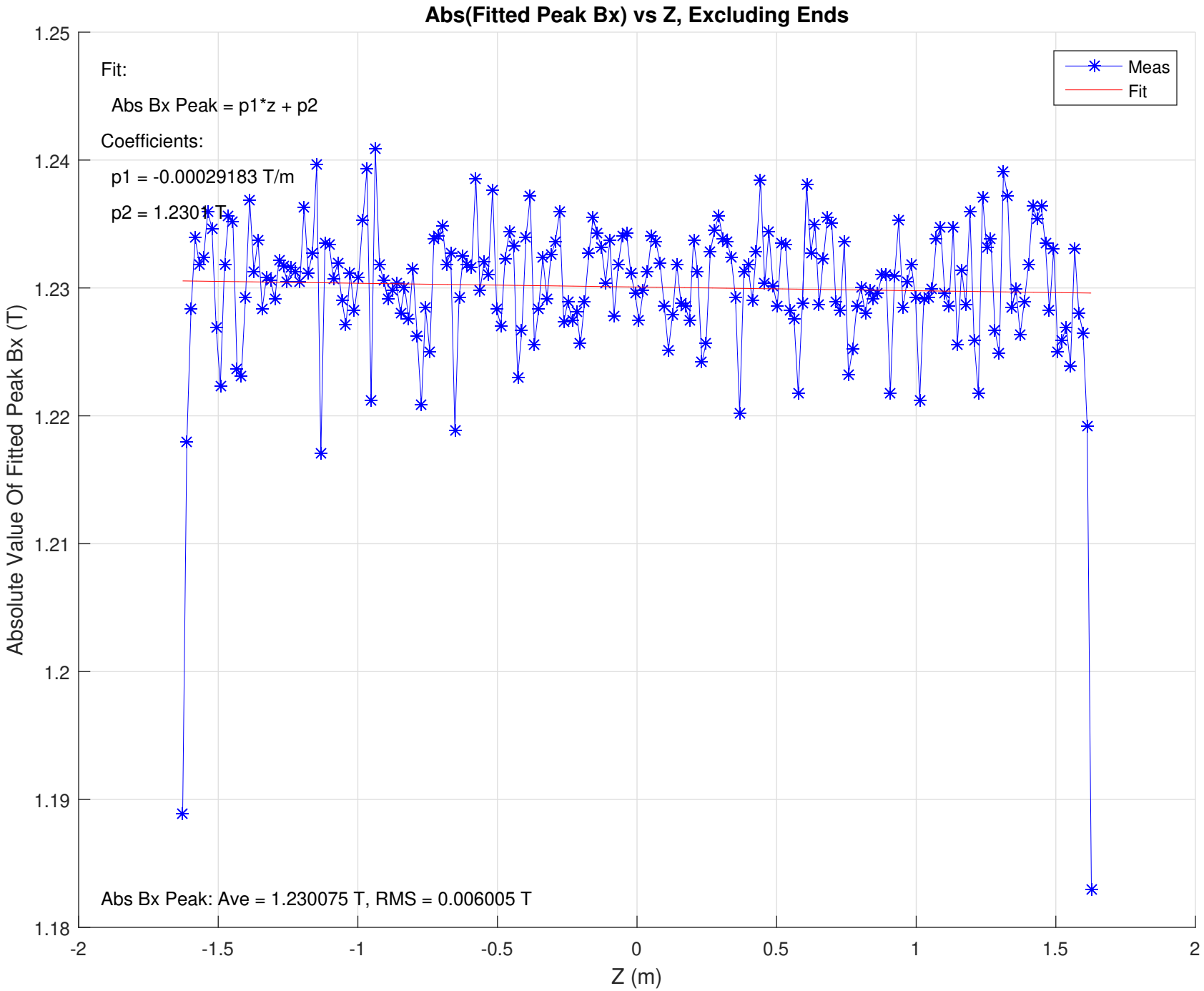

Bx Field Correction vs Zm
10^-5
-1.999999999992
-1.999999999994
-1.999999999996
-1.999999999998
-2
-2.000000000002
Bx Corr (T)
1
1.5
2
2.5
3
3.5
4
4.5
5
5.5

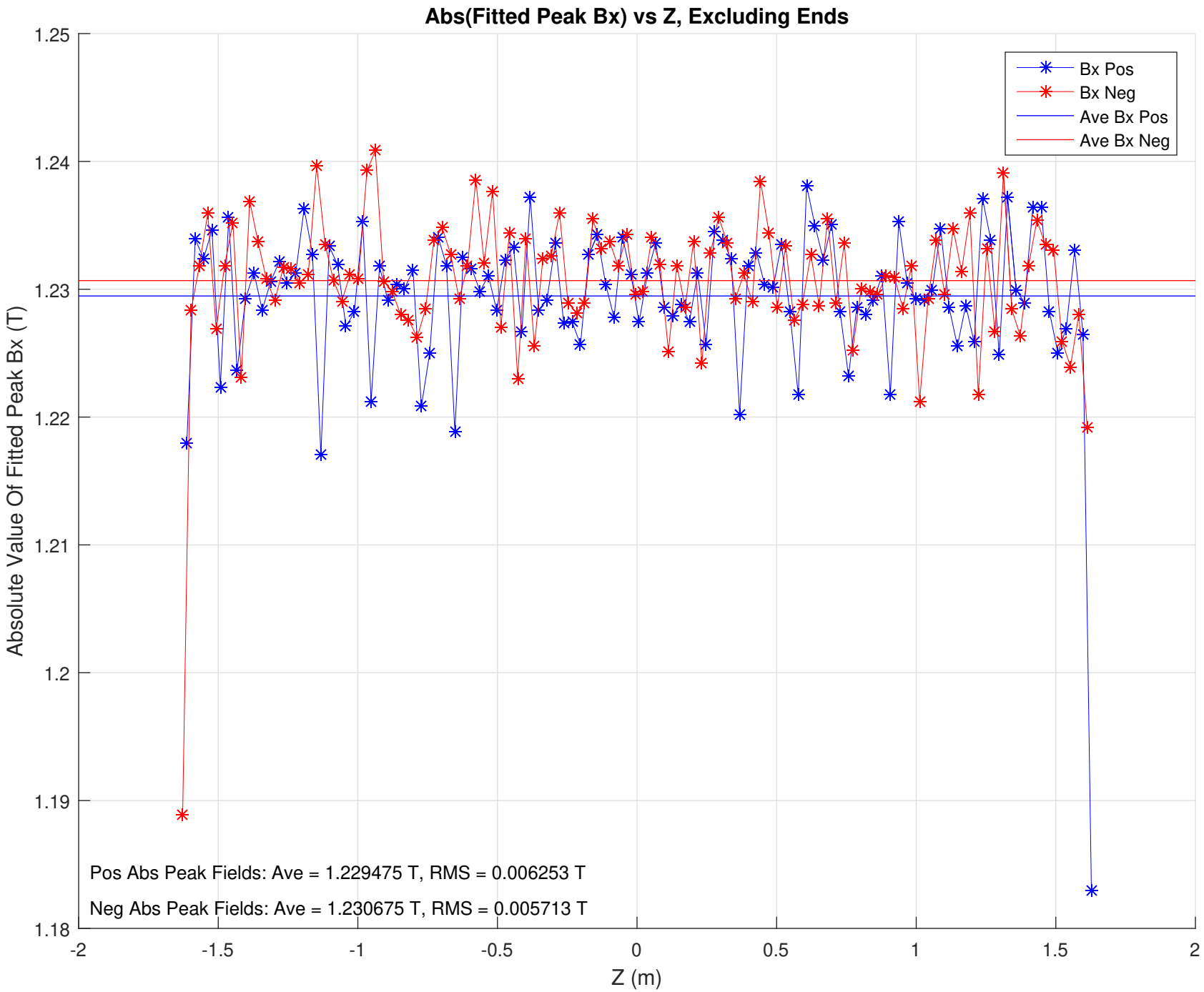

By Field Correction vs Zm
10^-5
-2.1999999999998
-2.1999999999999
-2.2
-2.200000000000101
-2.200000000000201
By Corr (T)
1
1.5
2
2.5
3
3.5
4
4.5
5
5.5
Zm Measurement Position (m)

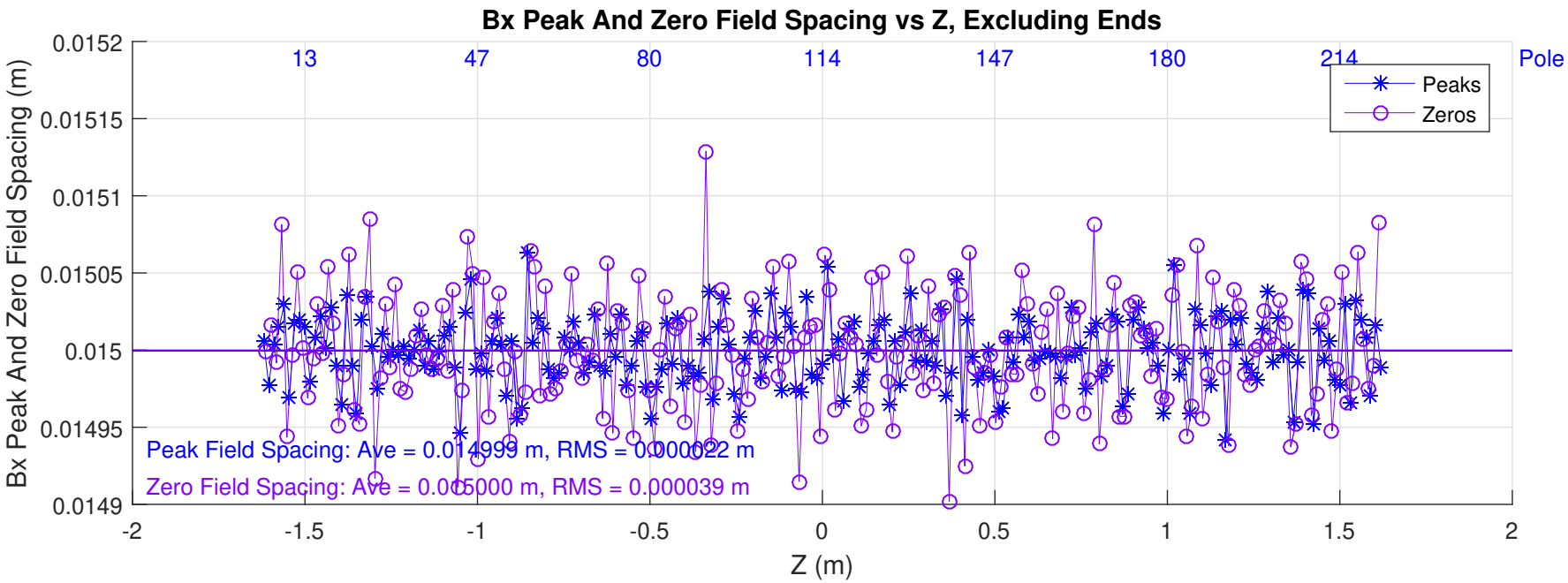

Bx, By vs Zm
Bx (T)
1.5
1
0.5
0
-0.5
-1
-1.5
1
1.5
2
2.5
3
3.5
4
4.5
5
5.5
10^-3
By (T)
5
0
-5
Zm Measurement Position (m)

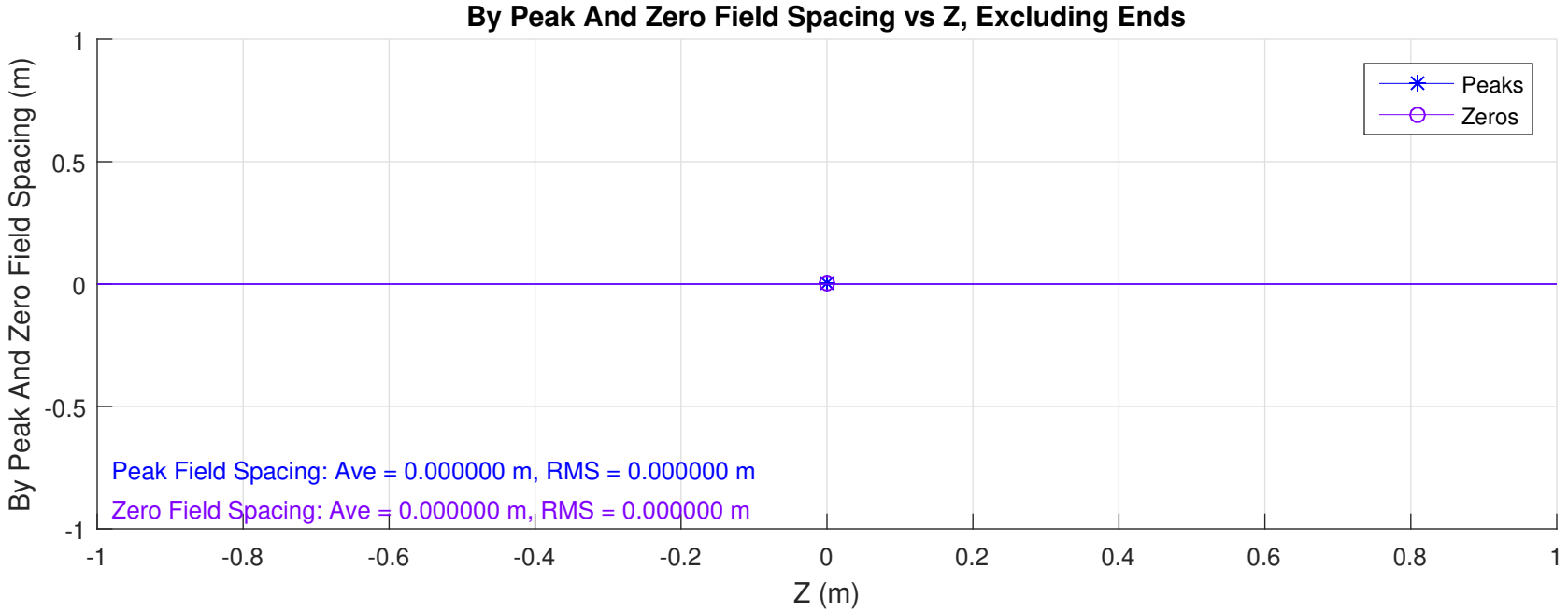

Bx vs Z With Fitted Peaks And Zeros
13
47
80
114
147
180
214
Pole
Bx (T)
Z (m)

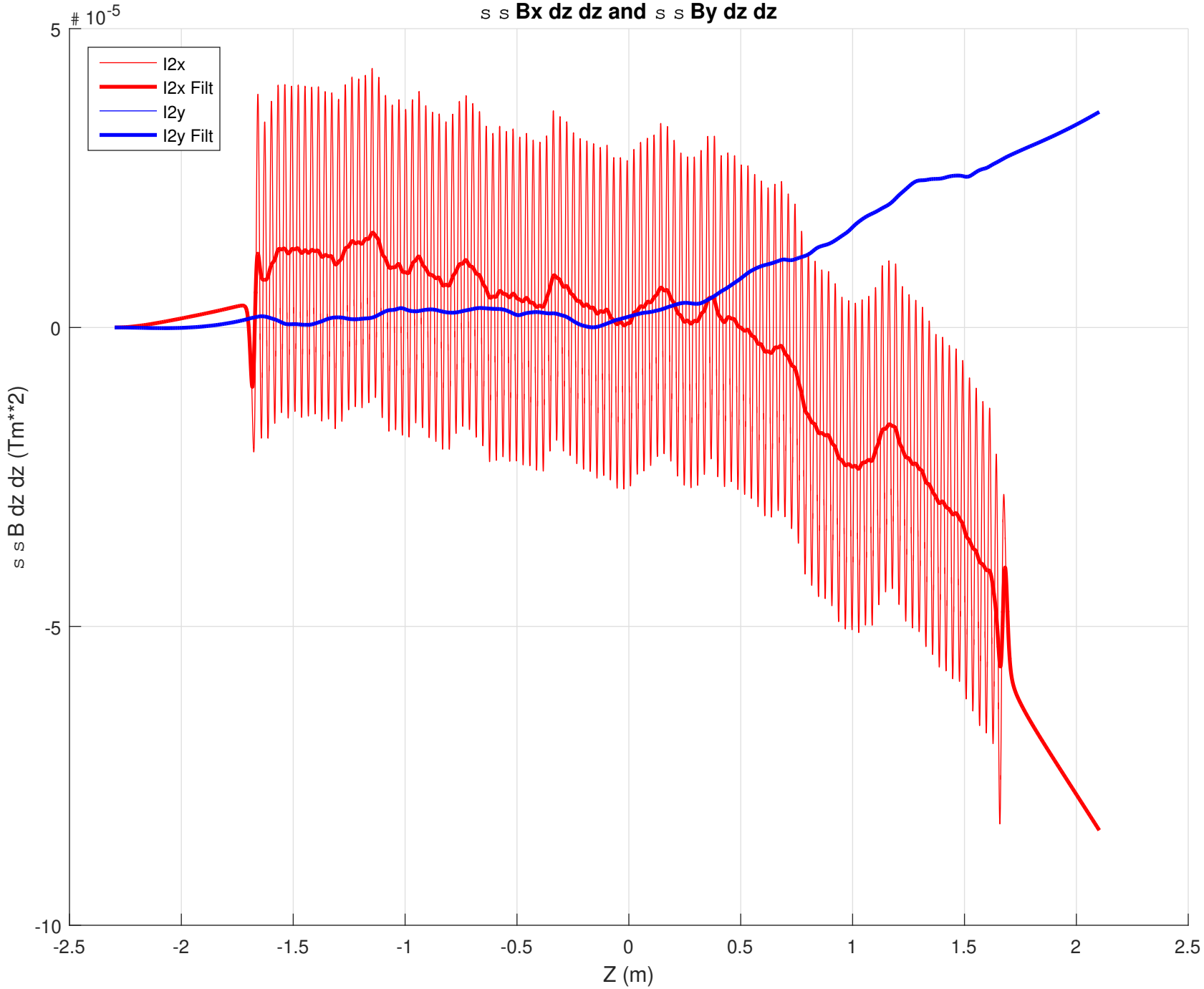

By vs Z With Fitted Peaks And Zeros
10^-3
By (T)
Z (m)

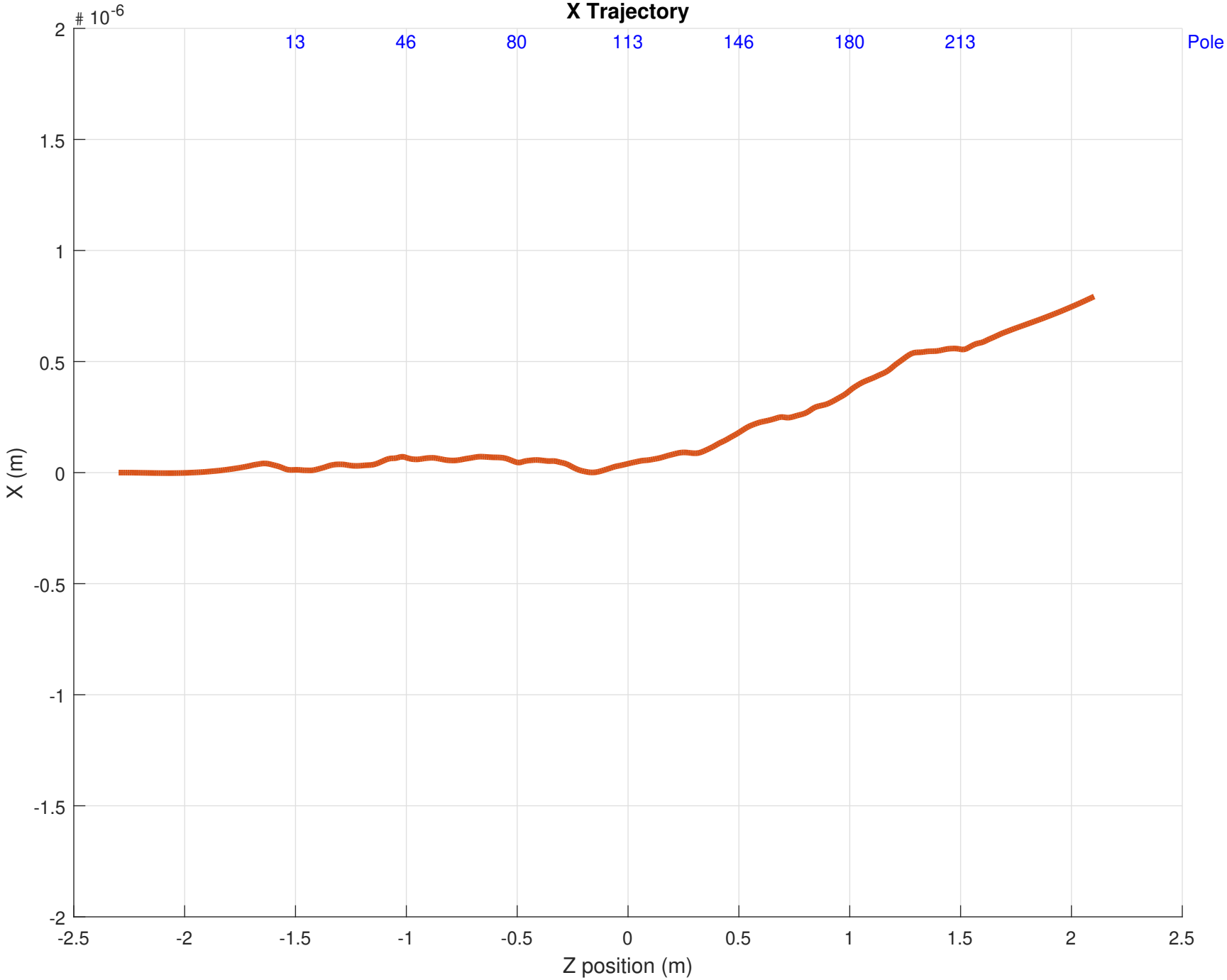

Abs(Fitted Peak Bx) vs Z, Excluding Ends
Fit:
Abs Bx Peak = p1*z + p2
Coefficients:
p1 = -0.00029183 T/m
p2 = 1.2301 T
Meas
Fit
Abs Bx Peak: Ave = 1.230075 T, RMS = 0.006005 T
Absolute Value Of Fitted Peak Bx (T)
Z (m)
1.25
1.24
1.23
1.22
1.21
1.2
1.19
1.18
-2
-1.5
-1
-0.5
0
0.5
1
1.5
2

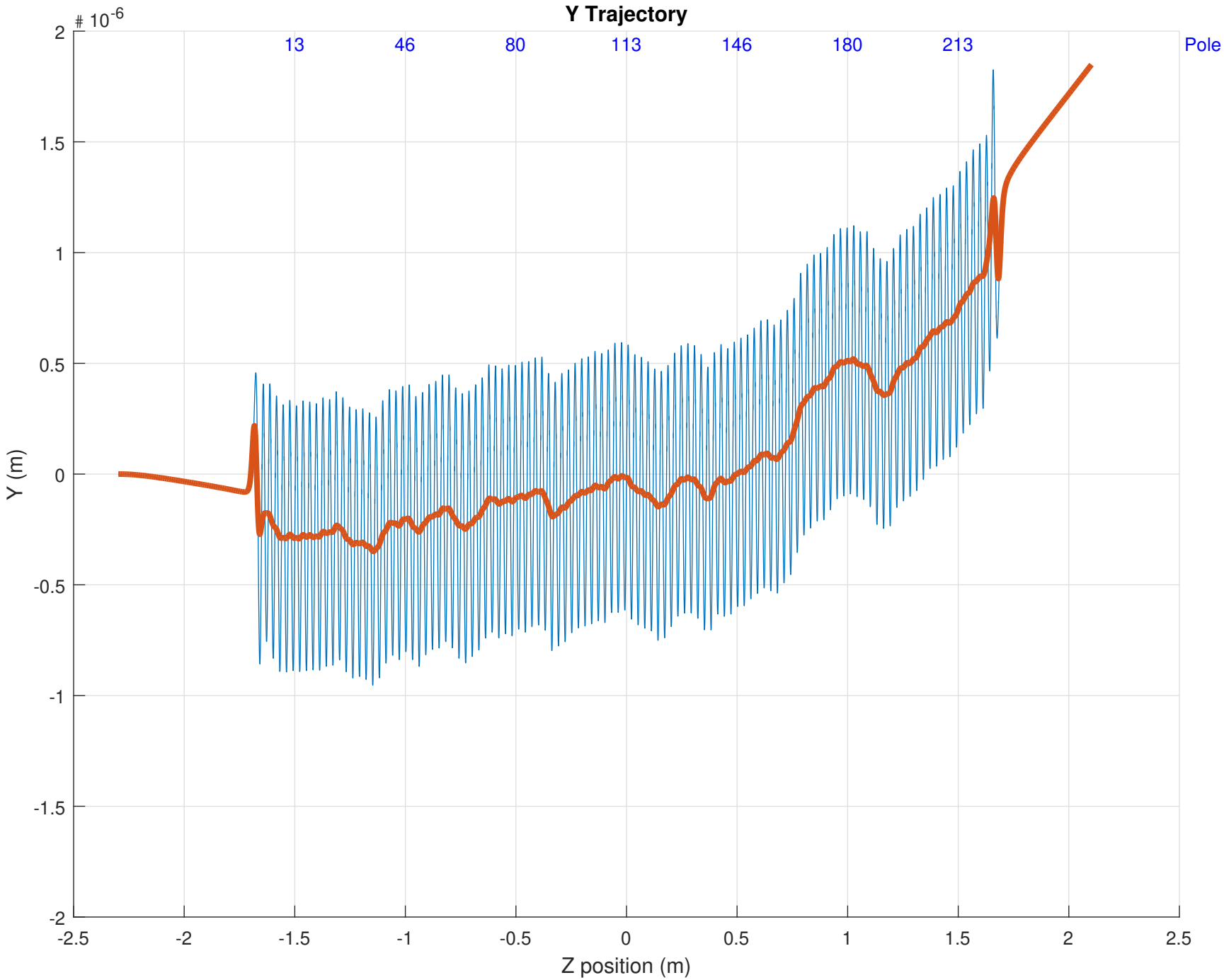

Abs(Fitted Peak Bx) vs Z, Excluding Ends
Bx Pos
Bx Neg
Ave Bx Pos
Ave Bx Neg
Absolute Value Of Fitted Peak Bx (T)
Z (m)
1.25
1.24
1.23
1.22
1.21
1.2
1.19
1.18
-2
-1.5
-1
-0.5
0
0.5
1
1.5
2
Pos Abs Peak Fields: Ave = 1.229475 T, RMS = 0.006253 T
Neg Abs Peak Fields: Ave = 1.230675 T, RMS = 0.005713 T

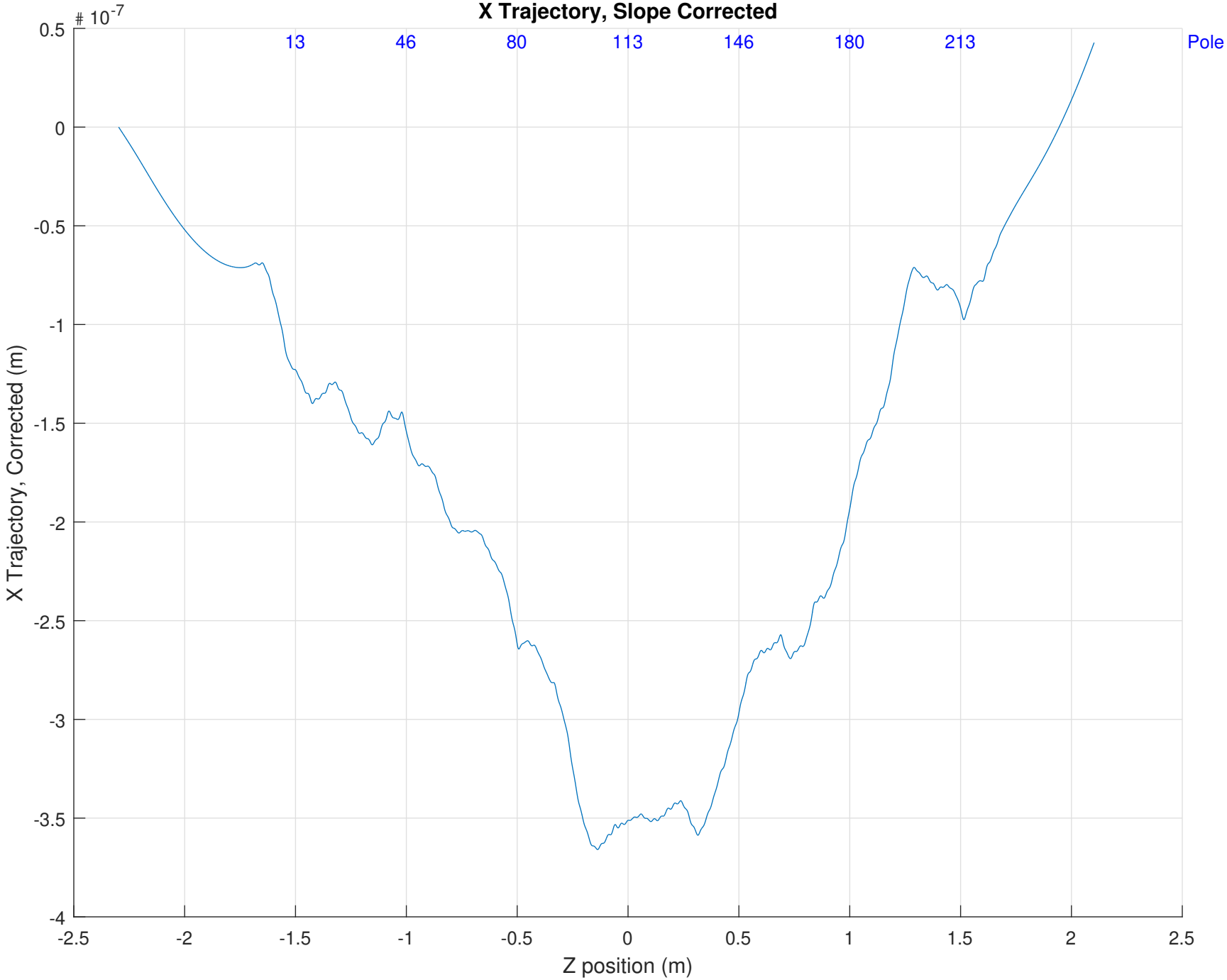

Bx Peak And Zero Field Spacing vs Z, Excluding Ends
Bx Peak And Zero Field Spacing (m)
0.0152
0.01515
0.0151
0.01505
0.015
0.01495
0.0149
13
47
80
114
147
180
214
Pole
Peaks
Zeros
Peak Field Spacing: Ave = 0.014999 m, RMS = 0.000022 m
Zero Field Spacing: Ave = 0.015000 m, RMS = 0.000039 m
-2
-1.5
-1
-0.5
0
0.5
1
1.5
2
Z (m)

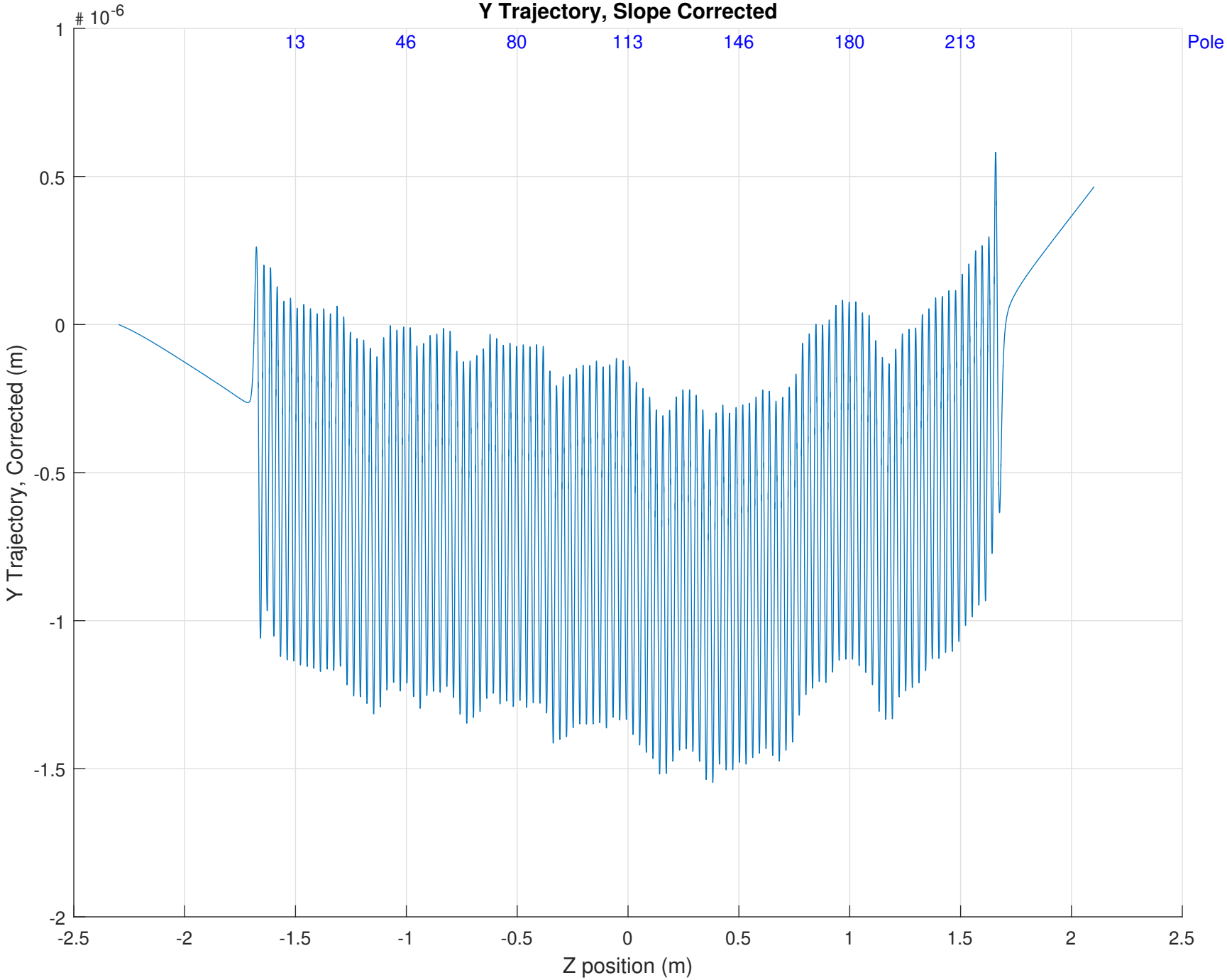

By Peak And Zero Field Spacing vs Z, Excluding Ends
By Peak And Zero Field Spacing (m)
1
0.5
0
-0.5
-1
Peaks
Zeros
Peak Field Spacing: Ave = 0.000000 m, RMS = 0.000000 m
Zero Field Spacing: Ave = 0.000000 m, RMS = 0.000000 m
-1
-0.8
-0.6
-0.4
-0.2
0
0.2
0.4
0.6
0.8
1
Z (m)

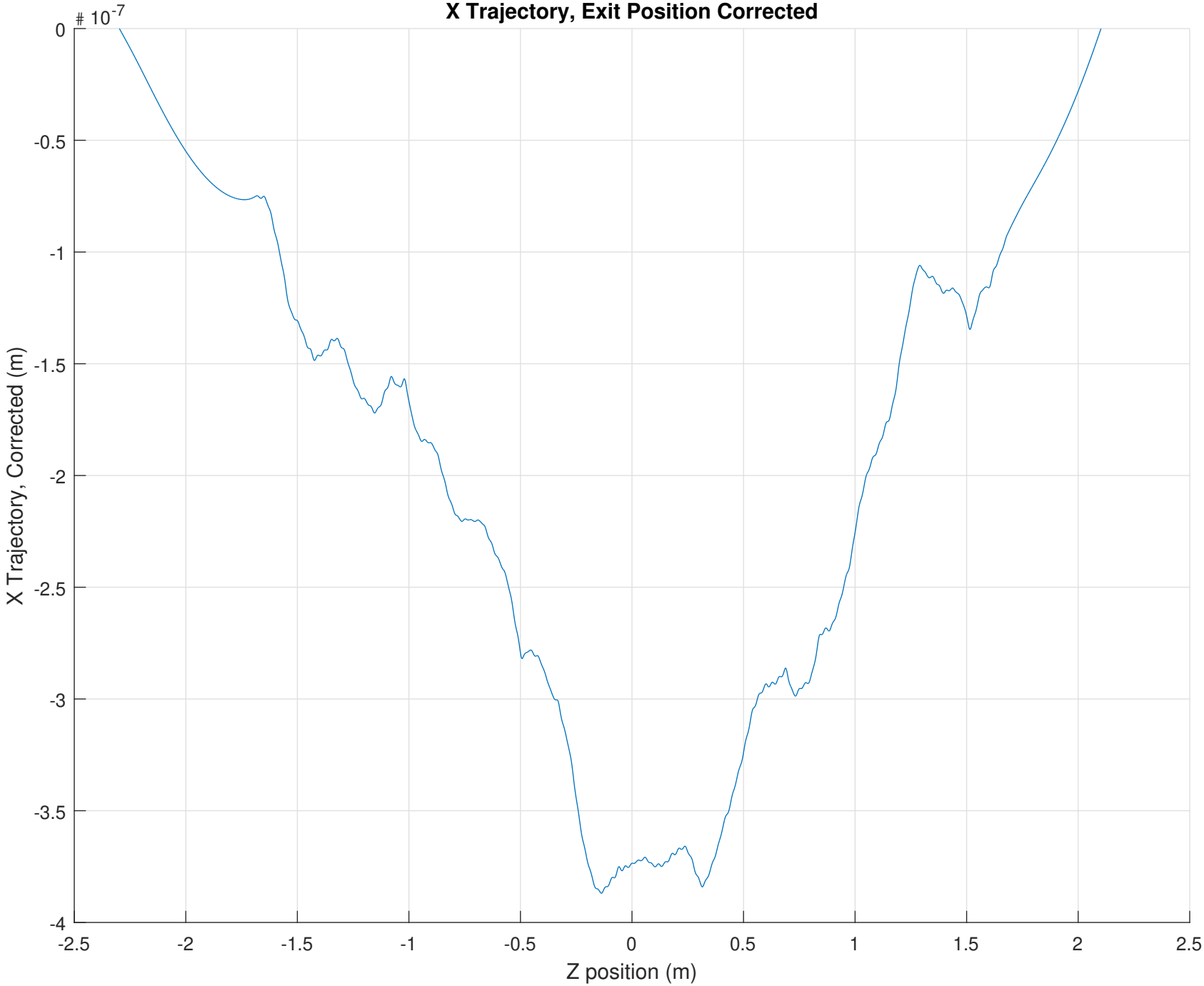

∫∫ Bx dz dz and ∫∫ By dz dz
10^-5
5
0
-5
-10
I2x
I2x Filt
I2y
I2y Filt
∫∫B dz dz (Tm**2)
-2.5
-2
-1.5
-1
-0.5
0
0.5
1
1.5
2
2.5
Z (m)

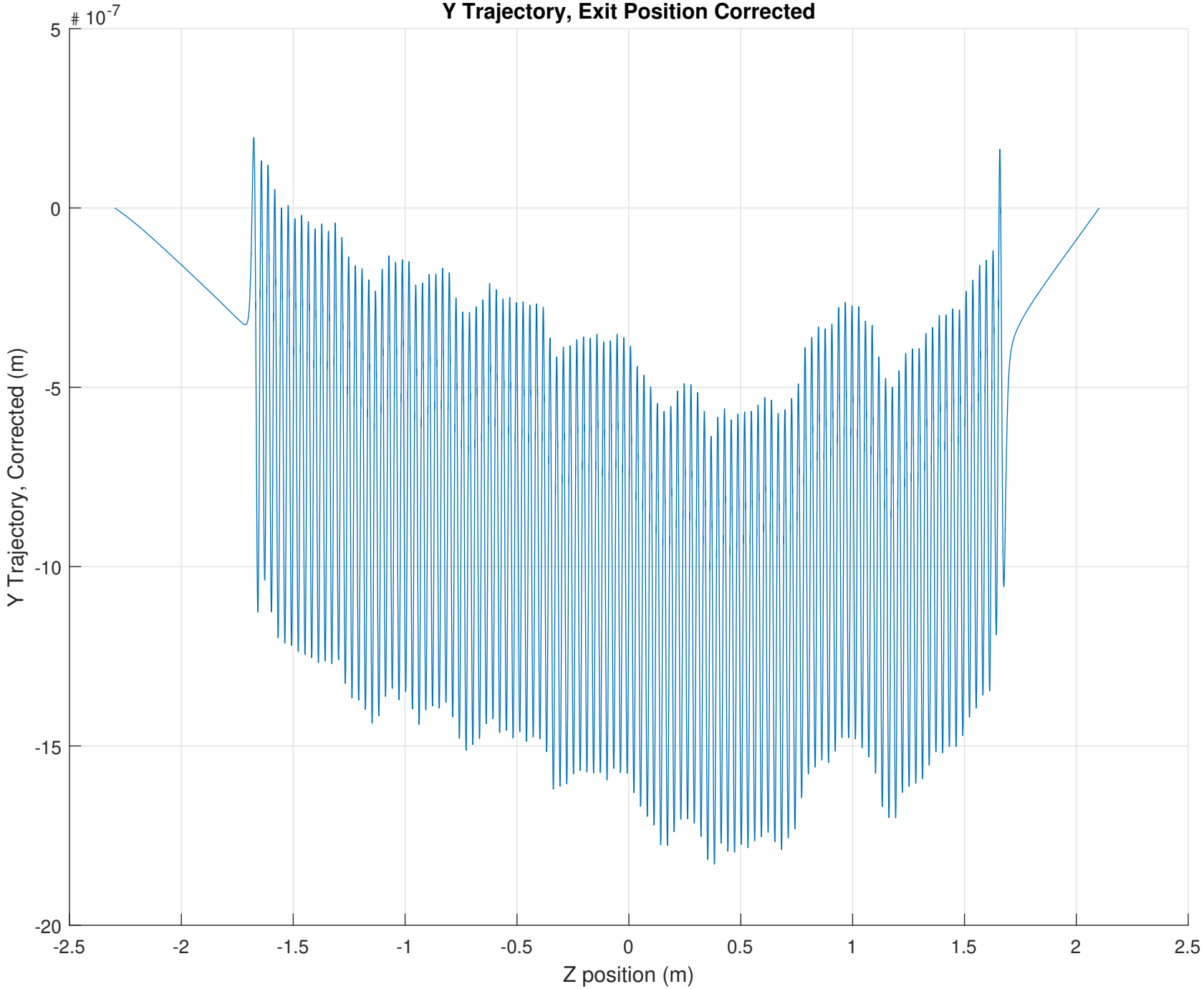

X Trajectory
10^-6
13
46
80
113
146
180
213
Pole
2
1.5
1
0.5
0
-0.5
-1
-1.5
-2
X (m)
-2.5
-2
-1.5
-1
-0.5
0
0.5
1
1.5
2
2.5
Z position (m)

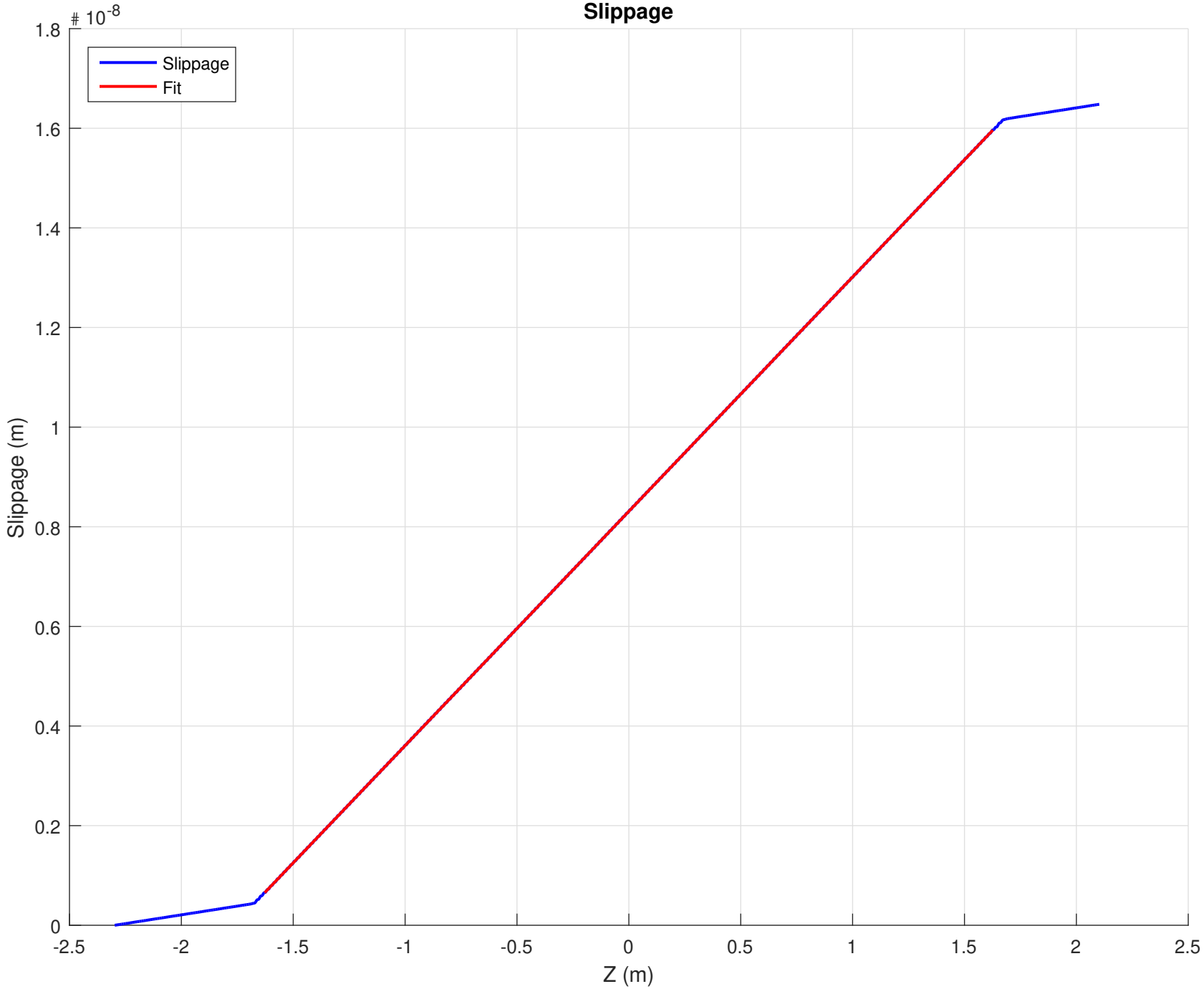

Y Trajectory
10^-6
13
46
80
113
146
180
213
Pole
2
1.5
1
0.5
0
-0.5
-1
-1.5
-2
Y (m)
-2.5
-2
-1.5
-1
-0.5
0
0.5
1
1.5
2
2.5
Z position (m)

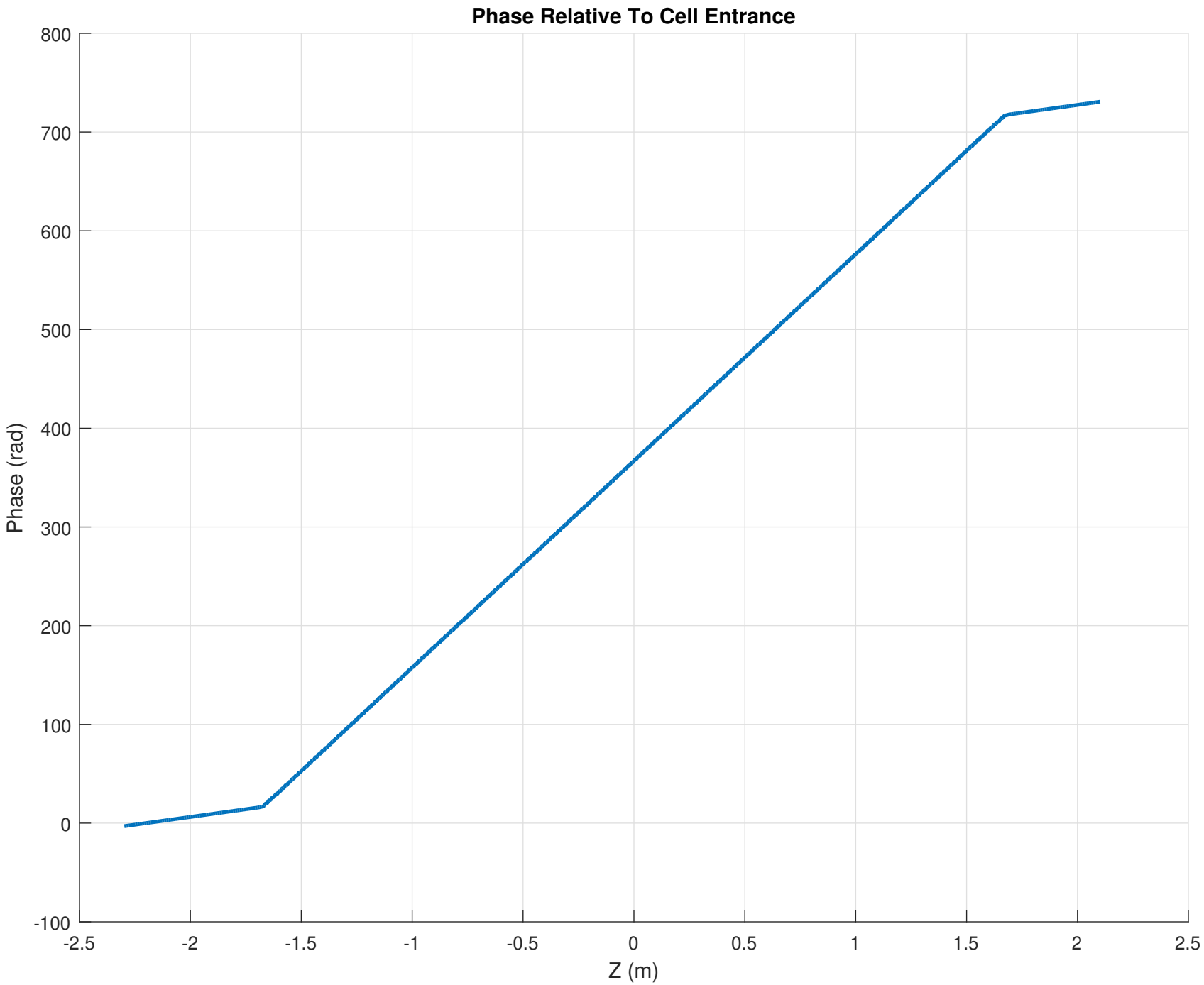

X Trajectory, Slope Corrected
10-7
13
46
80
113
146
180
213
Pole
0.5
0
-0.5
-1
-1.5
-2
-2.5
-3
-3.5
-4
X Trajectory, Corrected (m)
-2.5
-2
-1.5
-1
-0.5
0
0.5
1
1.5
2
2.5
Z position (m)

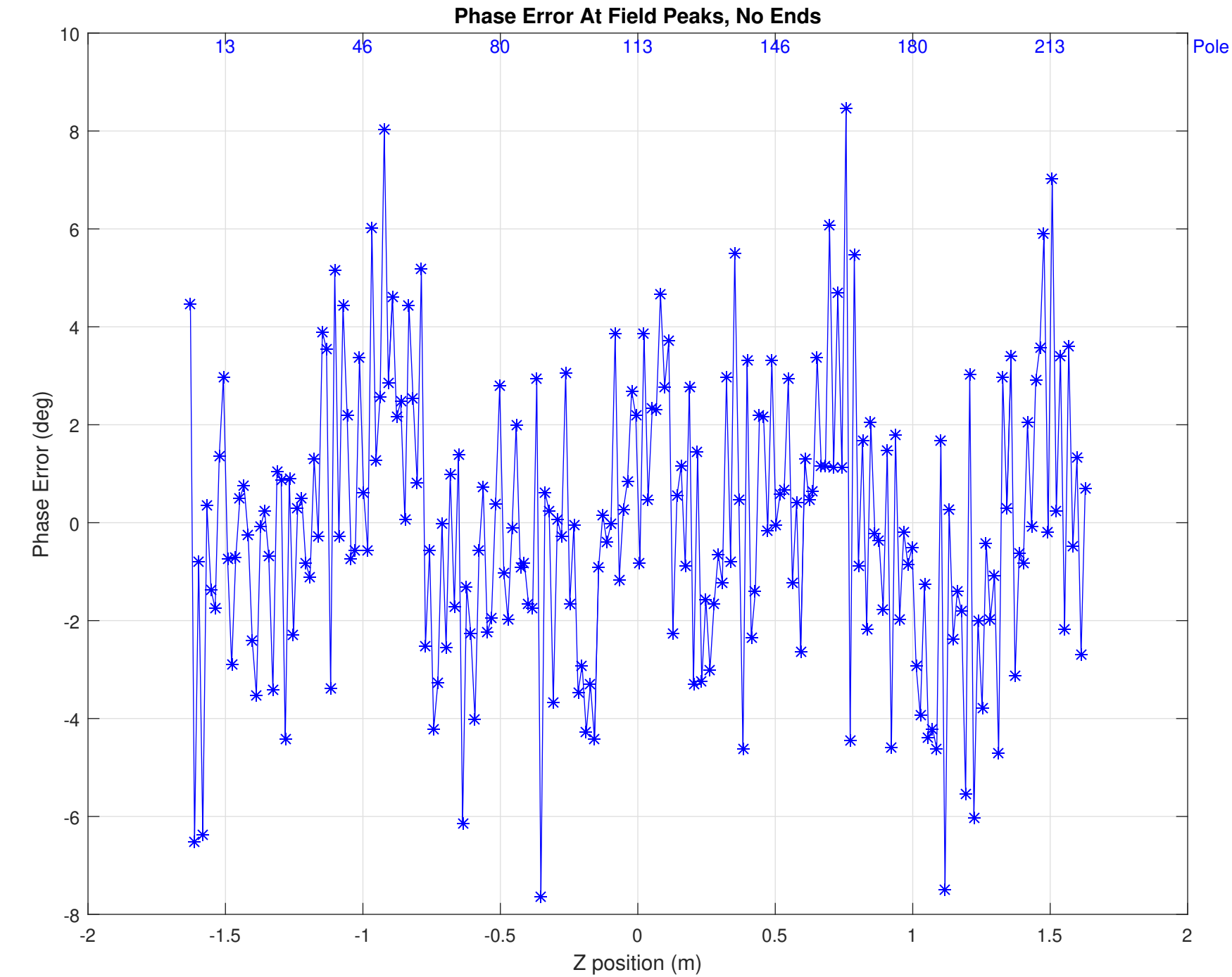

Y Trajectory, Slope Corrected
10-6
1
0.5
0
-0.5
-1
-1.5
-2
13
46
80
113
146
180
213
Pole
Y Trajectory, Corrected (m)
-2.5
-2
-1.5
-1
-0.5
0
0.5
1
1.5
2
2.5
Z position (m)


X Trajectory, Exit Position Corrected
10^-7
0
-0.5
-1
-1.5
-2
-2.5
-3
-3.5
-4
X Trajectory, Corrected (m)
-2.5
-2
-1.5
-1
-0.5
0
0.5
1
1.5
2
2.5
Z position (m)

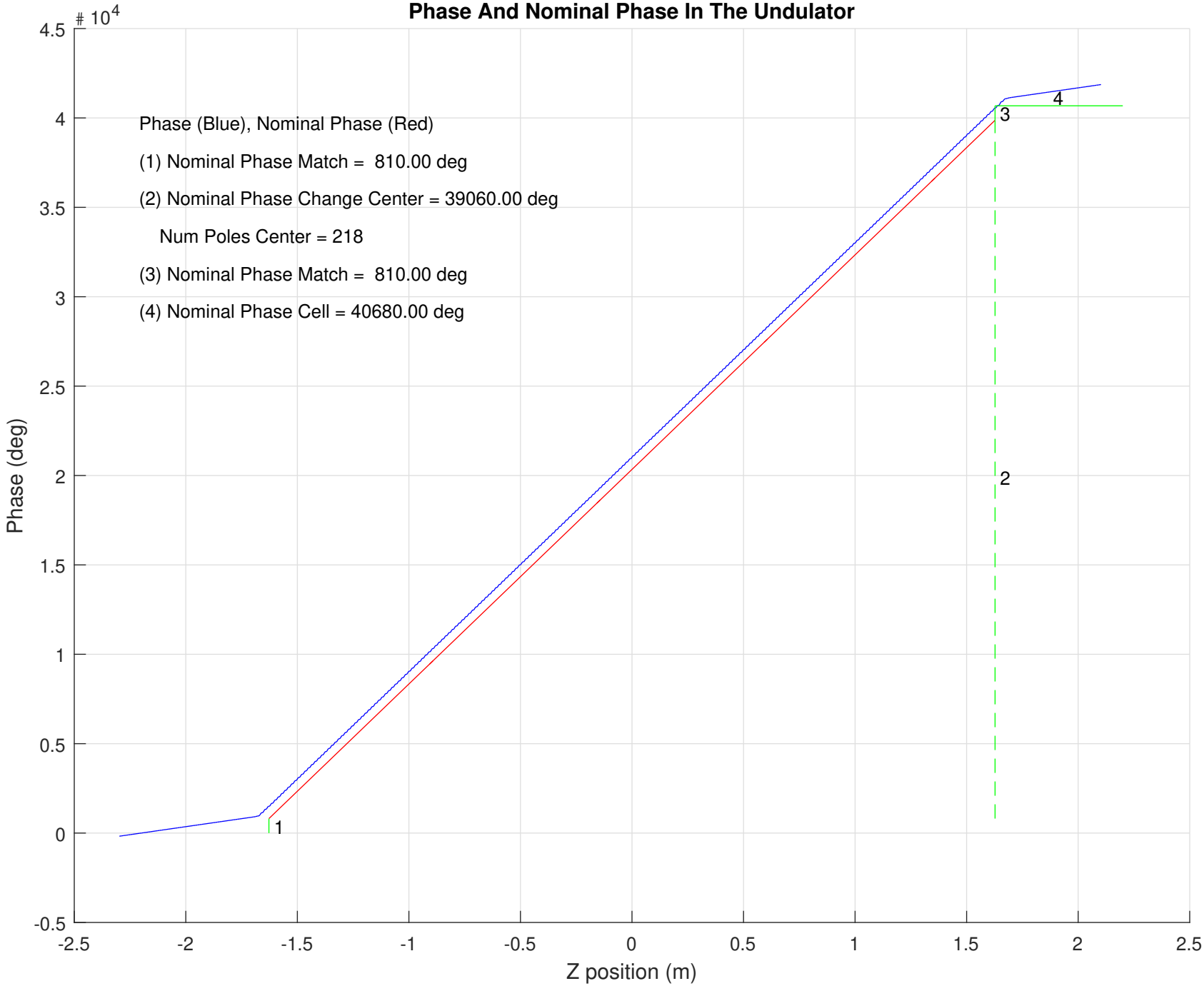

Y Trajectory, Exit Position Corrected
10^-7
5
0
-5
-10
-15
-20
Y Trajectory, Corrected (m)
-2.5
-2
-1.5
-1
-0.5
0
0.5
1
1.5
2
2.5
Z position (m)

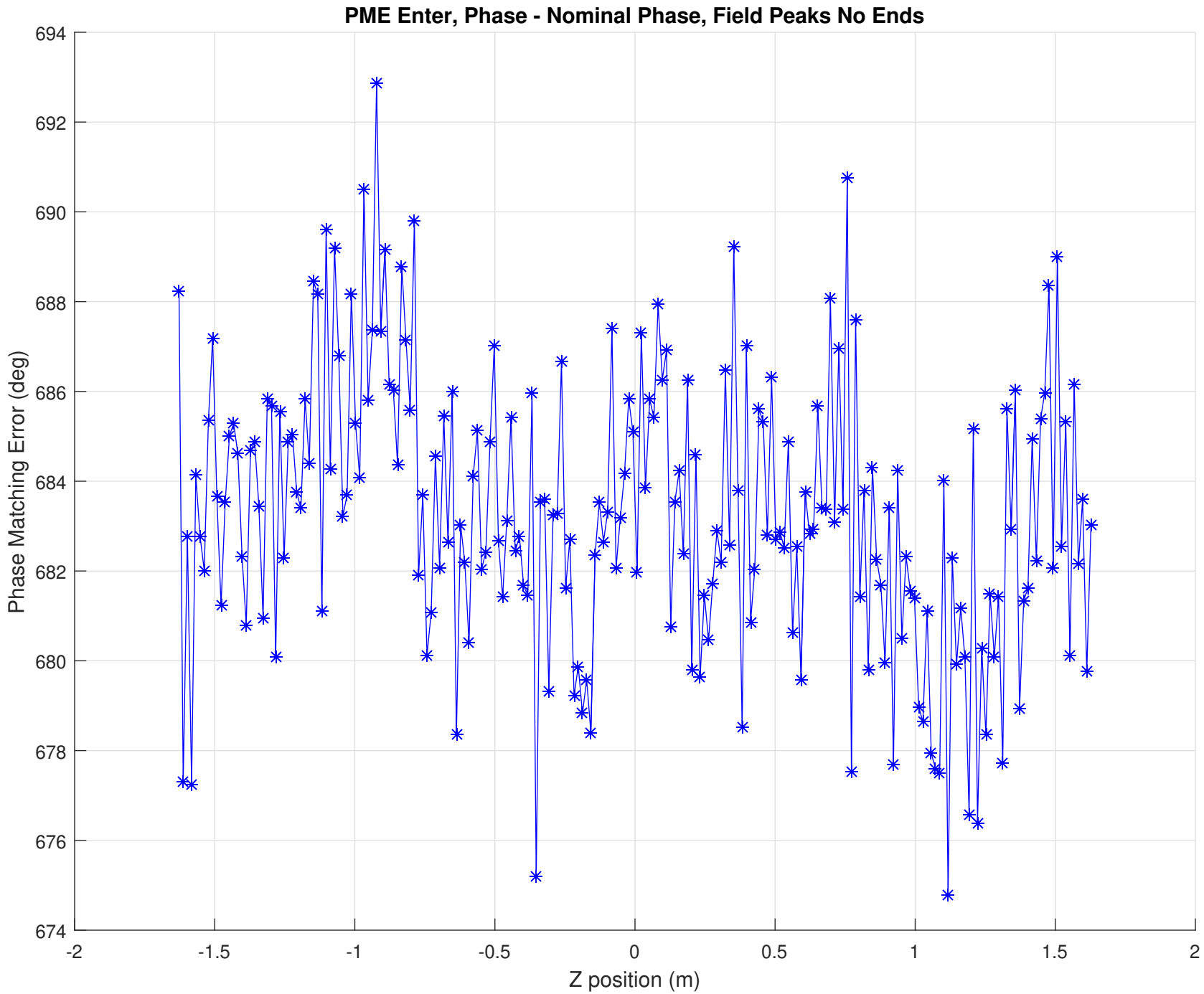

Slippage
10^-8
Slippage
Fit
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
Slippage (m)
-2.5
-2
-1.5
-1
-0.5
0
0.5
1
1.5
2
2.5
Z (m)


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)

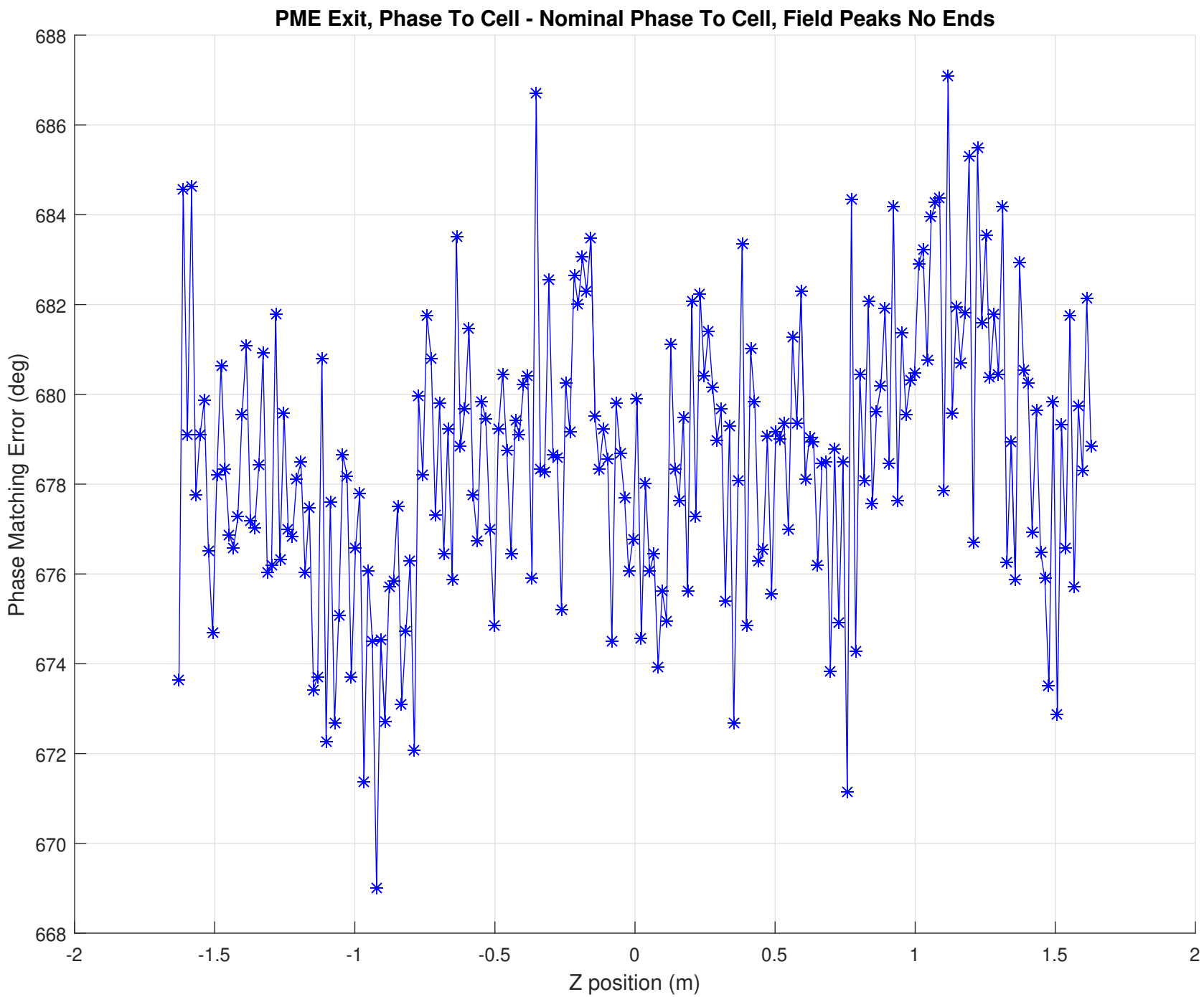


Phase Error: Ave = -0.000000 deg, RMS = 2.862275 deg


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 = 683.303326 deg, RMS = 3.093157 deg



Phase Match Error: Ave = 678.572600 deg, RMS = 3.093157 deg