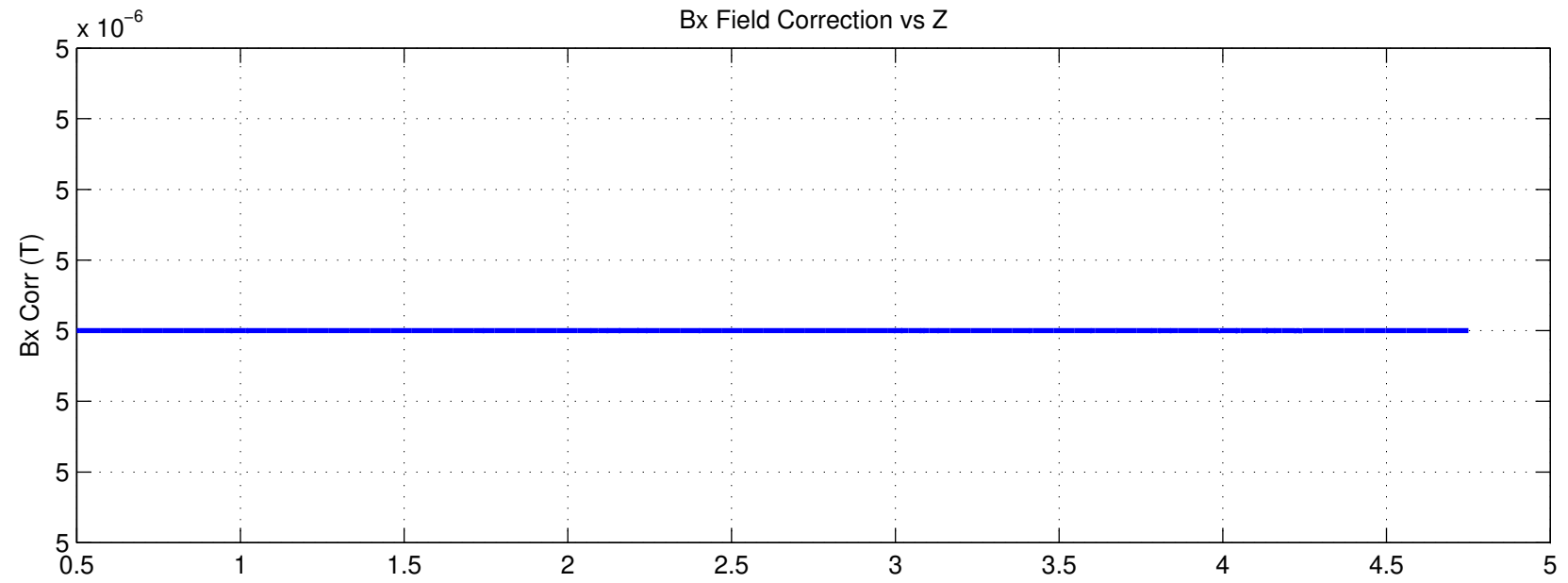
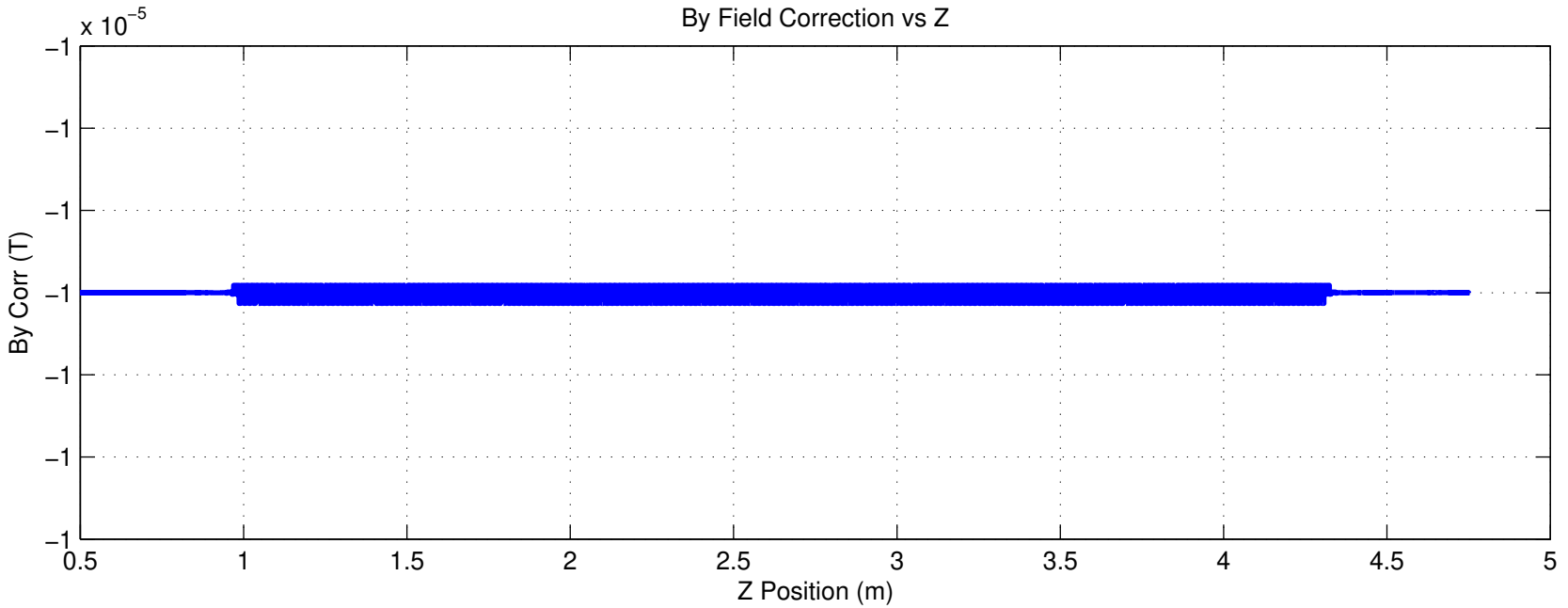
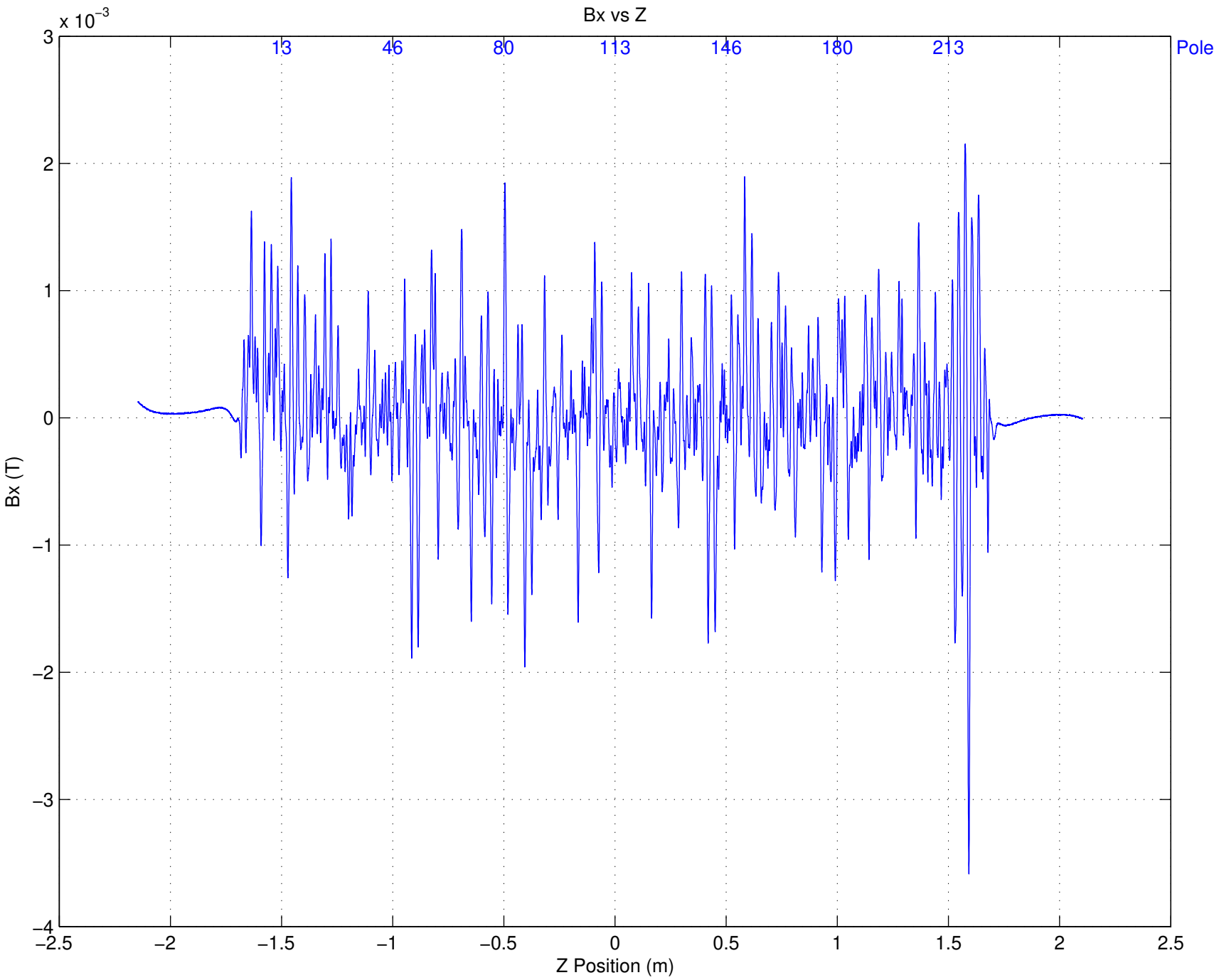
SLAC Magnetic Measurements

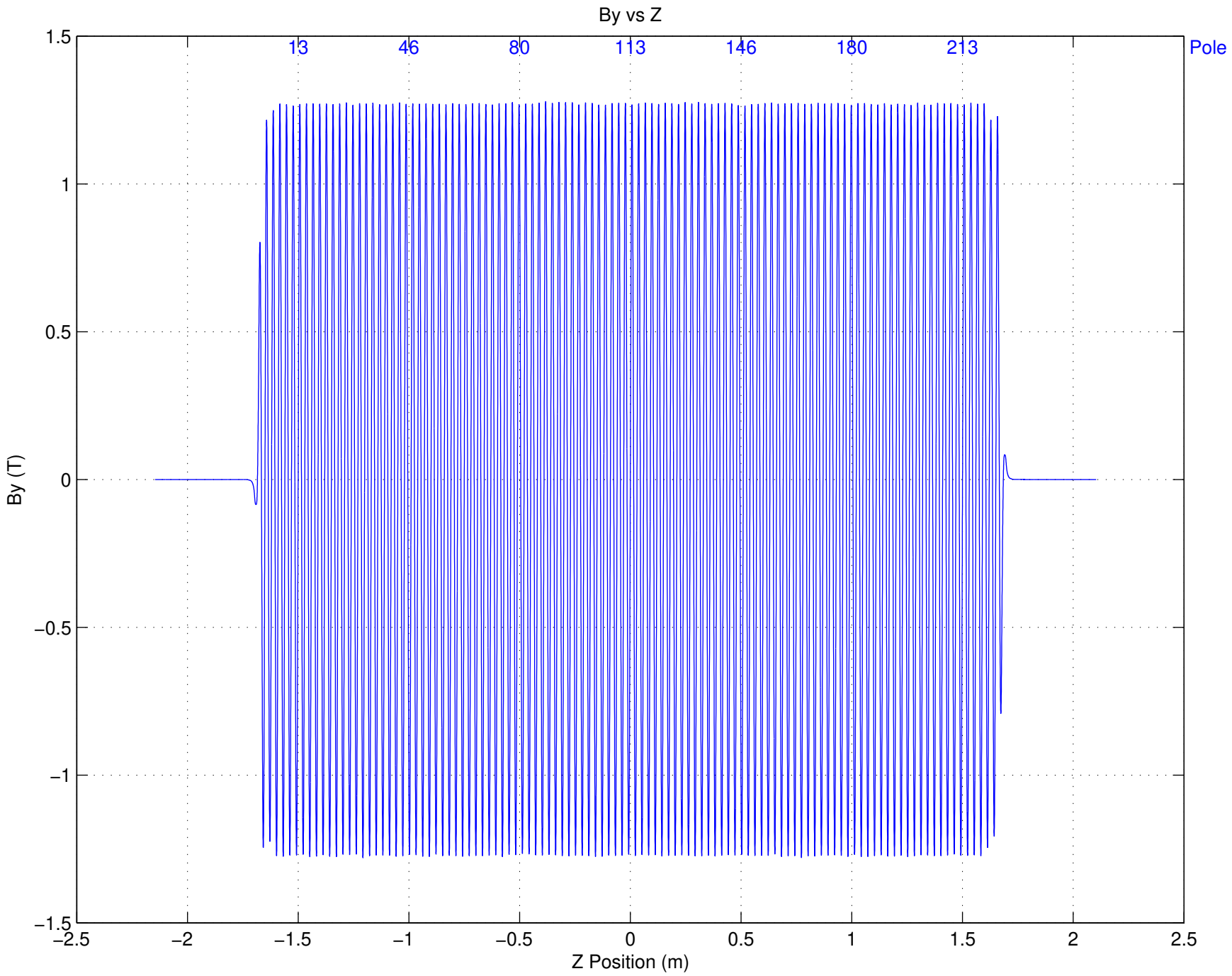
Planar Insertion Device Analysis

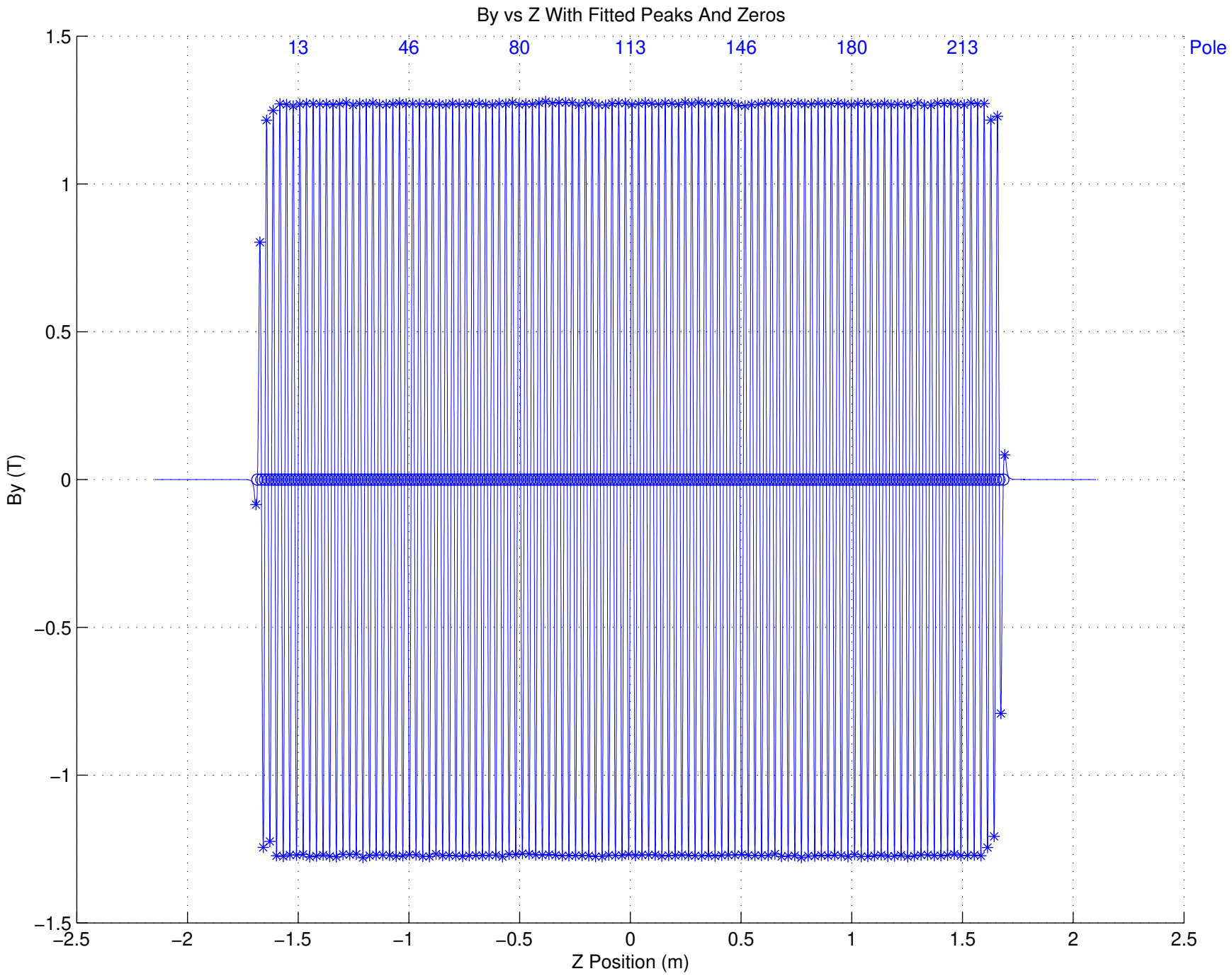
Parameters:
INPUT−FILE−DIR =S:\MagData\LCLS\Undulator\L143−112000−06\DATASET0001\Fine Tuning\Z Scans\Run 001\
INPUT−FILE−NAME =x+00000−y+000−bscanz.dat
INPUT−FILE−TYPE =ZVXYBXYH
CORR−REQUIRED =1
GAMMA =26654.56
NOM−LAMBDA−U =0.03
NOM−K−VALUE =3.4917
NOM−LAMBDA−R =1.4982e−010
NUM−POLES =226
NUM−END−POLES =4
CELL−LENGTH =3.656

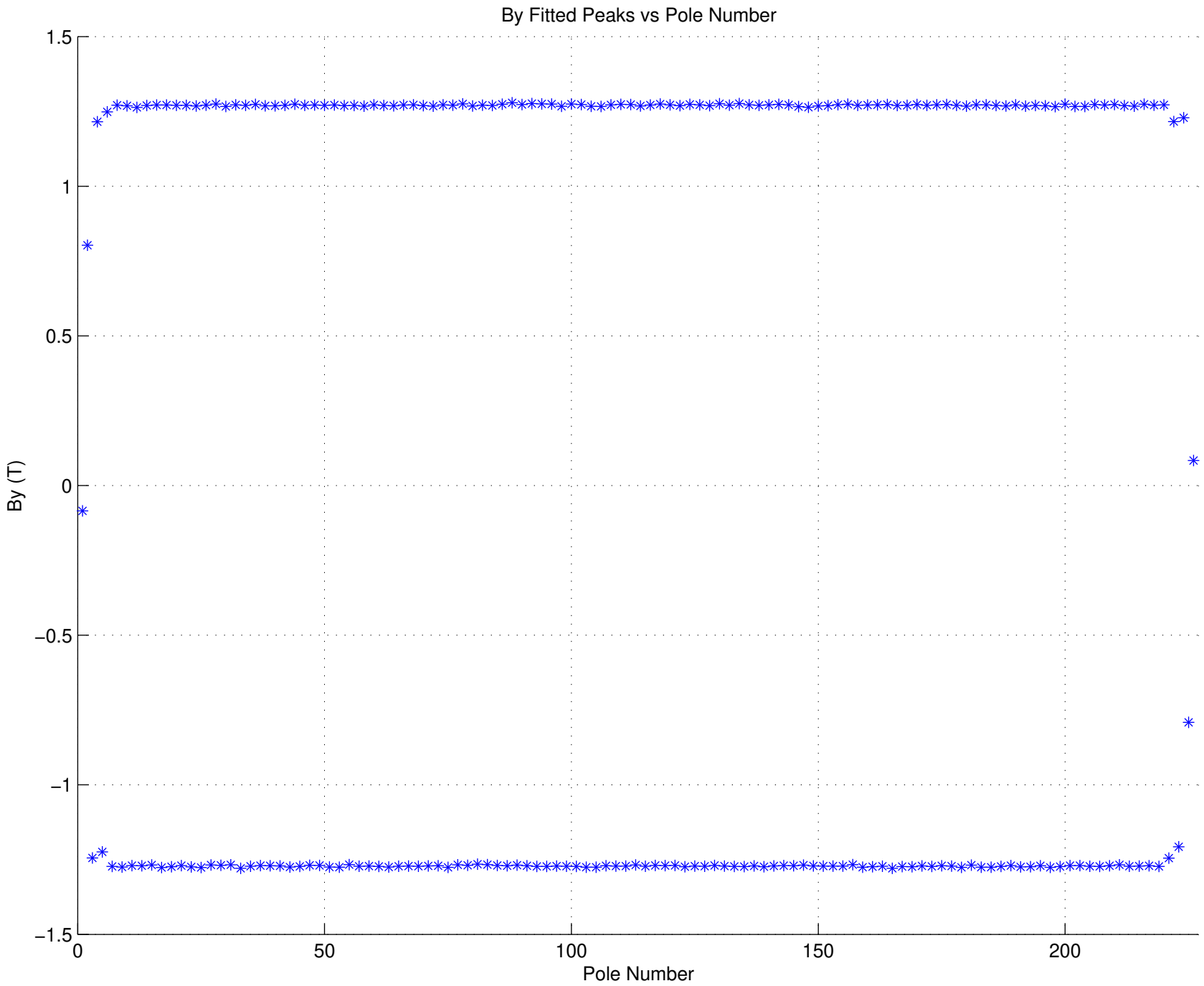

Bx Field Correction vs Z
x 10^-6
Bx Corr (T)
5
5
5
5
5
5
5
0.5
1
1.5
2
2.5
3
3.5
4
4.5
5

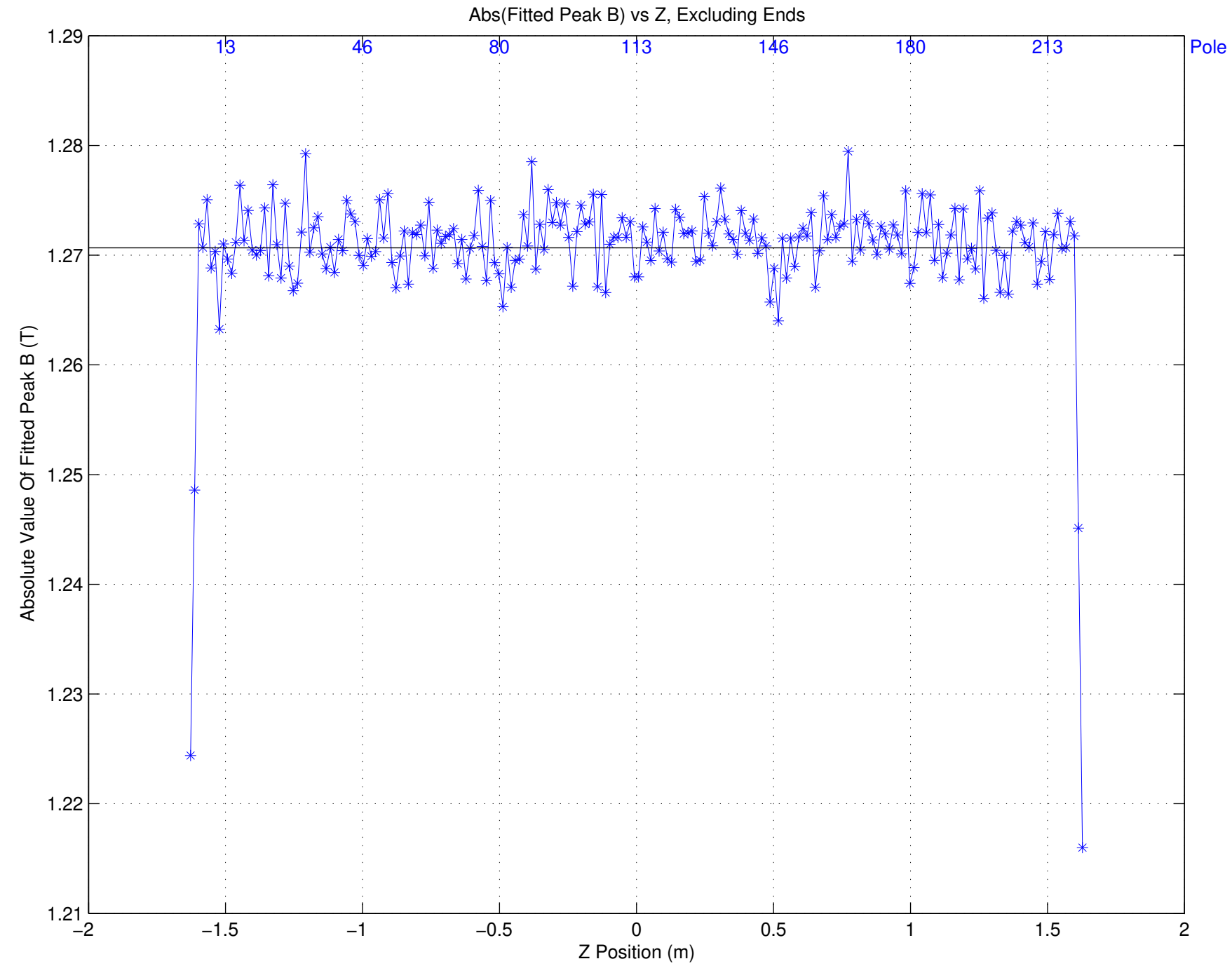

By Field Correction vs Z
x 10^-5
By Corr (T)
−1
−1
−1
−1
−1
−1
−1
0.5
1
1.5
2
2.5
3
3.5
4
4.5
5
Z Position (m)


Bx vs Z
x 10^-3
13
46
80
113
146
180
213
Pole
Bx (T)
Z Position (m)
3
2
1
0
−1
−2
−3
−4
−2.5
−2
−1.5
−1
−0.5
0
0.5
1
1.5
2
2.5

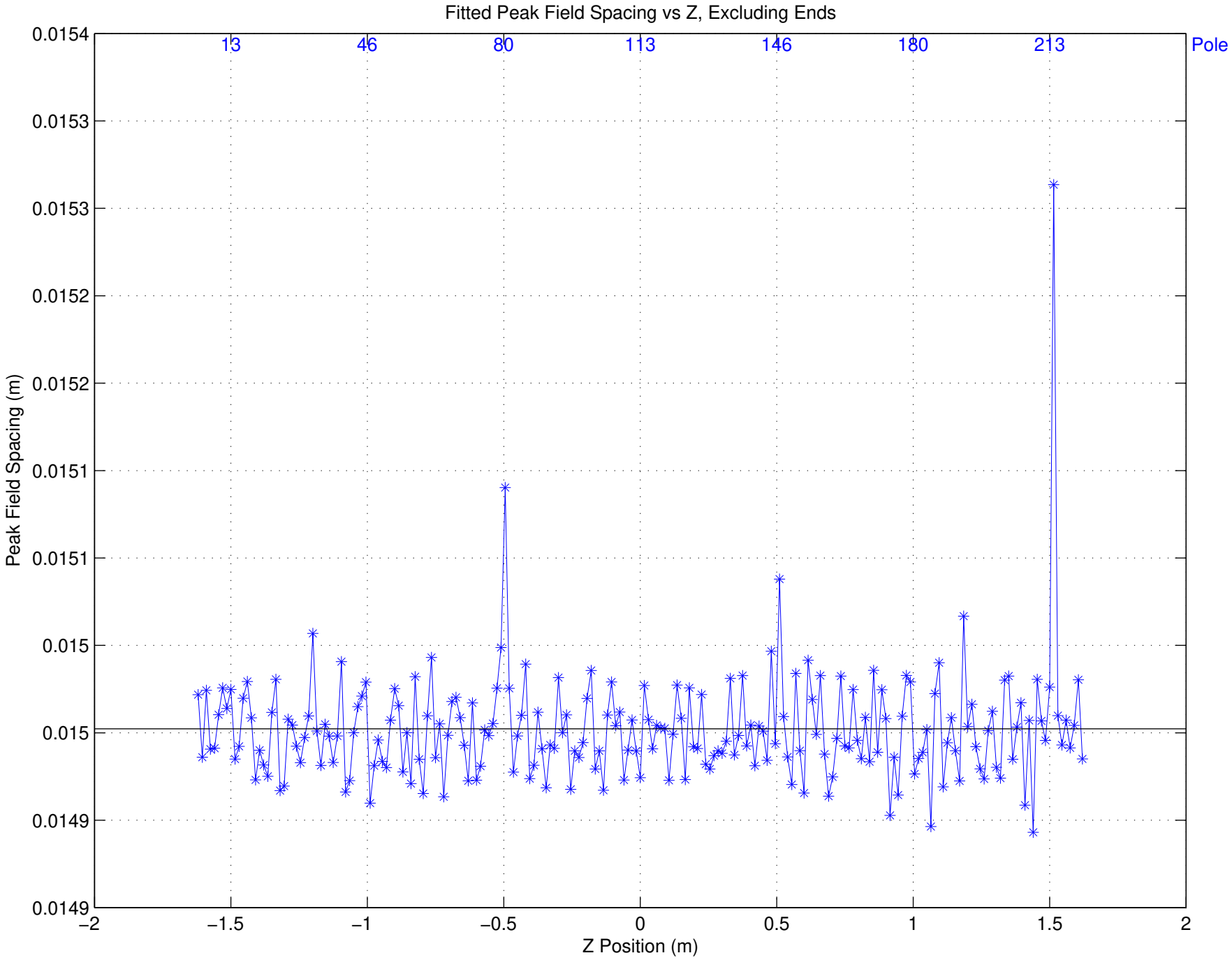

By vs Z
13
46
80
113
146
180
213
Pole
1.5
1
0.5
0
−0.5
−1
−1.5
By (T)
−2.5
−2
−1.5
−1
−0.5
0
0.5
1
1.5
2
2.5
Z Position (m)


By vs Z With Fitted Peaks And Zeros
13
46
80
113
146
180
213
Pole
1.5
1
0.5
0
−0.5
−1
−1.5
By (T)
−2.5
−2
−1.5
−1
−0.5
0
0.5
1
1.5
2
2.5
Z Position (m)

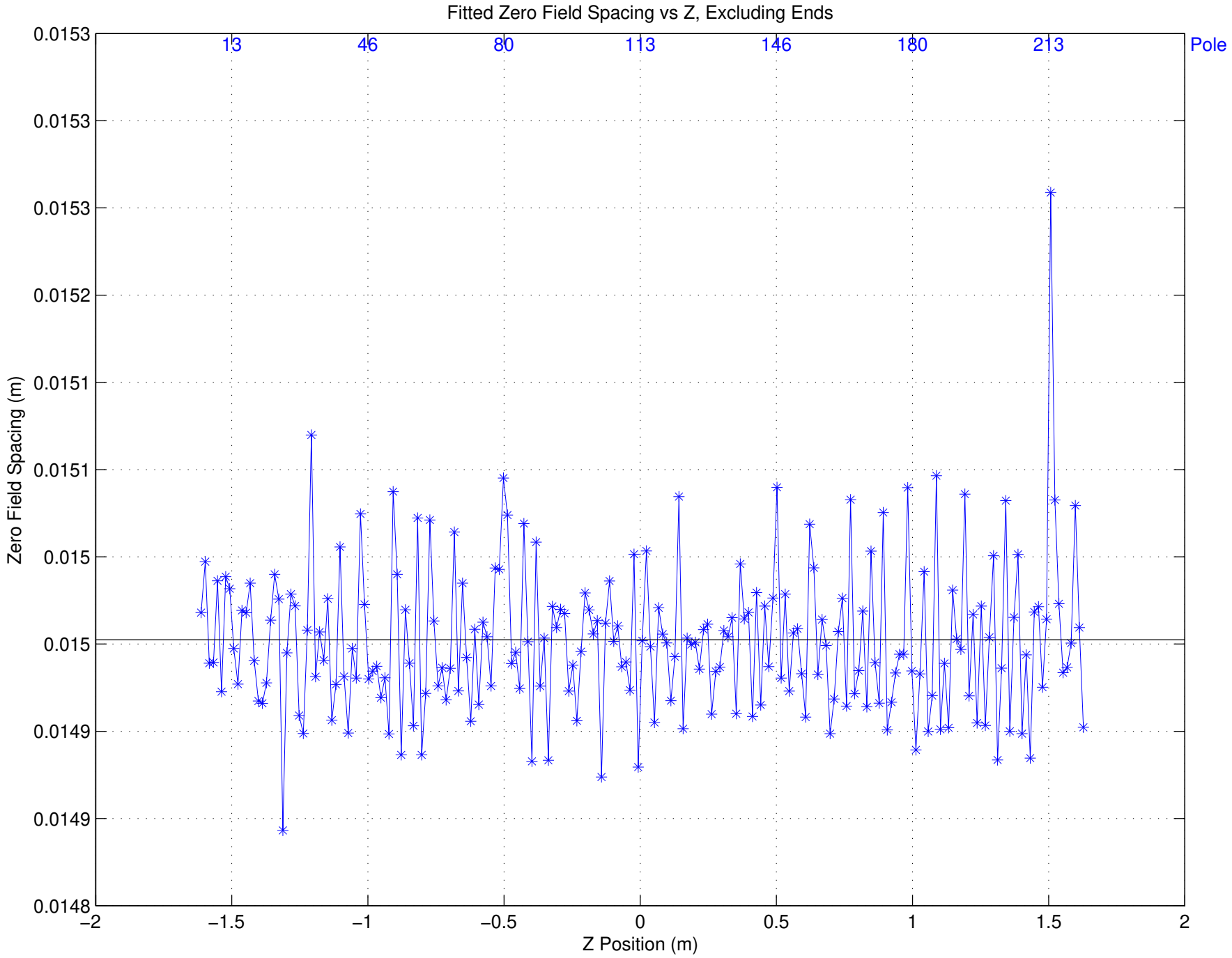

By Fitted Peaks vs Pole Number
By (T)
Pole Number
1.5
1
0.5
0
−0.5
−1
−1.5
0
50
100
150
200



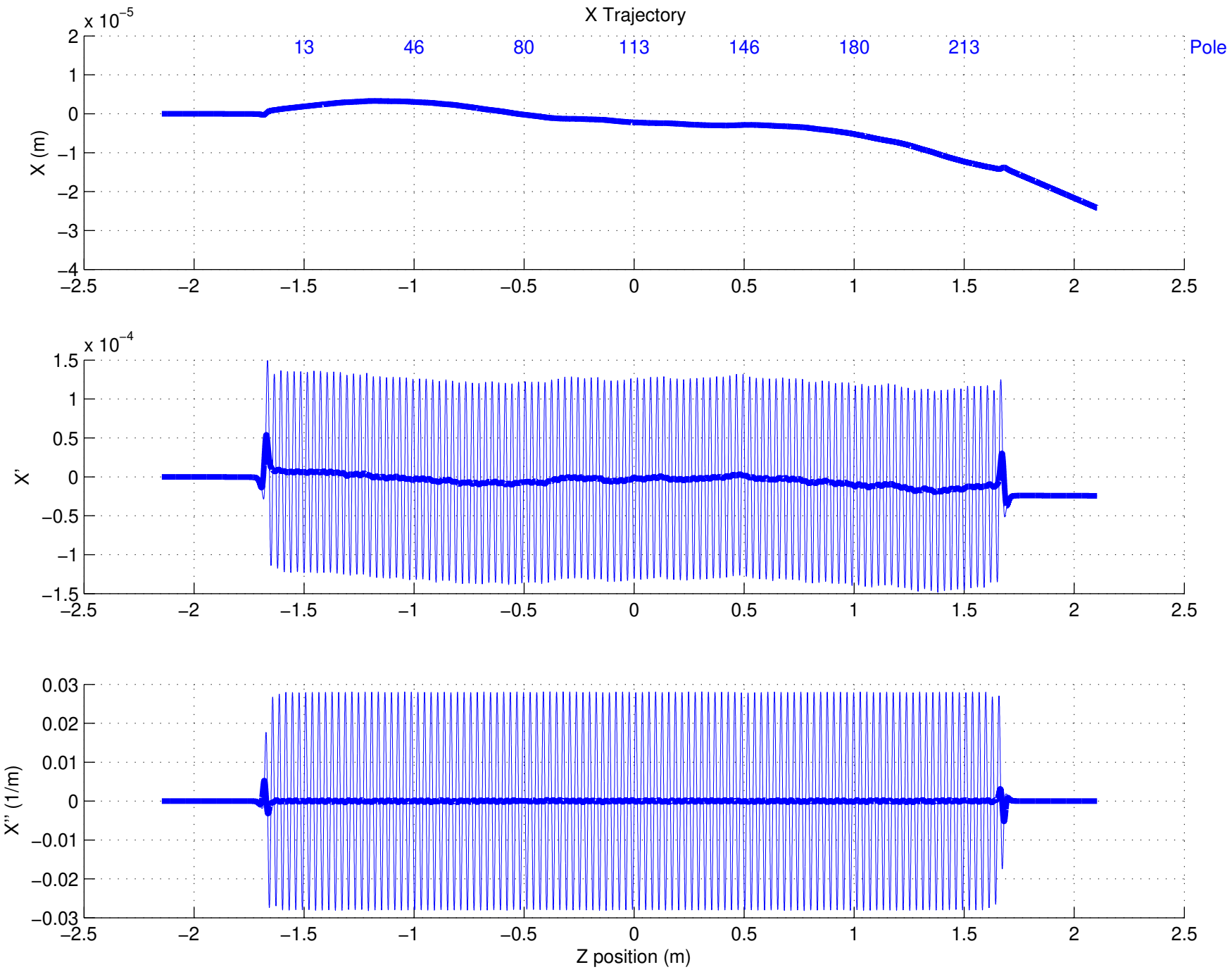
Peak Fields: Ave = 1.270663 T, RMS = 0.006028 T

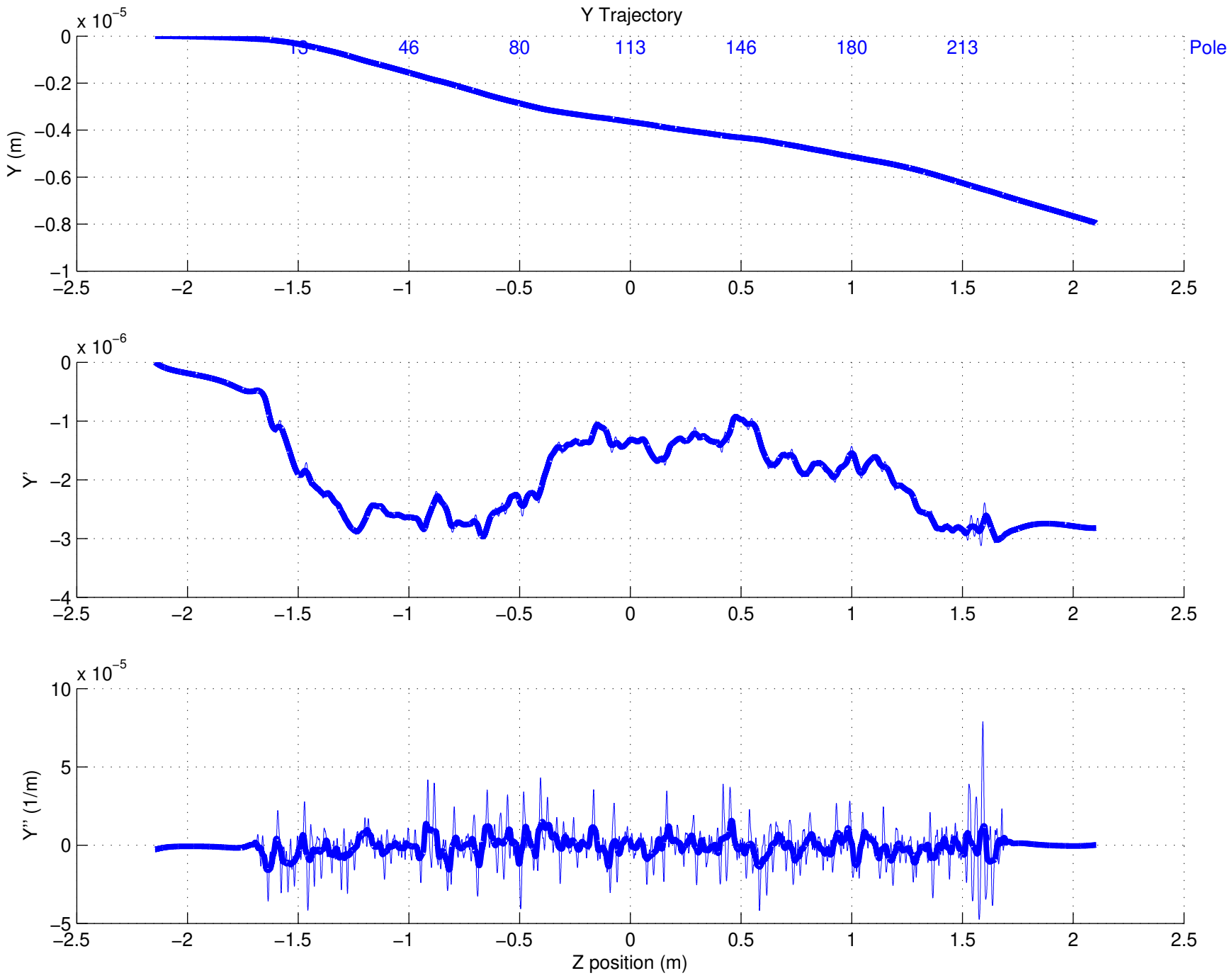


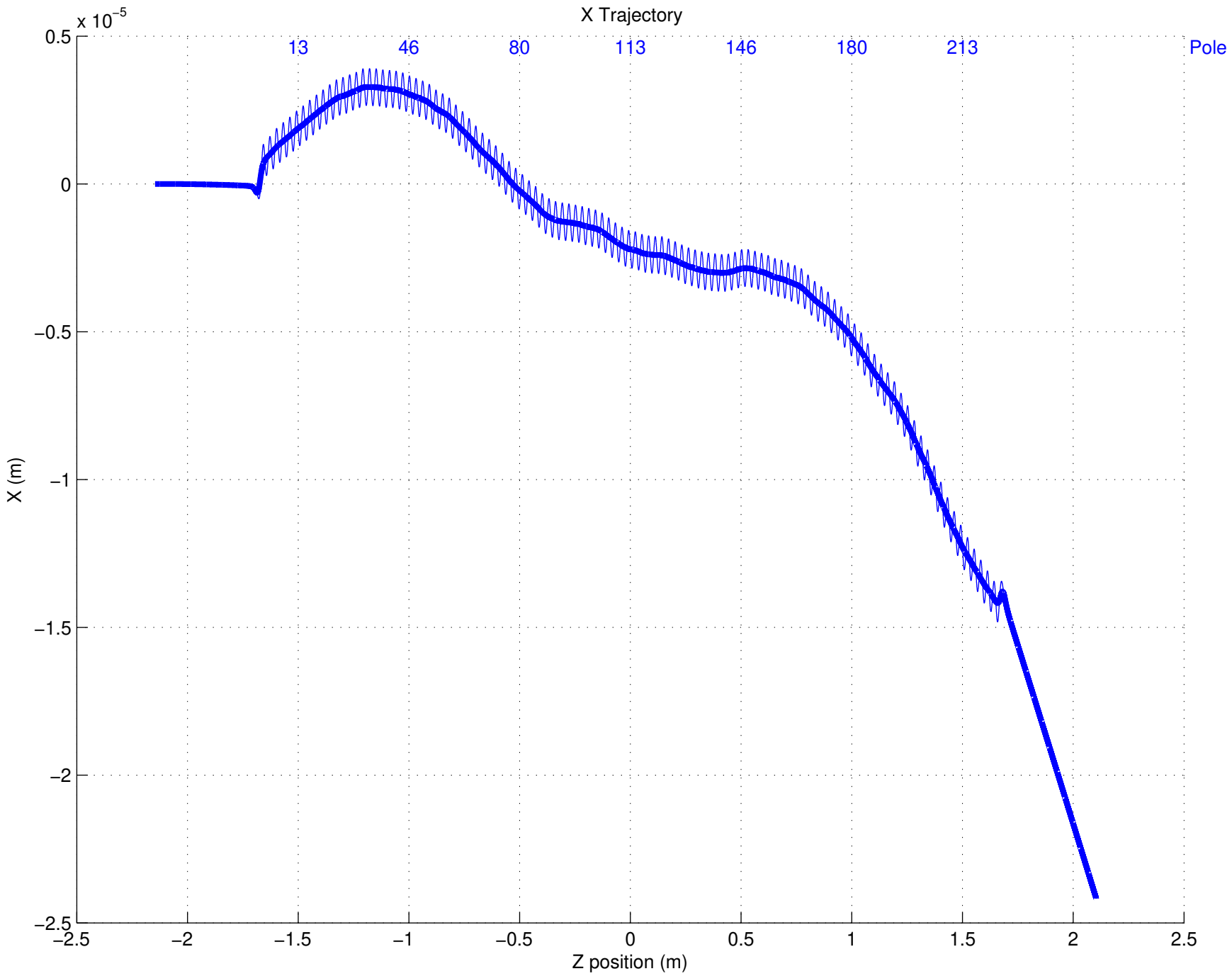
Peak Field Spacing: Ave = 0.015002 m, RMS = 0.000033 m

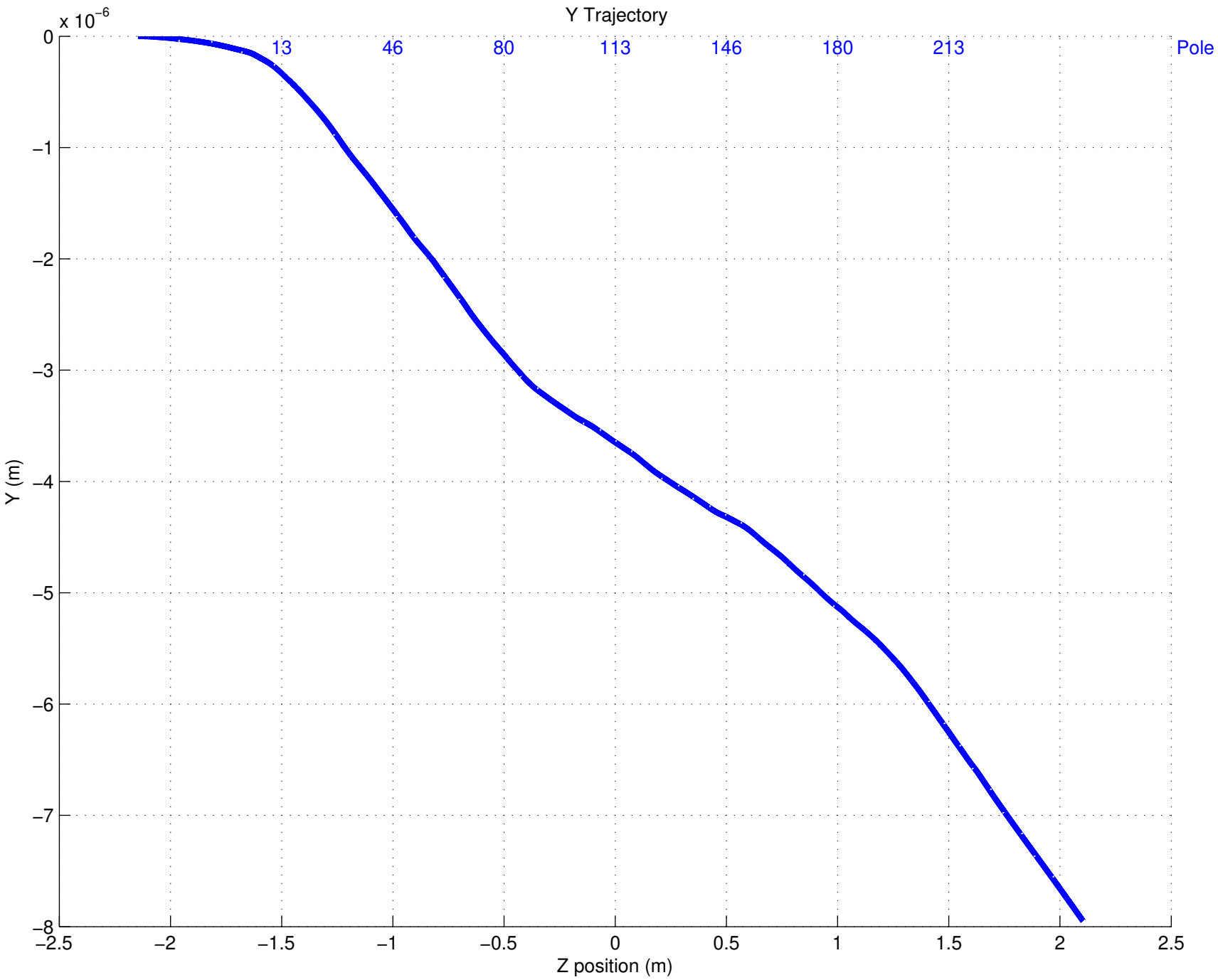


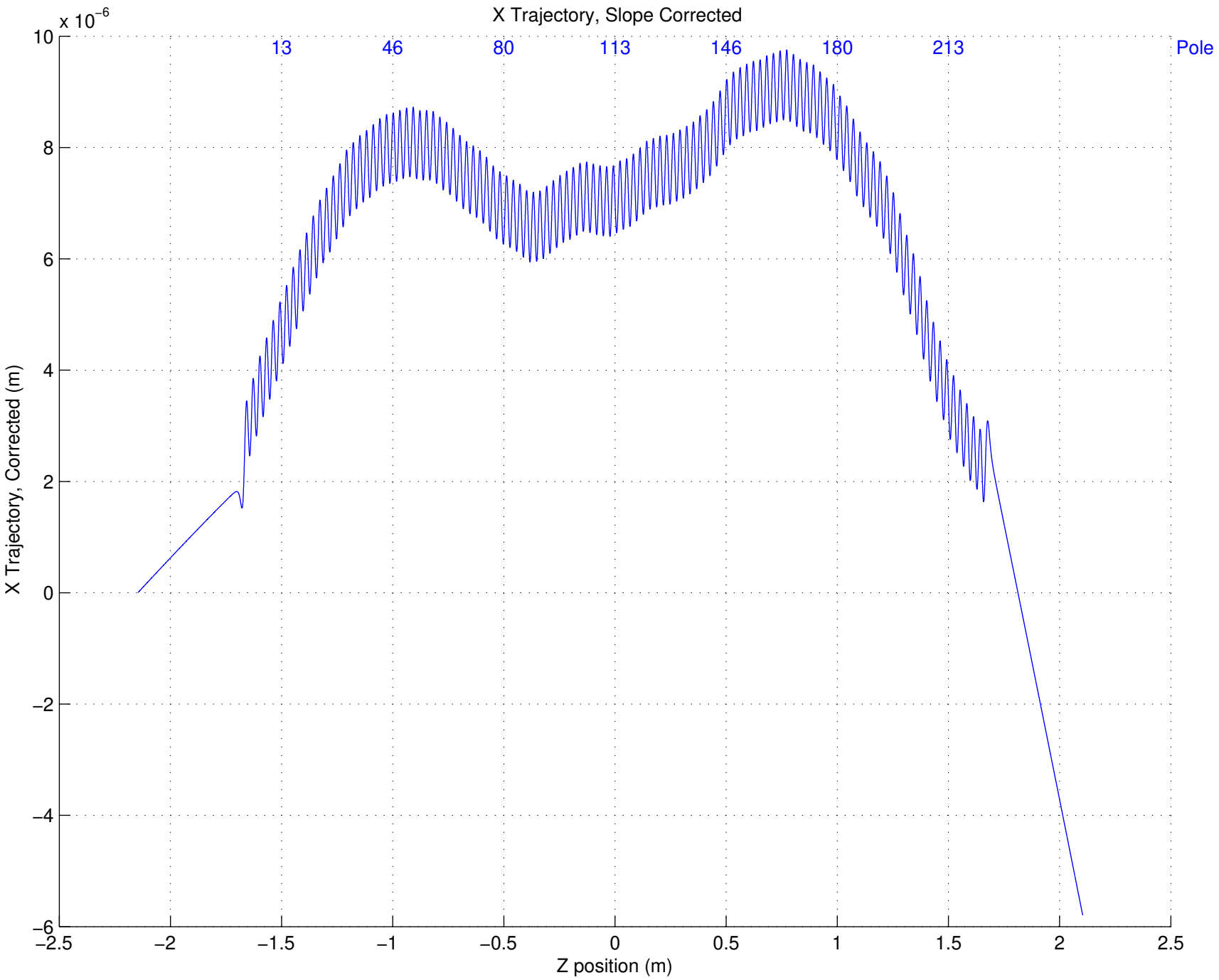
Zero Field Spacing: Ave = 0.015002 m, RMS = 0.000043 m

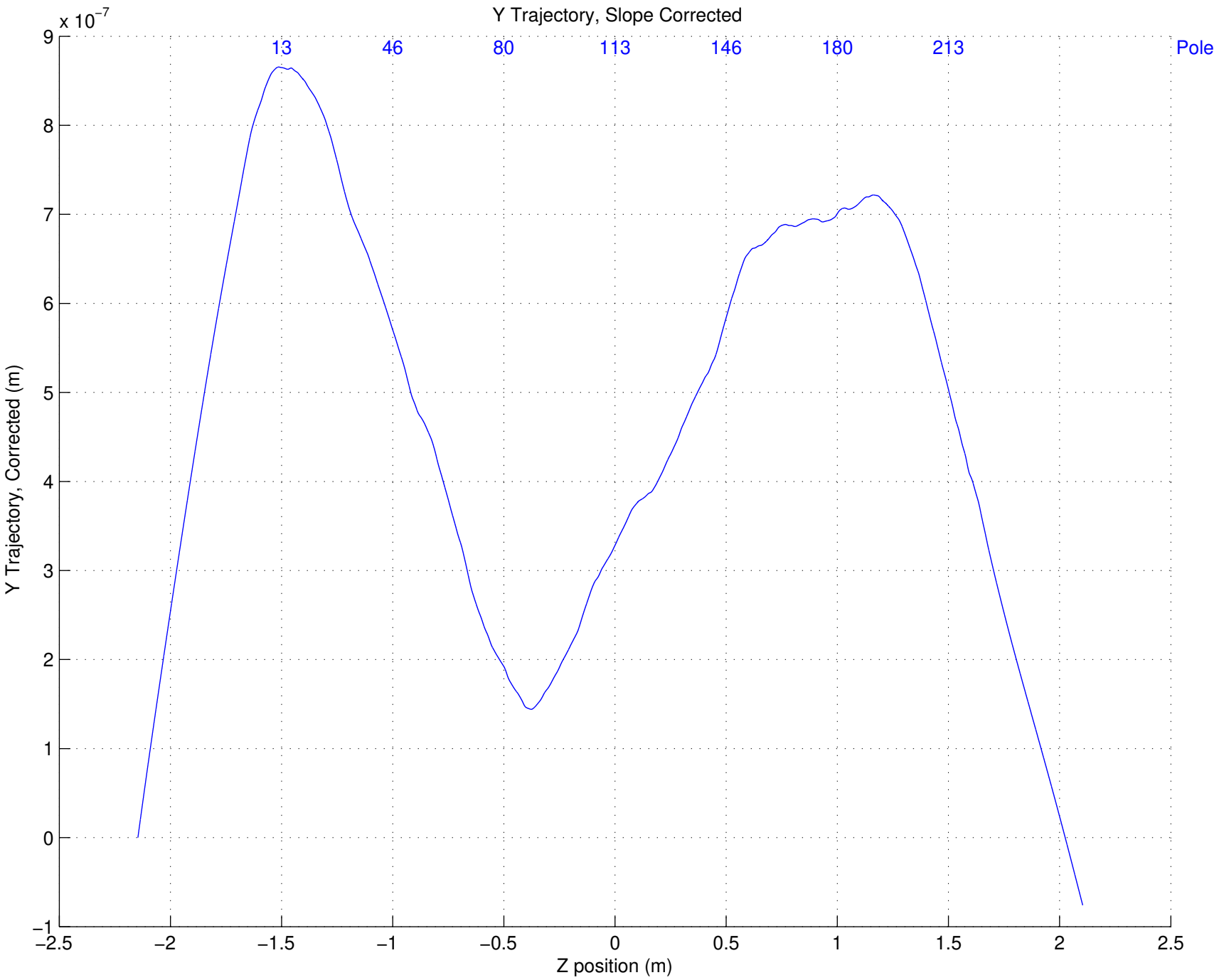

X Trajectory
x 10^-5
13
46
80
113
146
180
213
Pole
X (m)
x 10^-4
X'
X'' (1/m)
Z position (m)

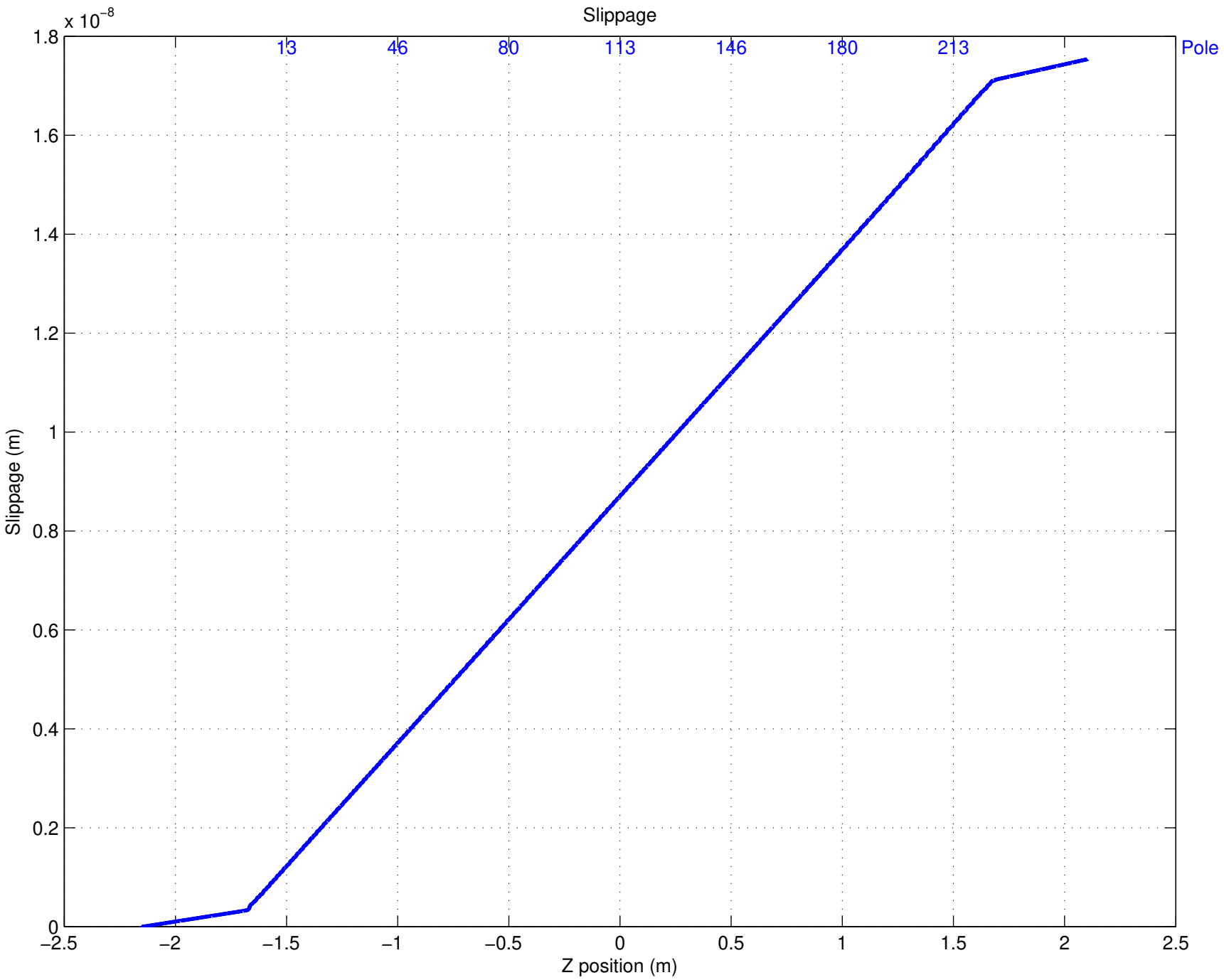

Y Trajectory
x 10^-5
Y (m)
0
−0.2
−0.4
−0.6
−0.8
−1
13
46
80
113
146
180
213
Pole
−2.5
−2
−1.5
−1
−0.5
0
0.5
1
1.5
2
2.5
x 10^-6
Y'
−1
−2
−3
−4
x 10^-5
Y'' (1/m)
10
5
0
−5
Z position (m)

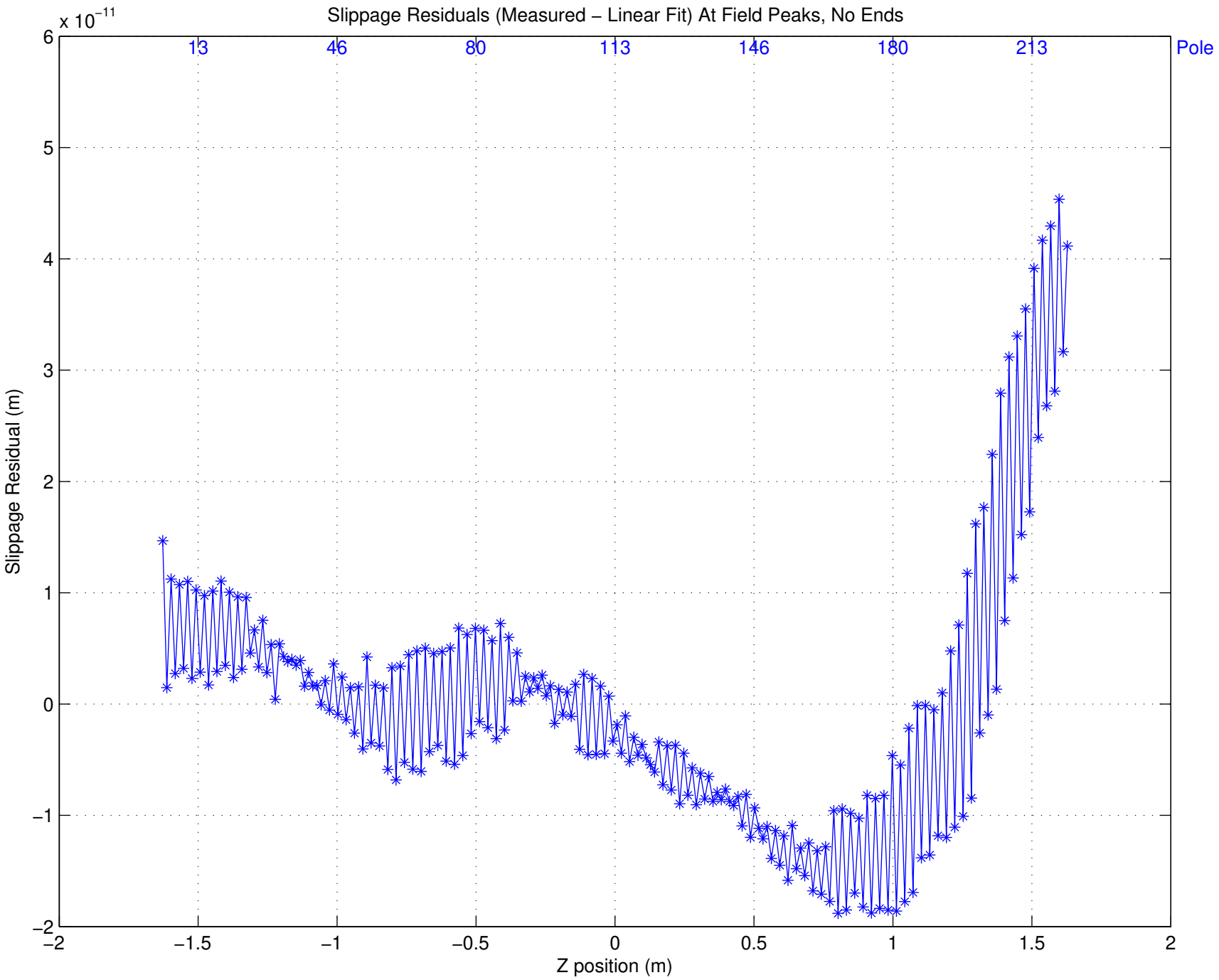

X Trajectory
x 10^-5
13
46
80
113
146
180
213
Pole
0.5
0
−0.5
−1
−1.5
−2
−2.5
X (m)
−2.5
−2
−1.5
−1
−0.5
0
0.5
1
1.5
2
2.5
Z position (m)

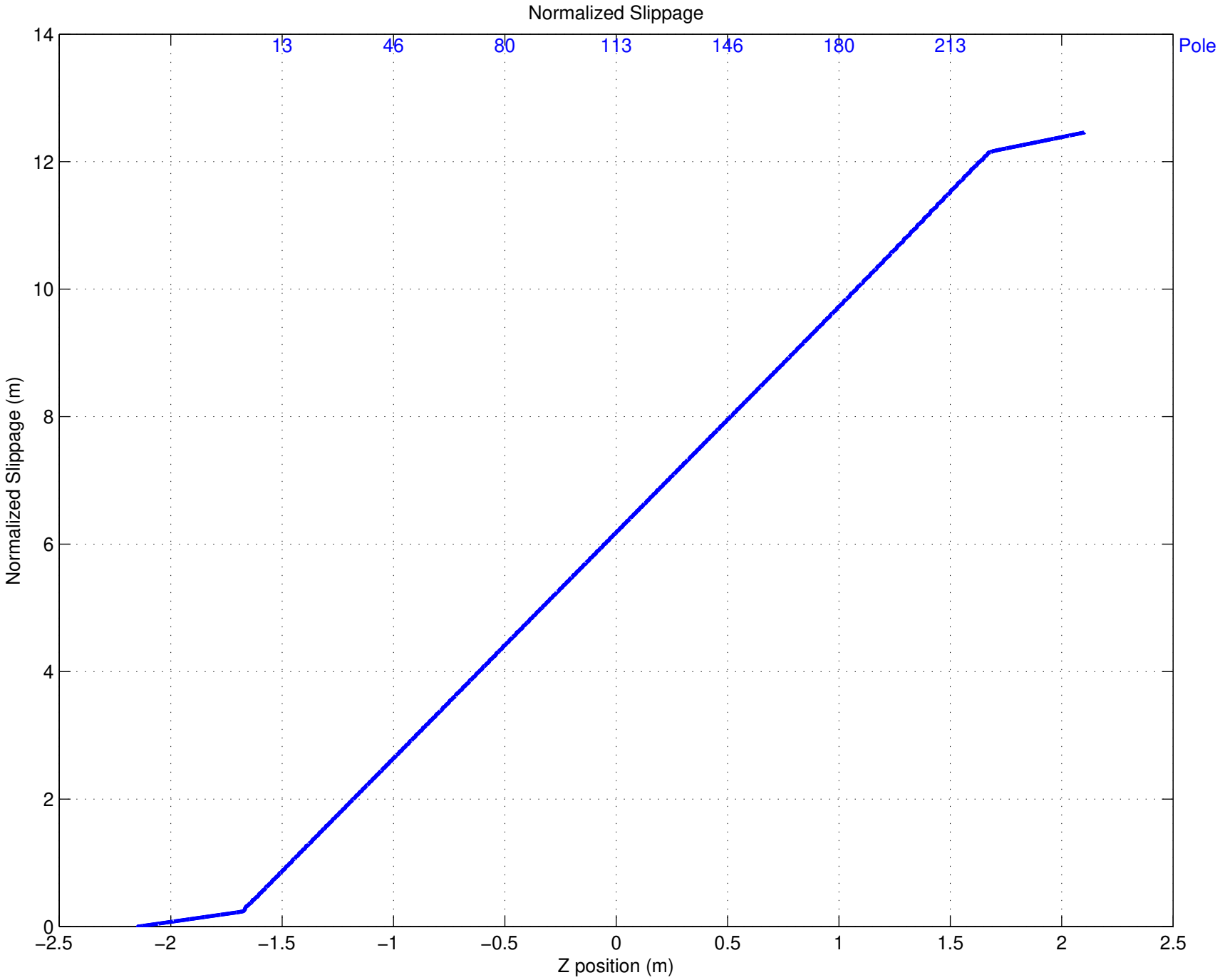

Y Trajectory
x 10^-6
0
−1
−2
−3
−4
−5
−6
−7
−8
Y (m)
13
46
80
113
146
180
213
Pole
−2.5
−2
−1.5
−1
−0.5
0
0.5
1
1.5
2
2.5
Z position (m)

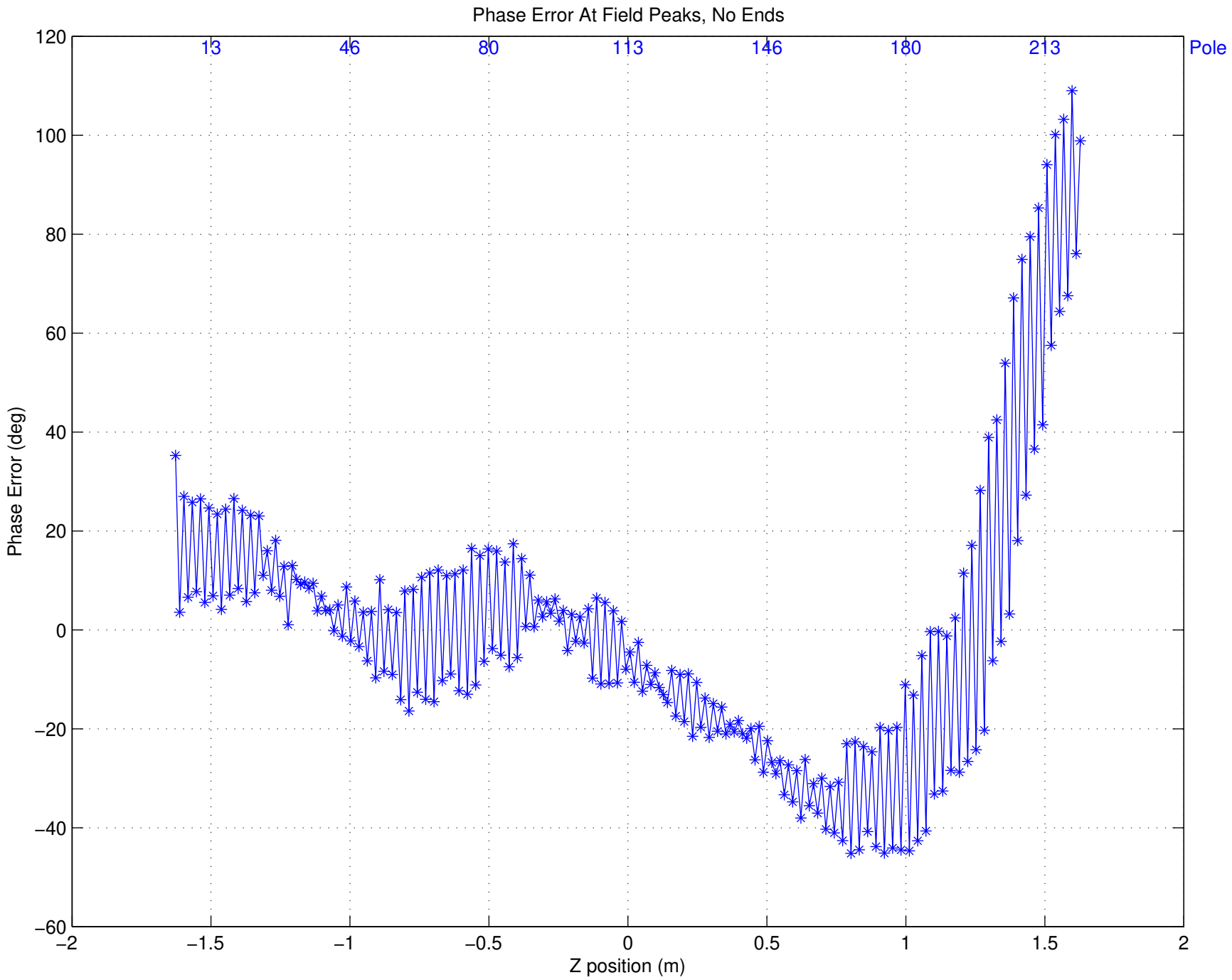

X Trajectory, Slope Corrected
x 10^-6
13
46
80
113
146
180
213
Pole
X Trajectory, Corrected (m)
Z position (m)
10
8
6
4
2
0
−2
−4
−6
−2.5
−2
−1.5
−1
−0.5
0
0.5
1
1.5
2
2.5


Y Trajectory, Slope Corrected
x 10^-7
13
46
80
113
146
180
213
Pole
Y Trajectory, Corrected (m)
Z position (m)
9
8
7
6
5
4
3
2
1
0
−1
−2.5
−2
−1.5
−1
−0.5
0
0.5
1
1.5
2
2.5

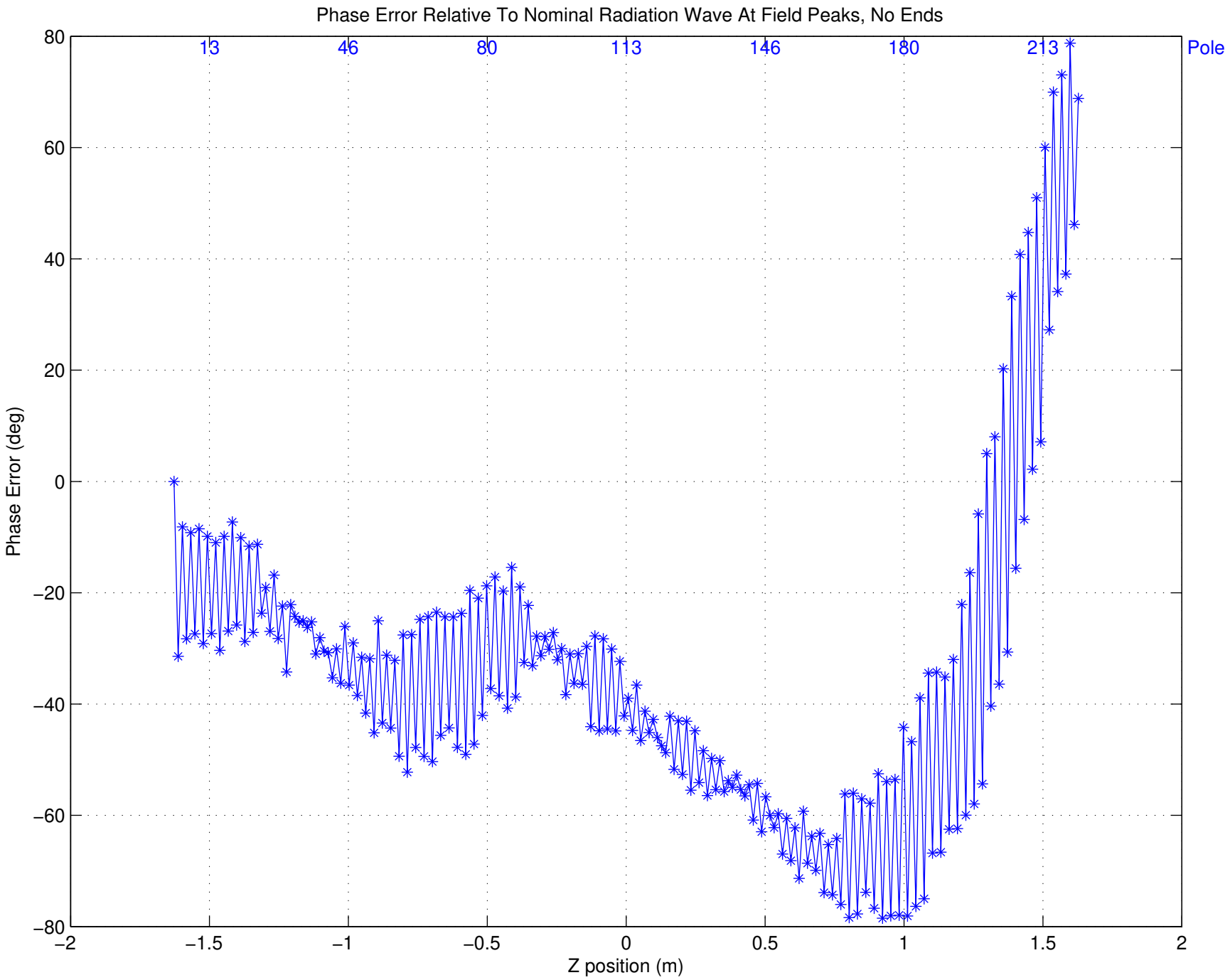

Slippage
x 10^-8
13
46
80
113
146
180
213
Pole
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
Slippage (m)
−2.5
−2
−1.5
−1
−0.5
0
0.5
1
1.5
2
2.5
Z position (m)


Slippage Residuals (Measured – Linear Fit) At Field Peaks, No Ends
x 10^-11
Slippage Residual (m)
Z position (m)
Pole
13
46
80
113
146
180
213
6
5
4
3
2
1
0
−1
−2
−2
−1.5
−1
−0.5
0
0.5
1
1.5
2


Normalized Slippage
13
46
80
113
146
180
213
Pole
14
12
10
8
6
4
2
0
Normalized Slippage (m)
−2.5
−2
−1.5
−1
−0.5
0
0.5
1
1.5
2
2.5
Z position (m)



Phase Error: Ave = −0.000000 deg, RMS = 28.613490 deg


Phase Error Relative To Nominal Radiation Wave At Field Peaks, No Ends
13
46
80
113
146
180
213
Pole
80
60
40
20
0
−20
−40
−60
−80
Phase Error (deg)
−2
−1.5
−1
−0.5
0
0.5
1
1.5
2
Z position (m)