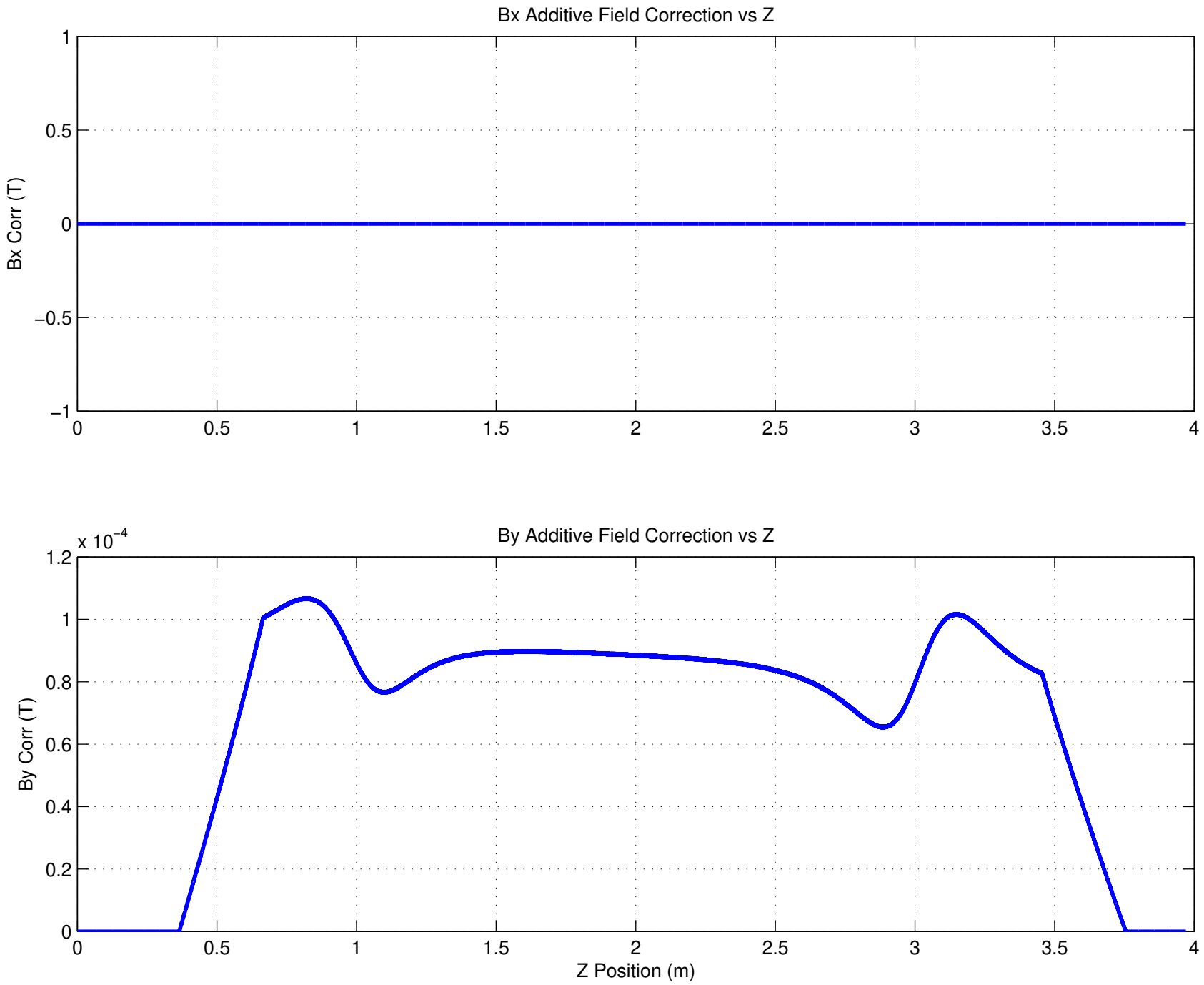
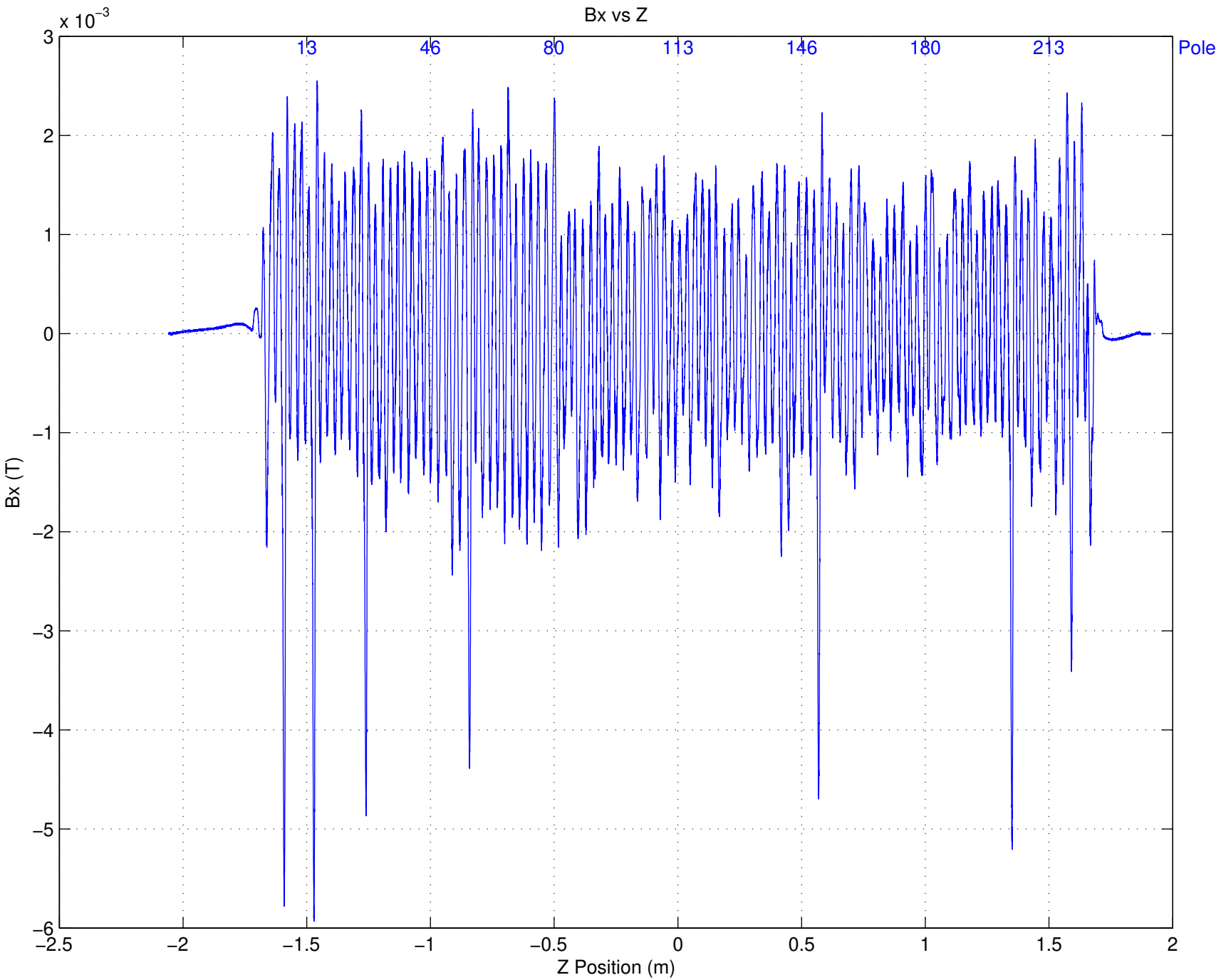
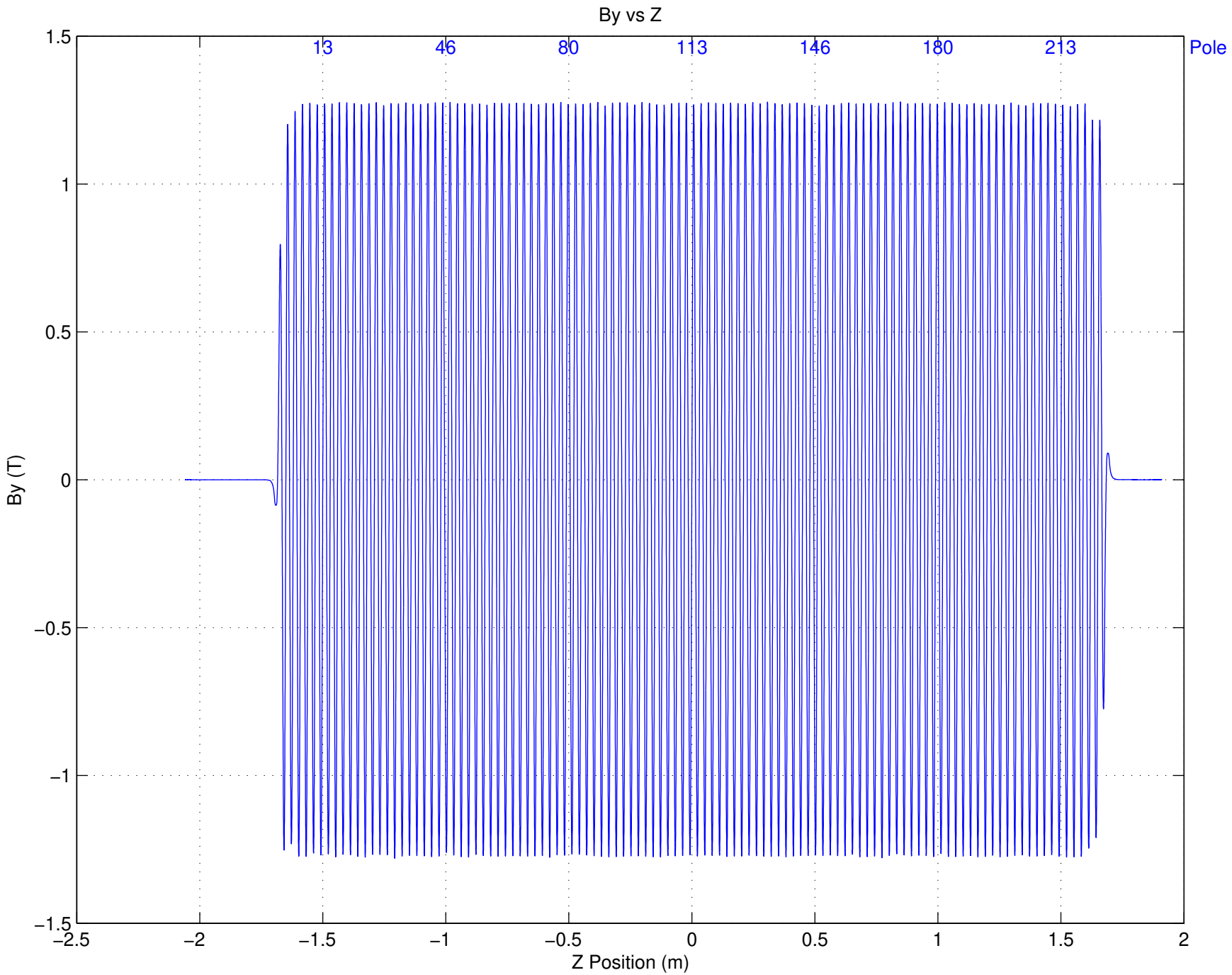
SLAC Magnetic Measurements

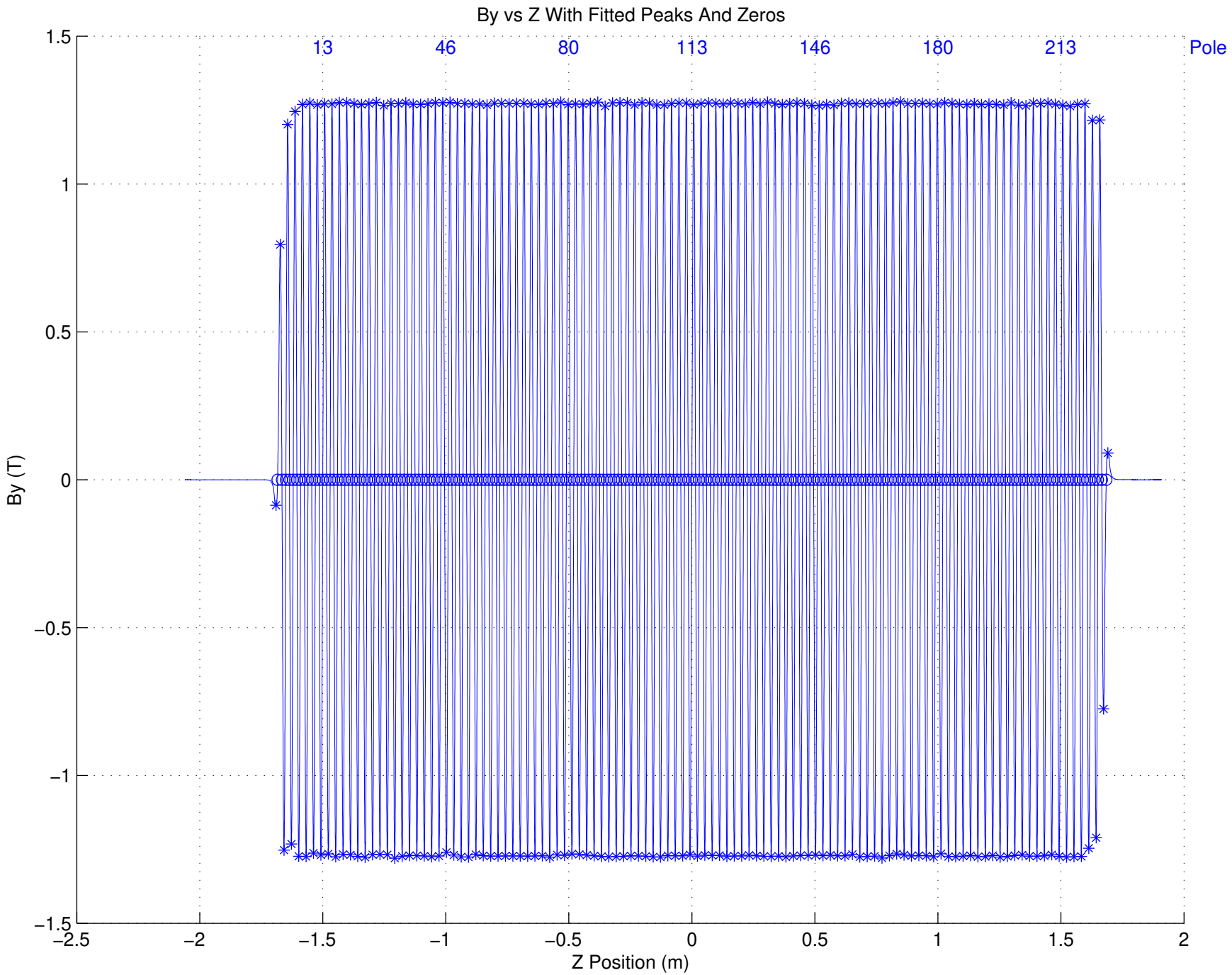
Planar Insertion Device Analysis

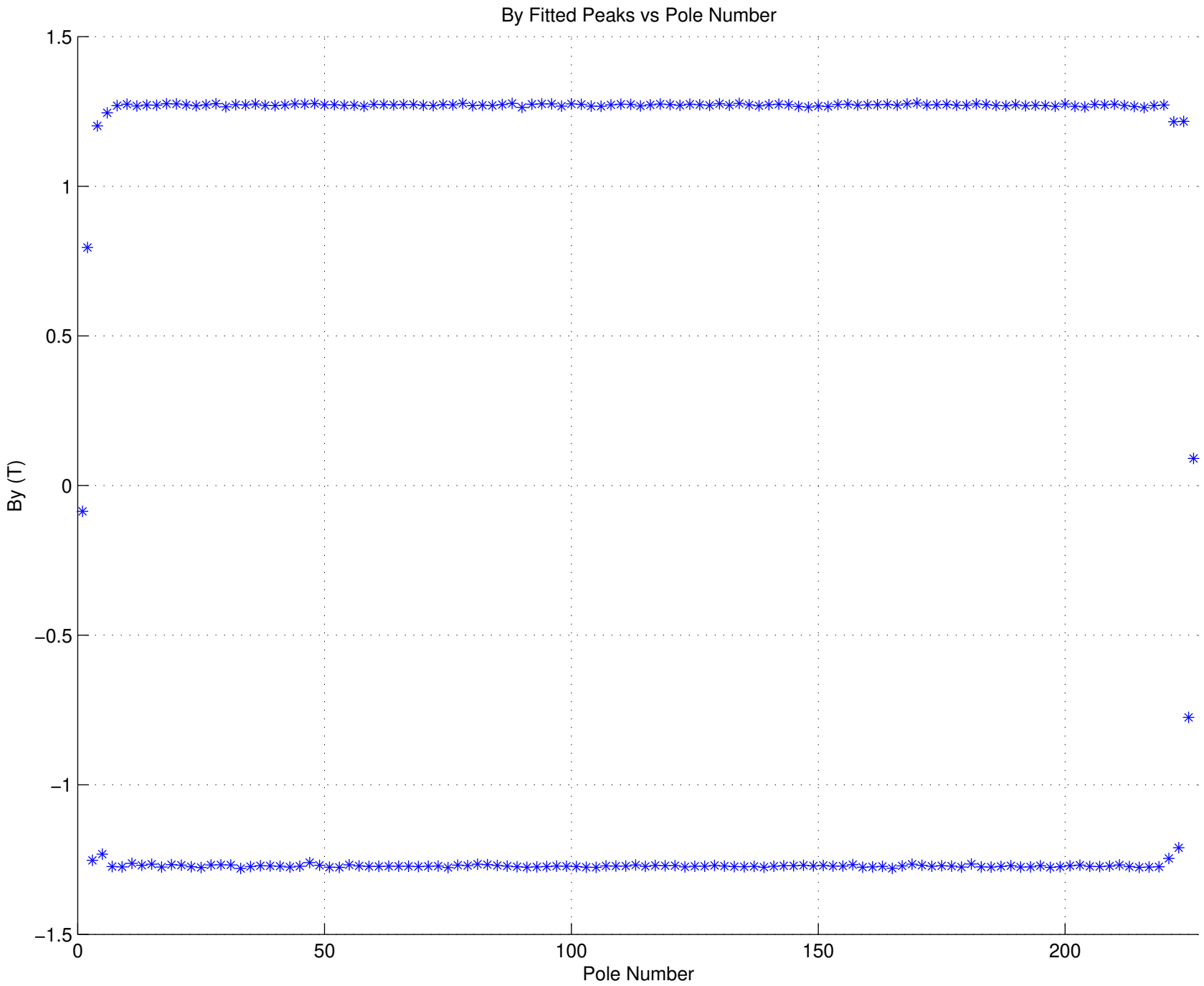
Parameters:
INPUT−FILE−DIR =S:\MagData\LCLS\Undulator\L143−112000−06\DATASET0001\Rough Tuning\Z Scans\Run 150\
INPUT−FILE−NAME =x+00000−y+000−bscanz.dat
INPUT−FILE−TYPE =ZVXYBXYH
CORR−REQUIRED =1
CORR−FILE =S:\Magdata\Earth Field Correction\earth−field−corr.dat
CORR−FILE−TYPE =CORR−ZBXY
GAMMA =26625.06
NOM−LAMBDA−U =0.03
NOM−K−VALUE =3.4862
NOM−LAMBDA−R =1.4975e−010
NUM−POLES =226
NUM−END−POLES =4
CELL−LENGTH =3.656

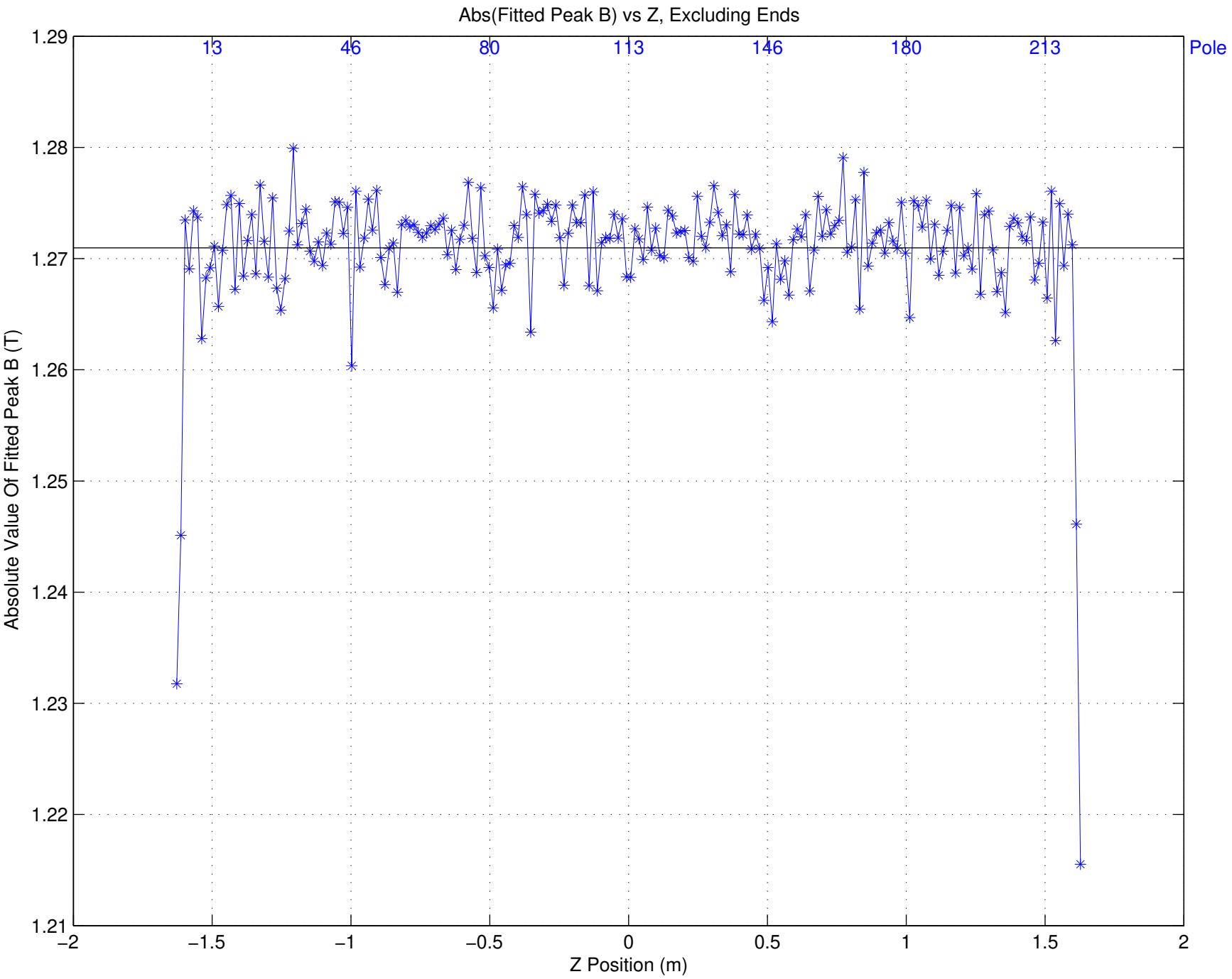

Bx Additive Field Correction vs Z
Bx Corr (T)
1
0.5
0
−0.5
−1
0
0.5
1
1.5
2
2.5
3
3.5
4
By Additive Field Correction vs Z
x 10^−4
By Corr (T)
1.2
1
0.8
0.6
0.4
0.2
0
Z Position (m)


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
−5
−6
−2.5
−2
−1.5
−1
−0.5
0
0.5
1
1.5
2

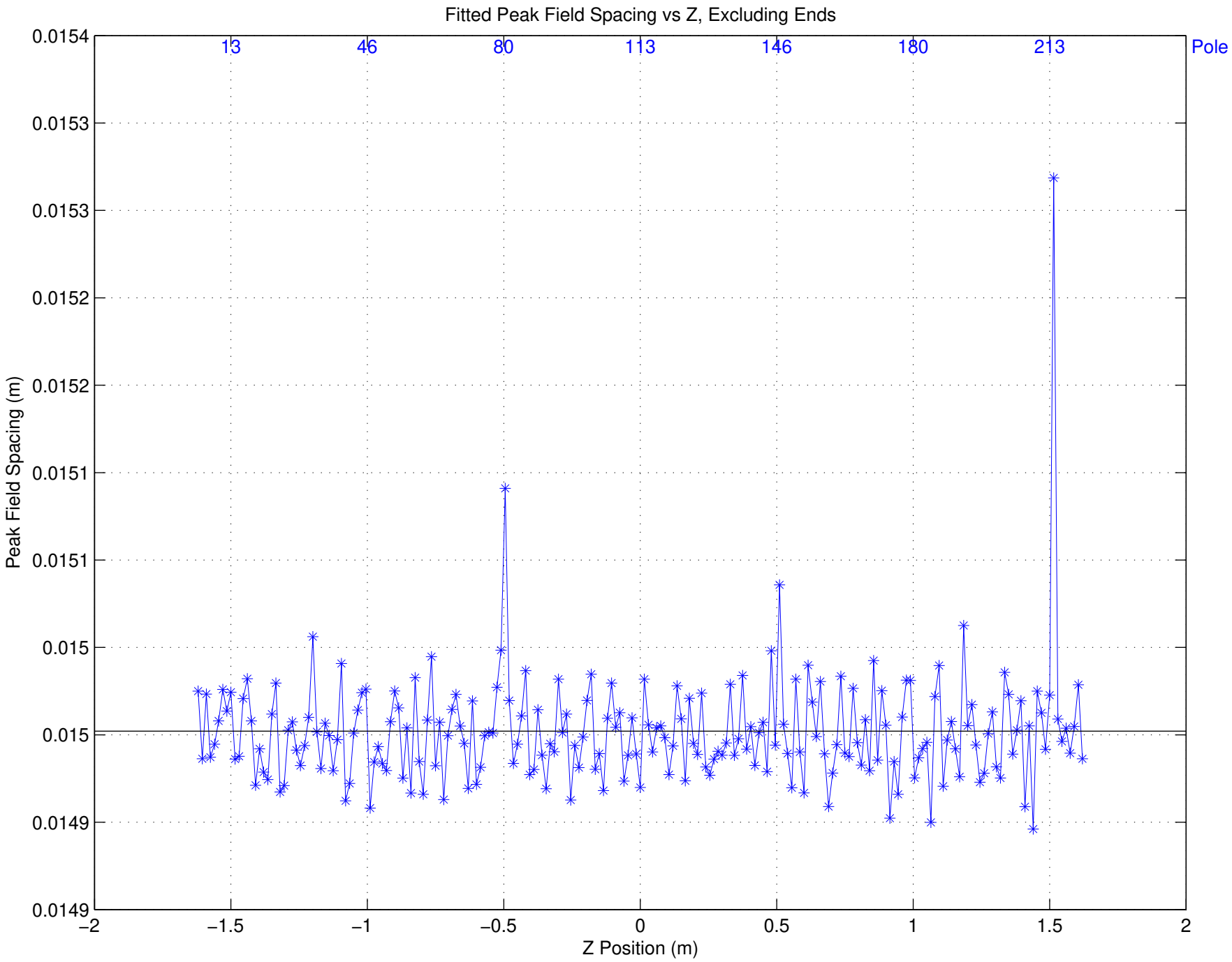

By vs Z
13
46
80
113
146
180
213
Pole
1.5
1
0.5
0
−0.5
−1
−1.5
By (T)
−2.5
−2
−1.5
−1
−0.5
0
0.5
1
1.5
2
Z Position (m)


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
Z Position (m)

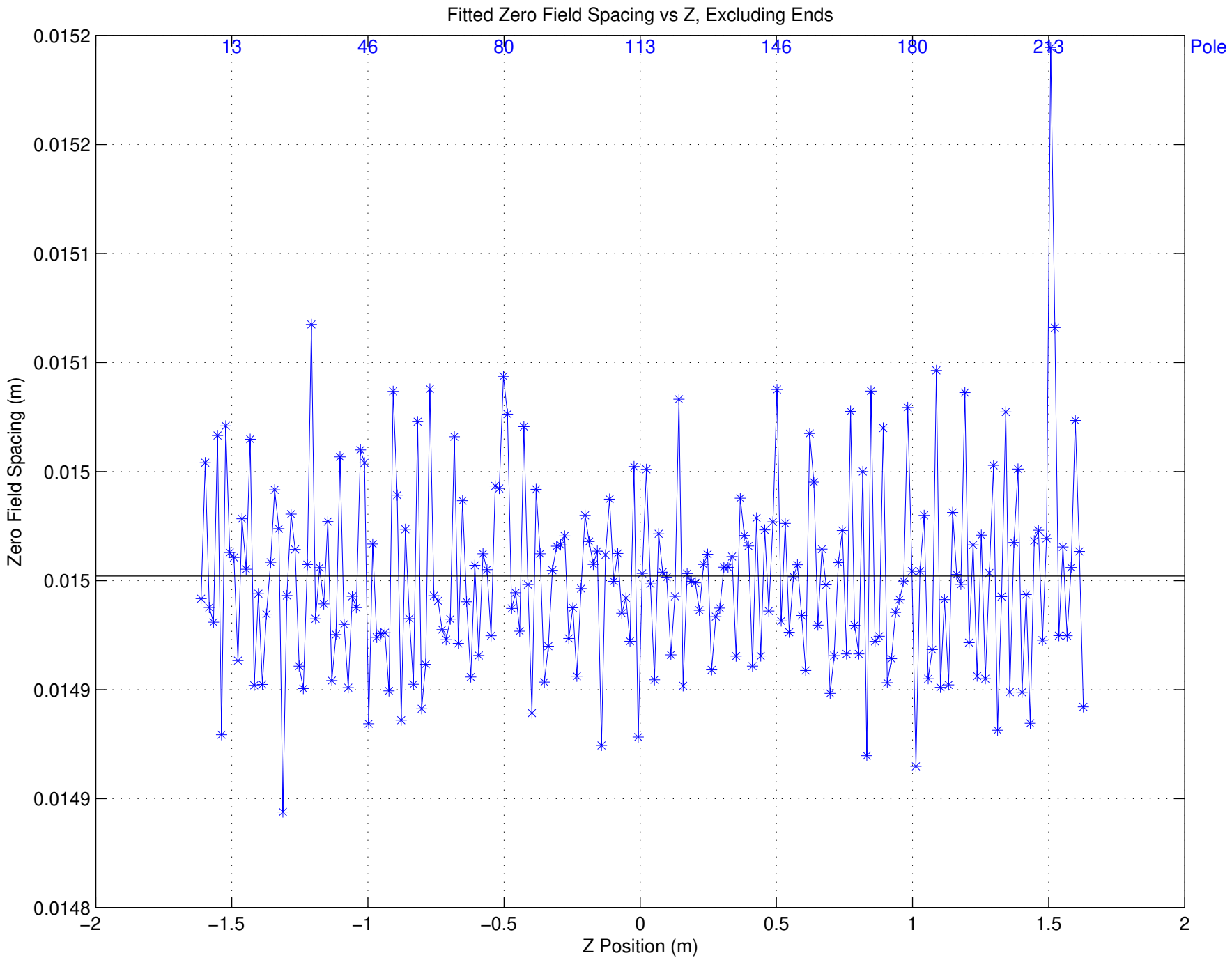

By Fitted Peaks vs Pole Number
By (T)
Pole Number
1.5
1
0.5
0
−0.5
−1
−1.5
0
50
100
150
200



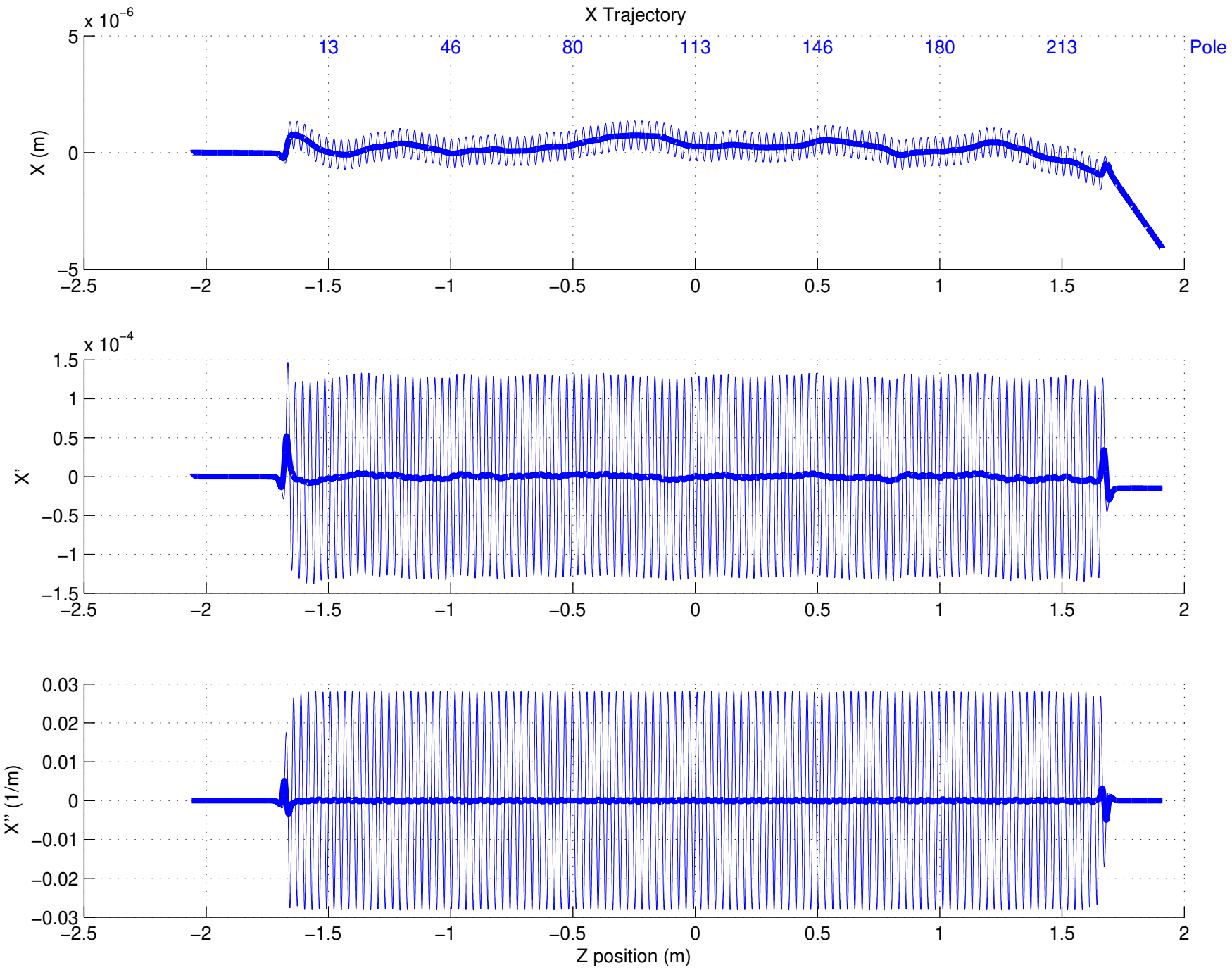
Peak Fields: Ave = 1.270971 T, RMS = 0.006101 T

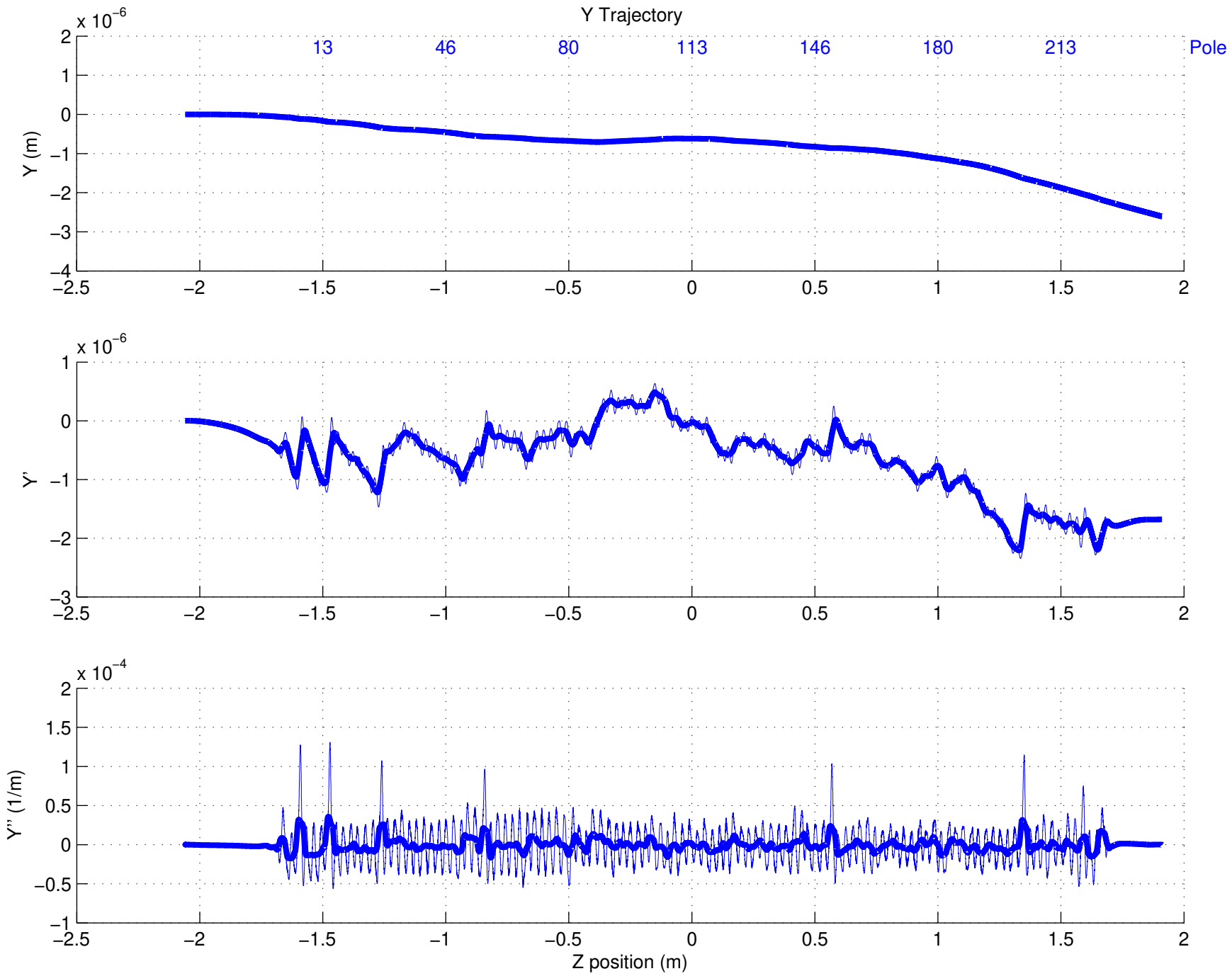


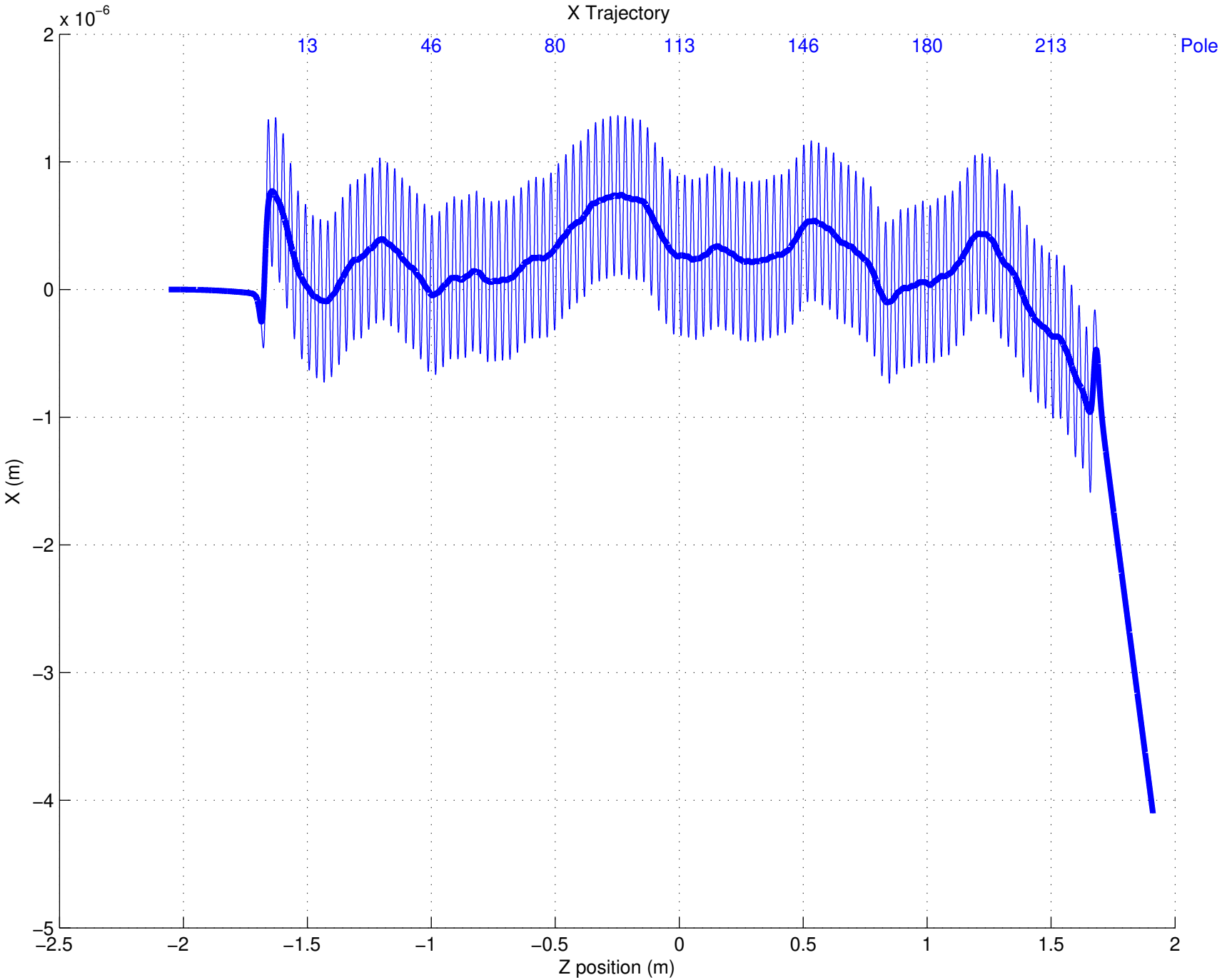
Peak Field Spacing: Ave = 0.015002 m, RMS = 0.000033 m

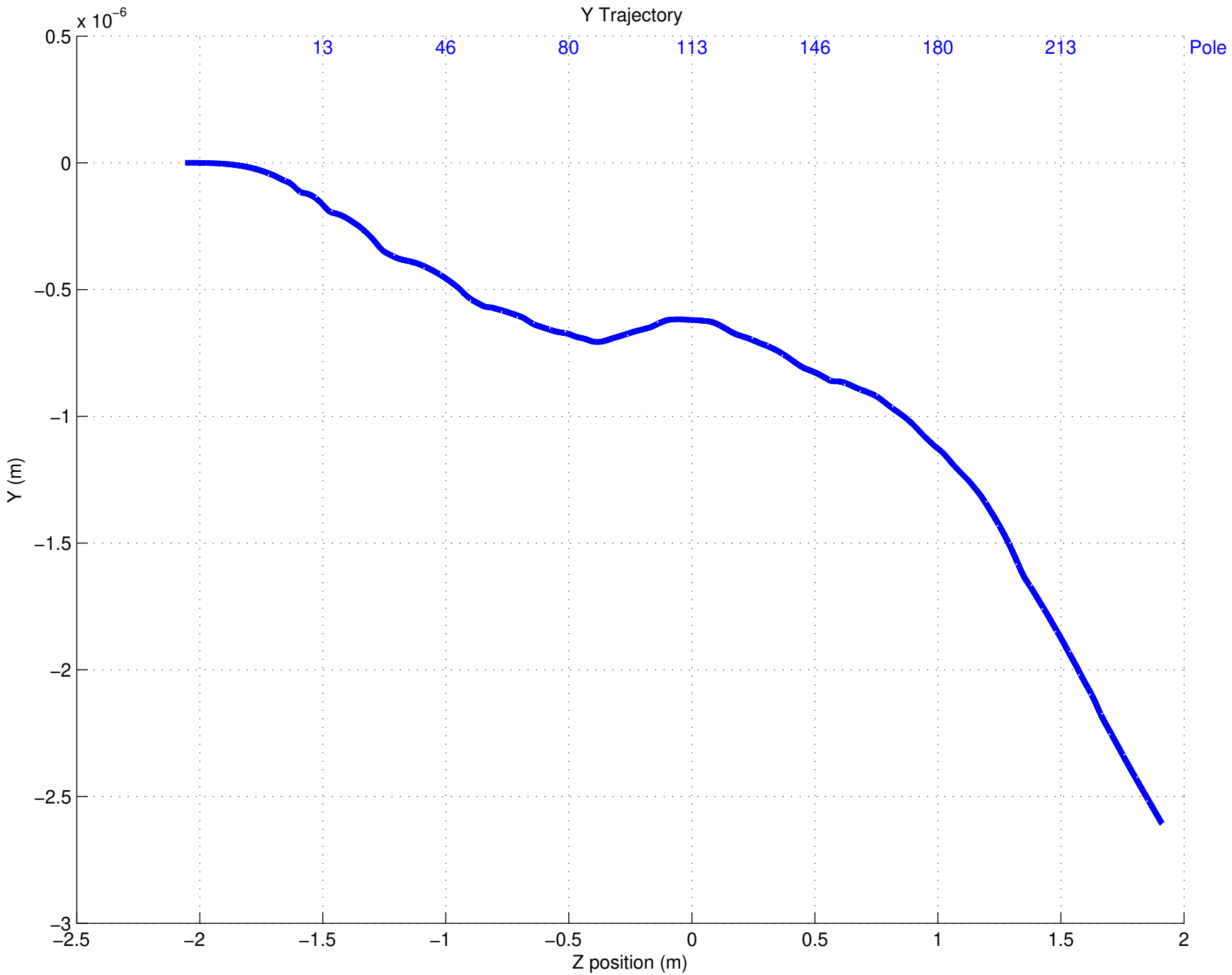


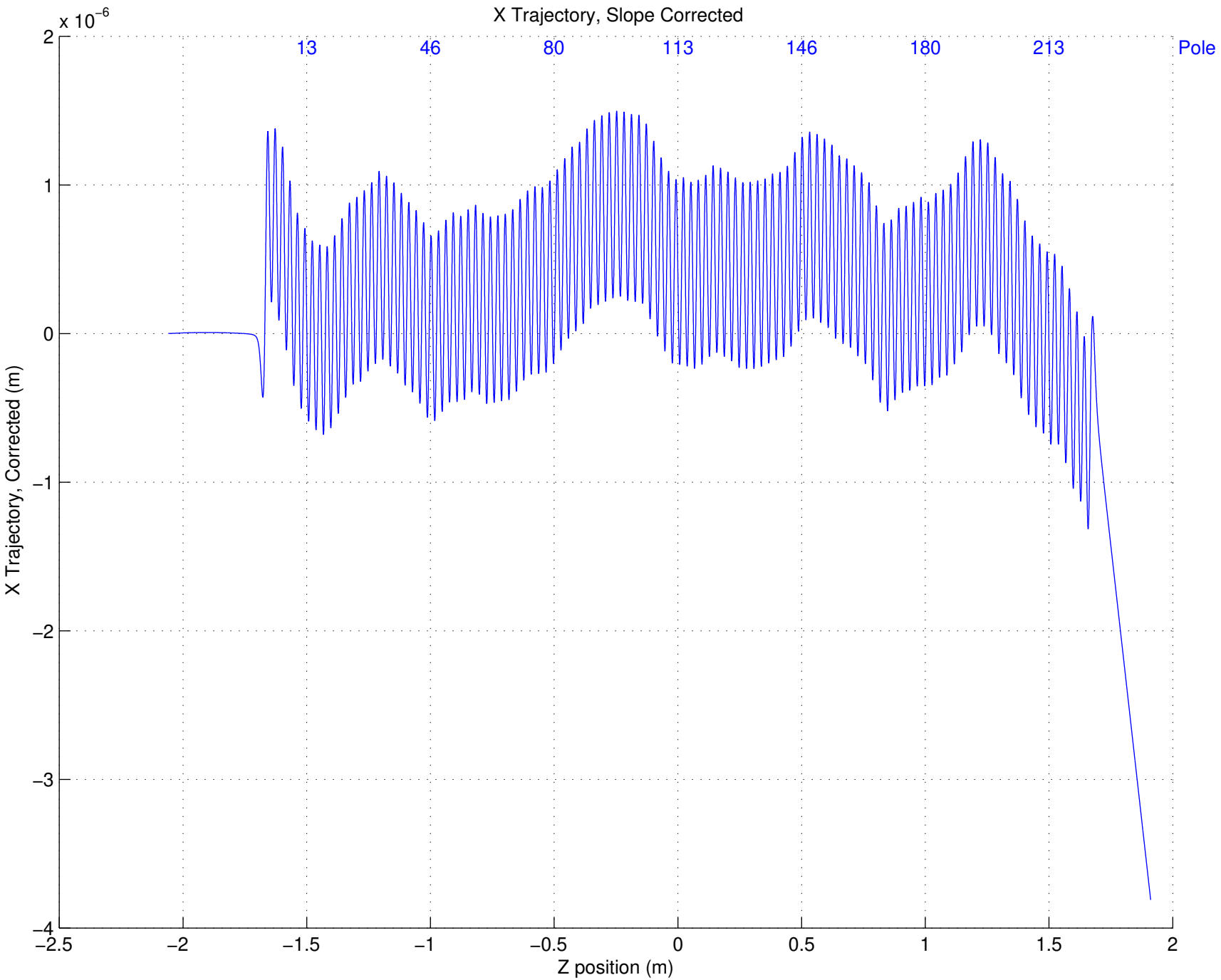
Zero Field Spacing: Ave = 0.015002 m, RMS = 0.000045 m

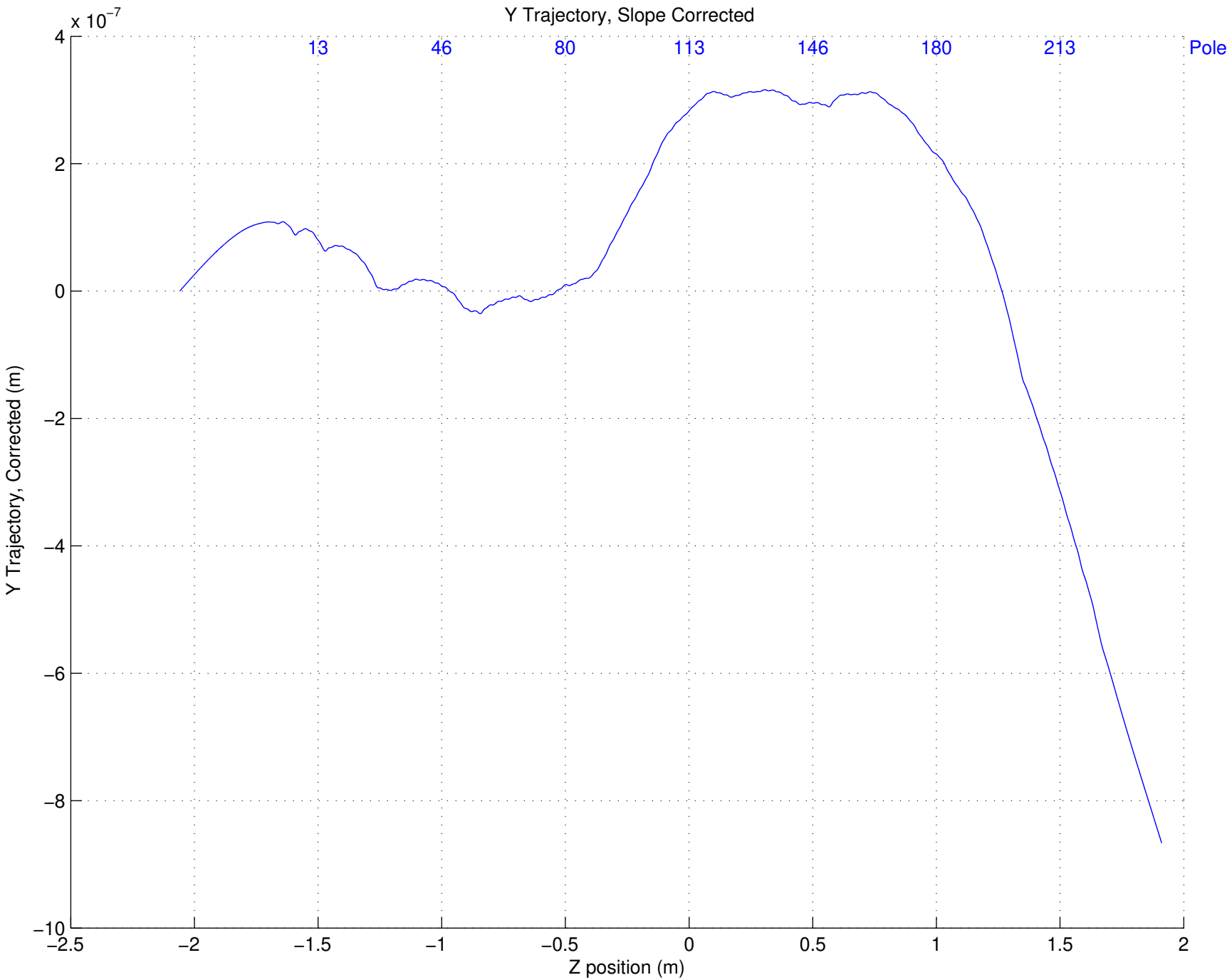

X Trajectory
x 10^-6
5
0
−5
X (m)
13
46
80
113
146
180
213
Pole
−2.5
−2
−1.5
−1
−0.5
0
0.5
1
1.5
2
x 10^-4
1.5
1
0.5
0
−0.5
−1
−1.5
X'
0.03
0.02
0.01
0
−0.01
−0.02
−0.03
X'' (1/m)
Z position (m)

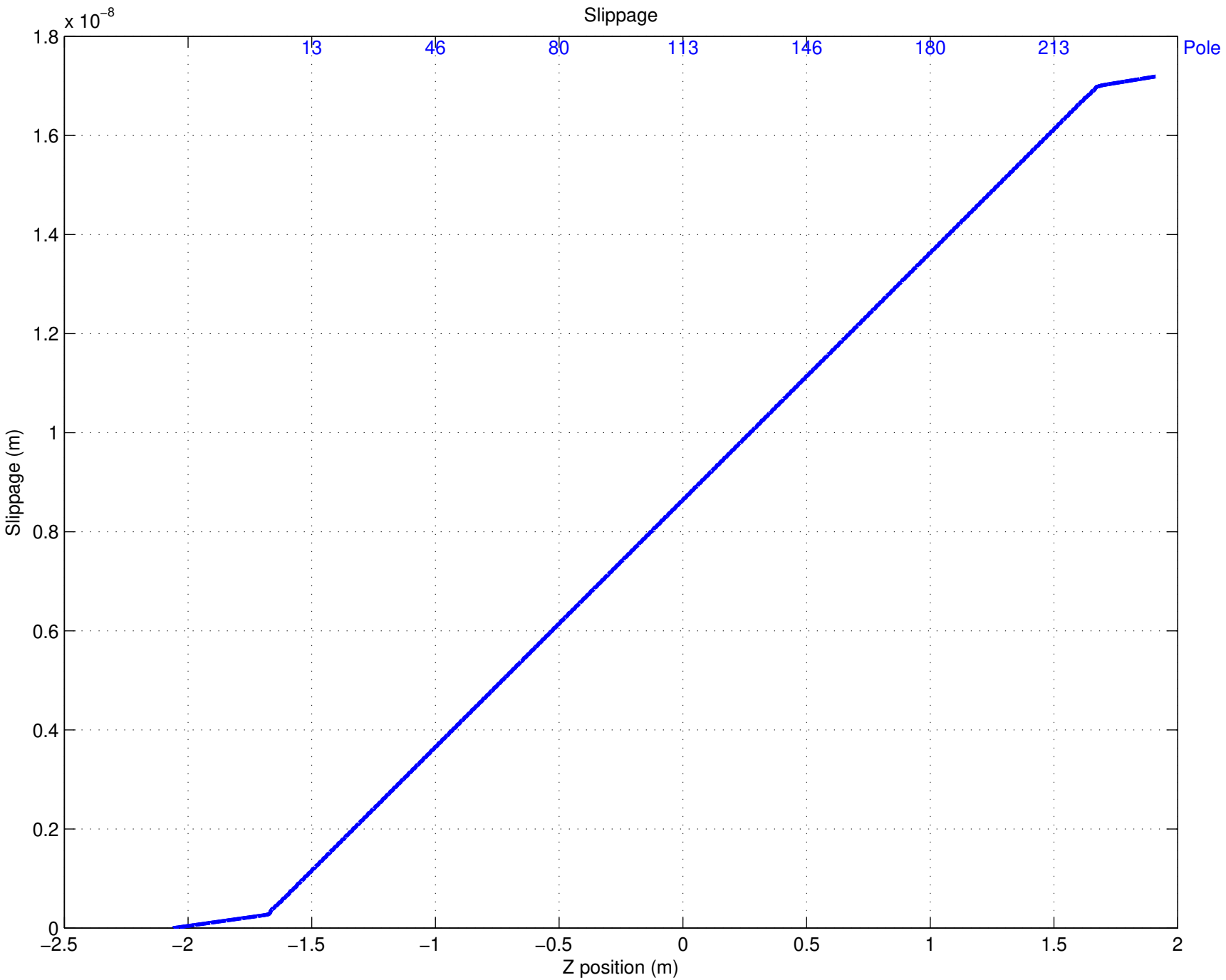

Y Trajectory
x 10^-6
13
46
80
113
146
180
213
Pole
Y (m)
x 10^-6
Y'
x 10^-4
Y'' (1/m)
Z position (m)

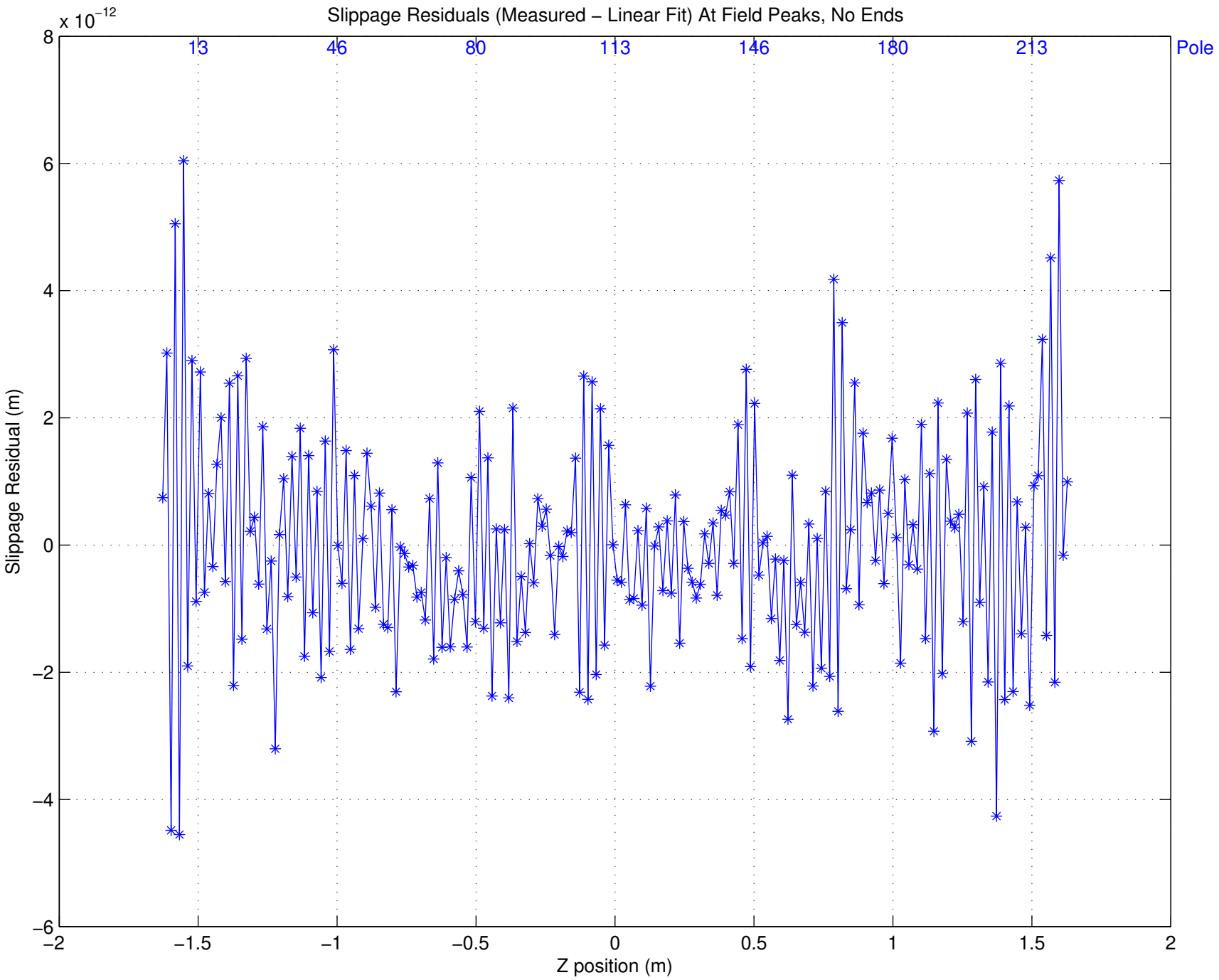

X Trajectory
x 10^-6
13
46
80
113
146
180
213
Pole
2
1
0
−1
−2
−3
−4
−5
X (m)
−2.5
−2
−1.5
−1
−0.5
0
0.5
1
1.5
2
Z position (m)

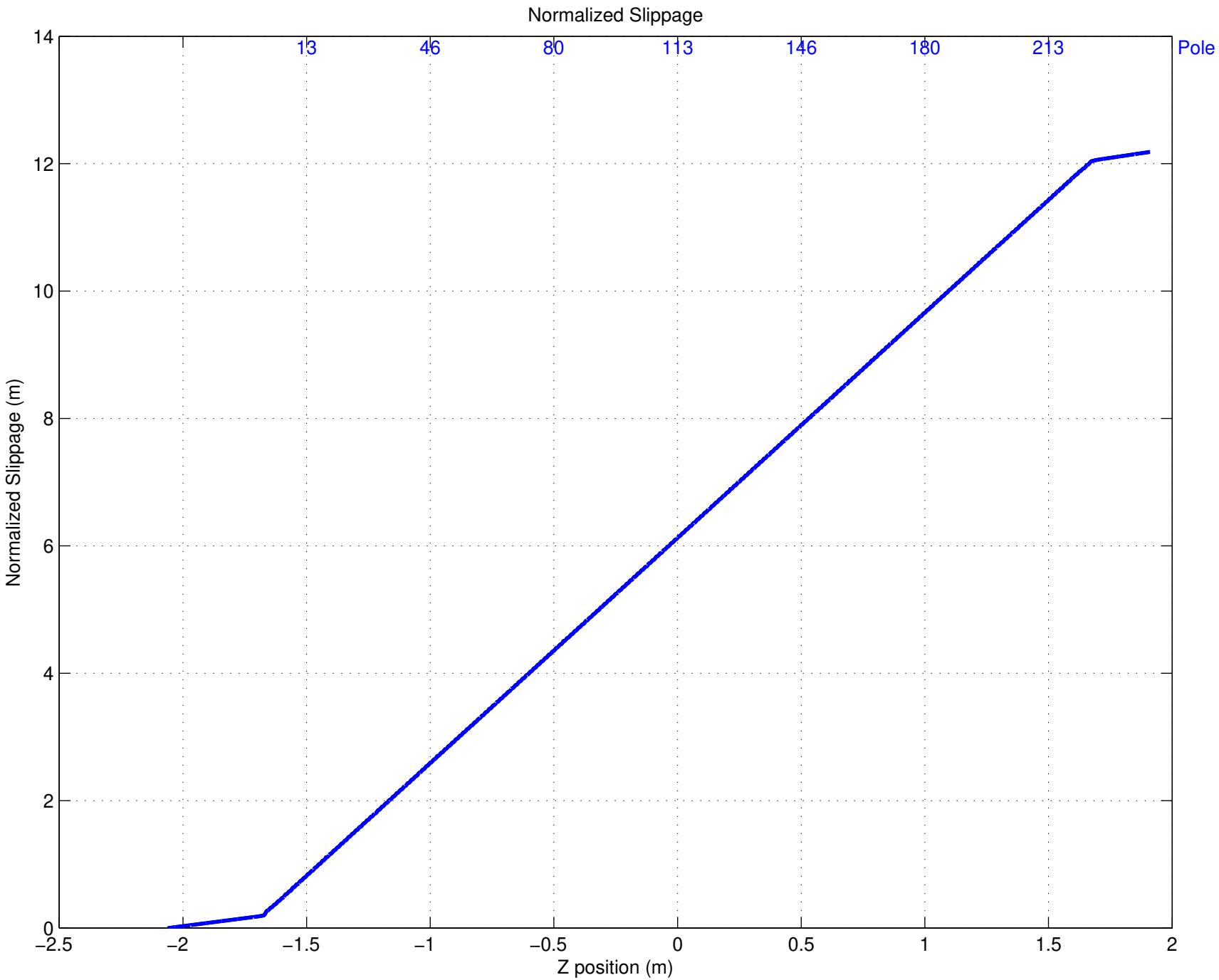

Y Trajectory
x 10^-6
13
46
80
113
146
180
213
Pole
0.5
0
−0.5
−1
−1.5
−2
−2.5
−3
Y (m)
−2.5
−2
−1.5
−1
−0.5
0
0.5
1
1.5
2
Z position (m)

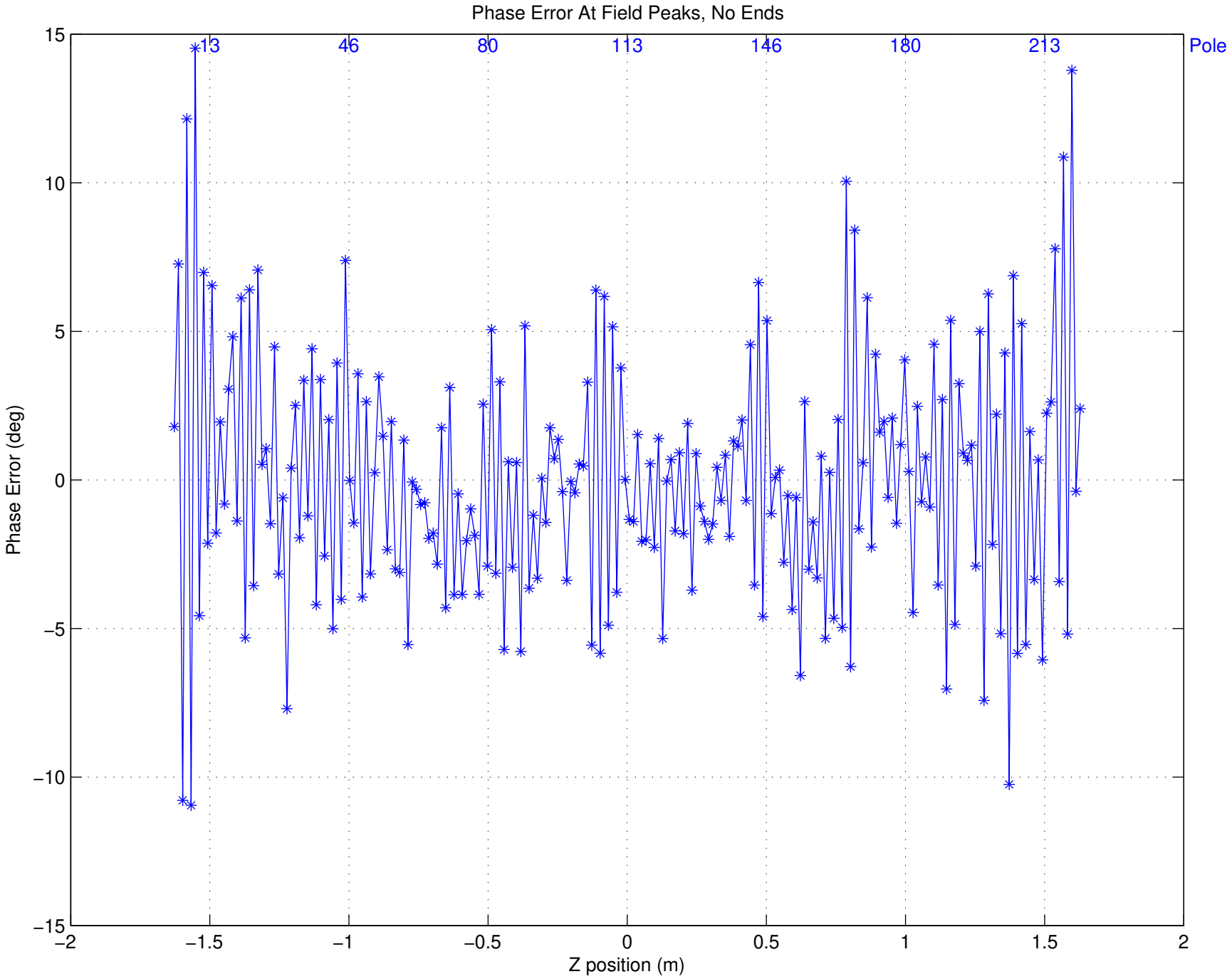

X Trajectory, Slope Corrected
x 10^-6
13
46
80
113
146
180
213
Pole
X Trajectory, Corrected (m)
Z position (m)
2
1
0
−1
−2
−3
−4
−2.5
−2
−1.5
−1
−0.5
0
0.5
1
1.5
2


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

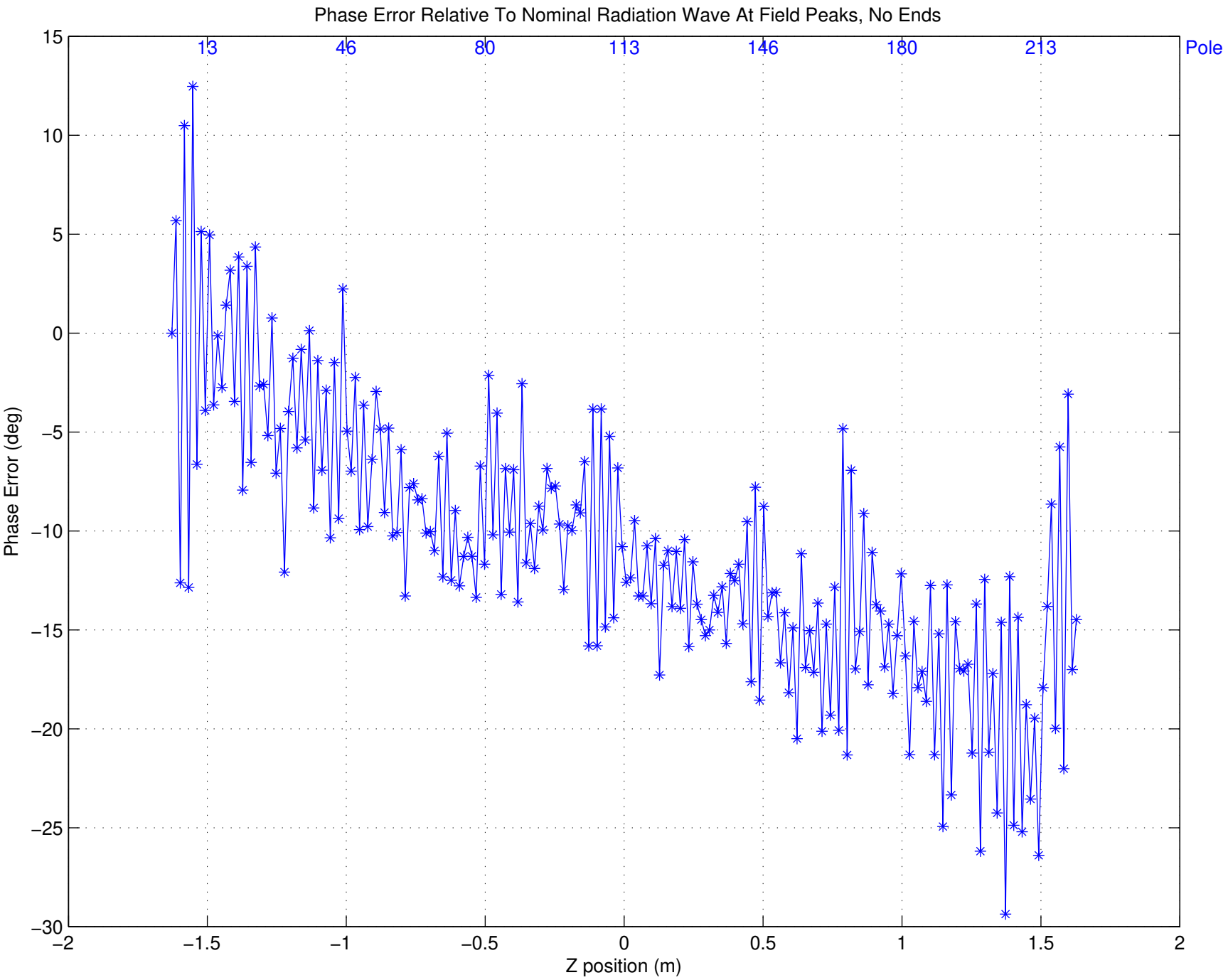

Slippage
x 10^-8
13
46
80
113
146
180
213
Pole
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
Slippage (m)
−2.5
−2
−1.5
−1
−0.5
0
0.5
1
1.5
2
Z position (m)


Slippage Residuals (Measured – Linear Fit) At Field Peaks, No Ends
x 10^-12
Slippage Residual (m)
Z position (m)
Pole
13
46
80
113
146
180
213
8
6
4
2
0
−2
−4
−6
−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
Z position (m)



Phase Error: Ave = 0.000000 deg, RMS = 4.146023 deg


Phase Error Relative To Nominal Radiation Wave At Field Peaks, No Ends
13
46
80
113
146
180
213
Pole
15
10
5
0
−5
−10
−15
−20
−25
−30
Phase Error (deg)
−2
−1.5
−1
−0.5
0
0.5
1
1.5
2
Z position (m)