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SLAC Magnetic Measurements

EPU Analysis
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INPUT-FILE-NAME =hall2-anal-probe2-field.dat
INPUT-FILE-TYPE =ZBXYZH
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GAMMA =26671.59
NOM-LAMBDA-U =0
NOM-K-VALUE =0
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NUM-POLES =196
NUM-END-POLES =4
CELL-LENGTH =3.656
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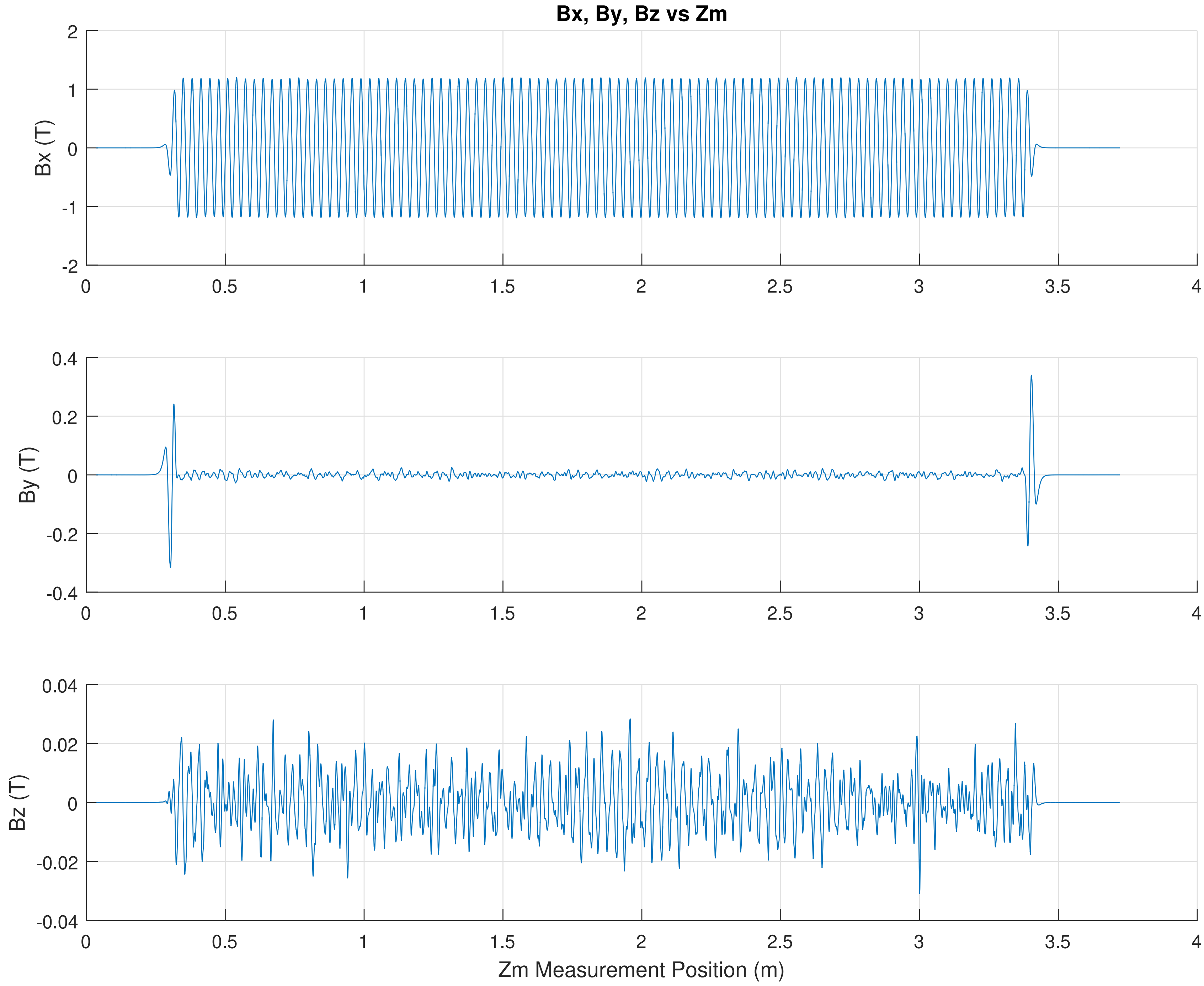
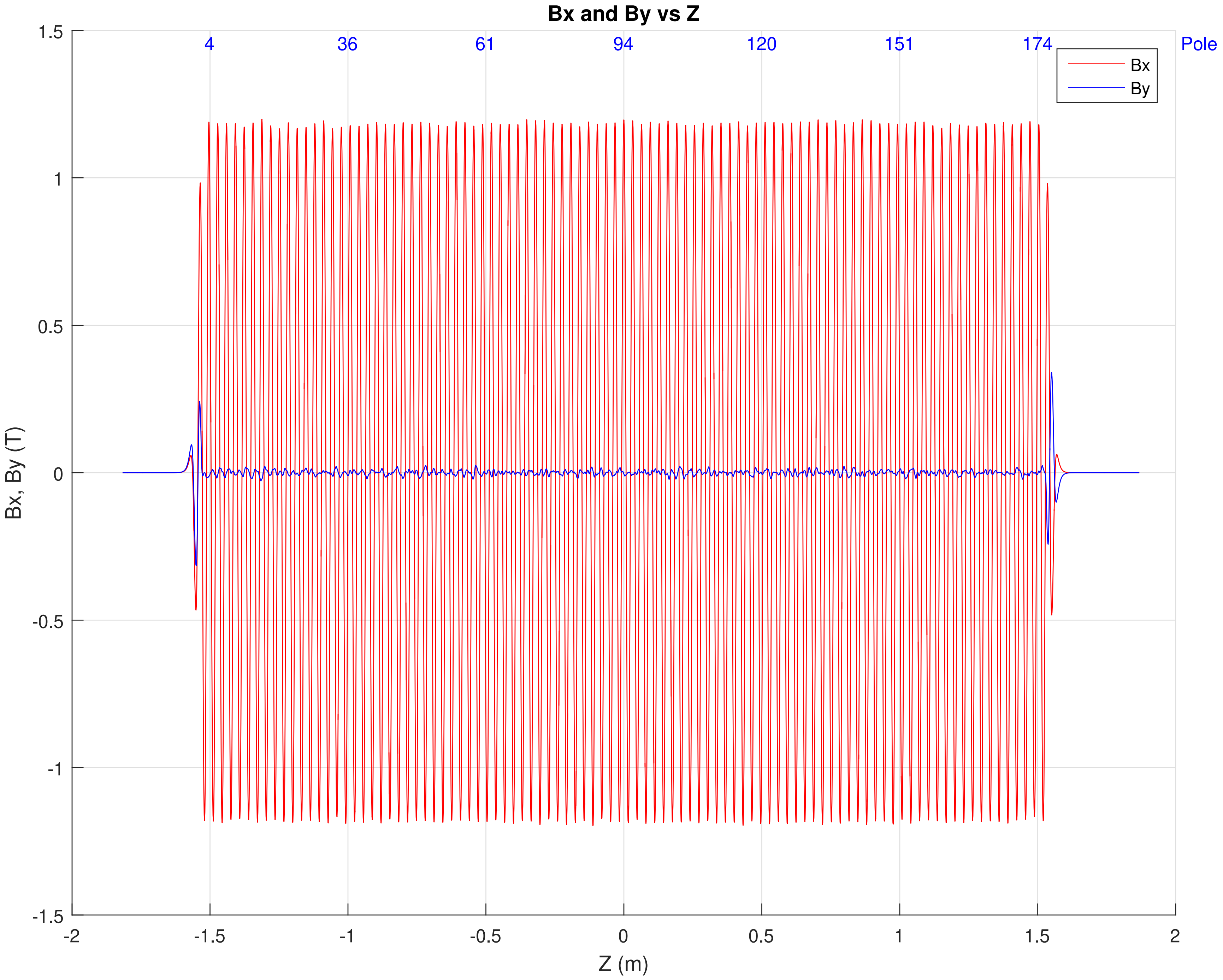
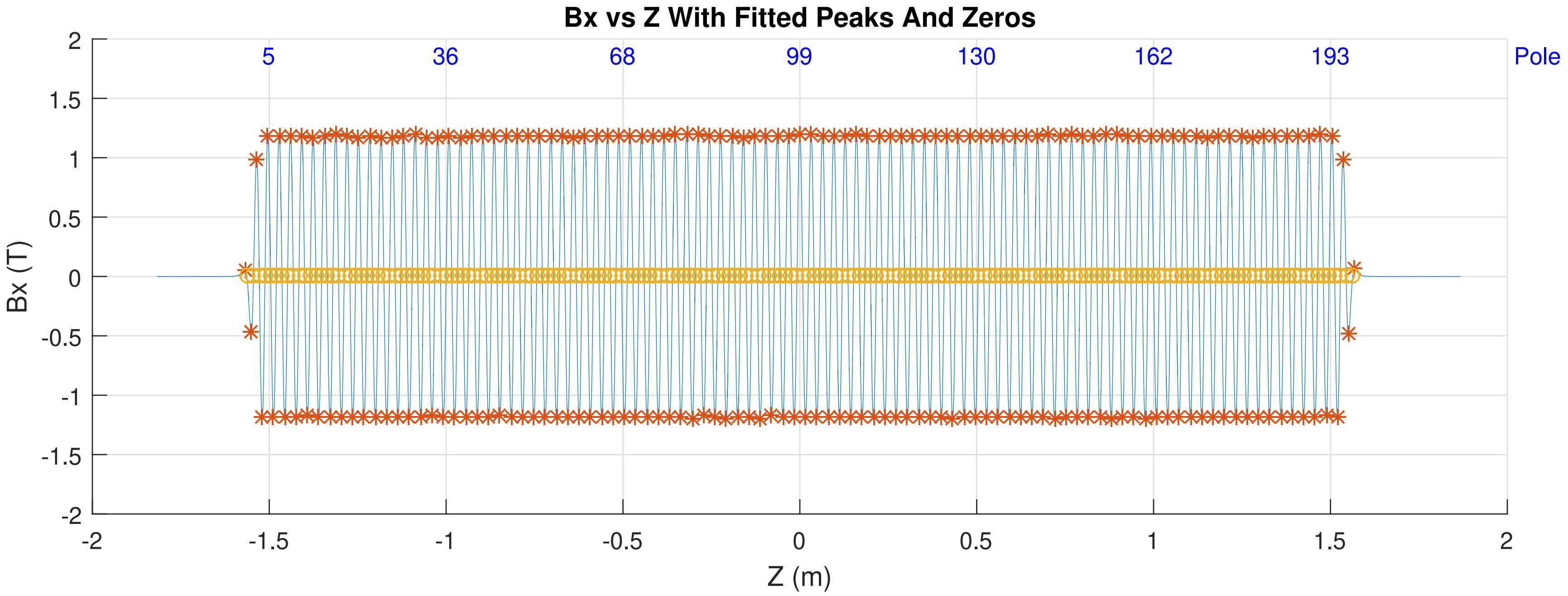
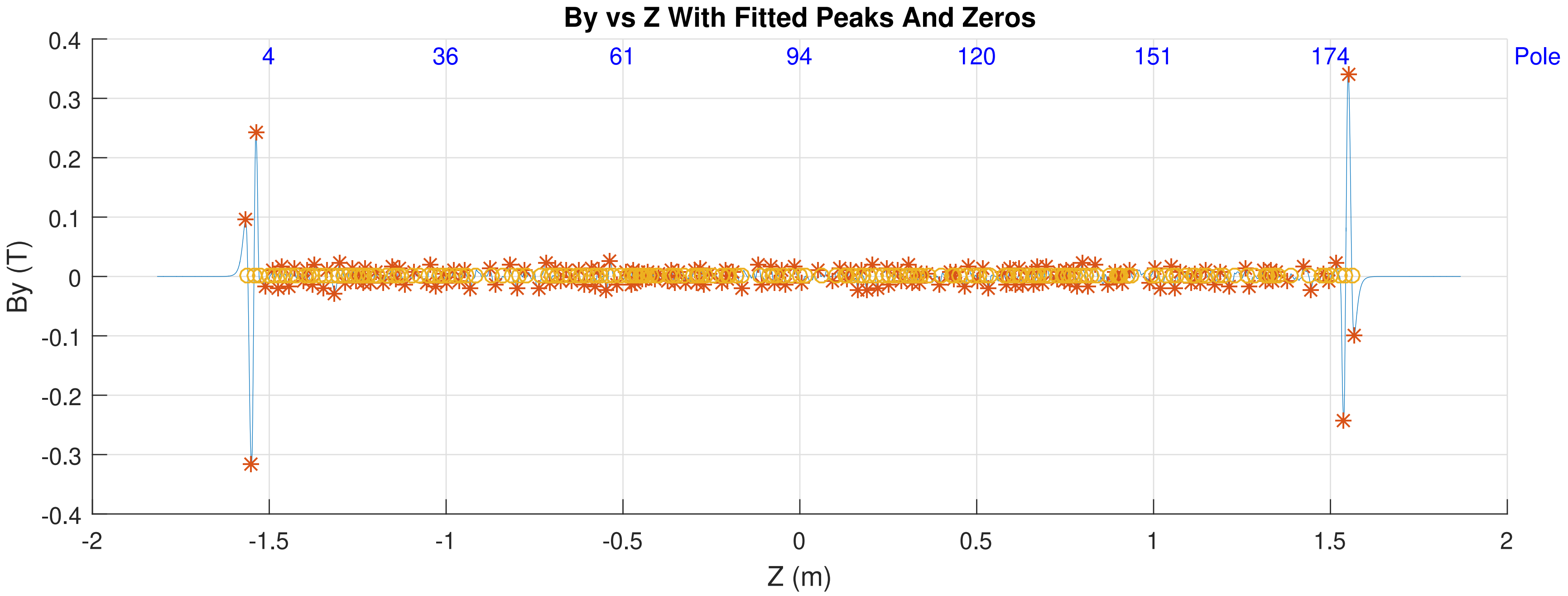
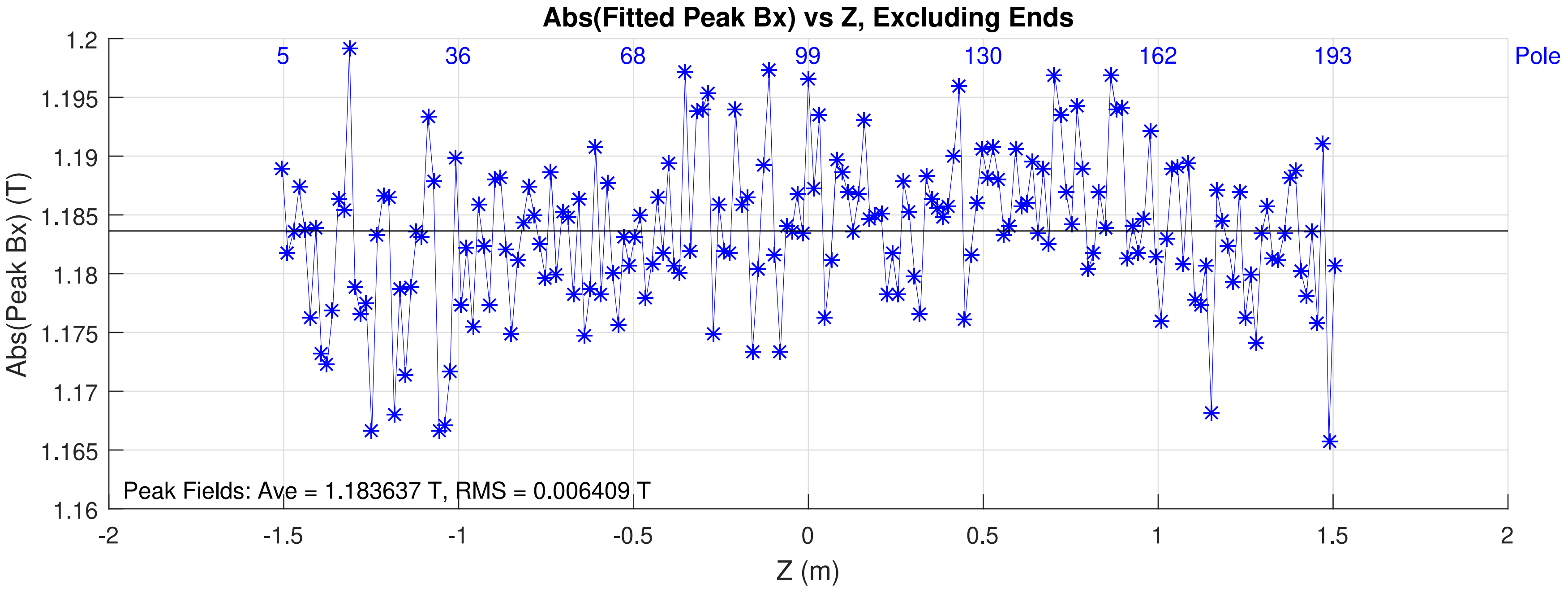
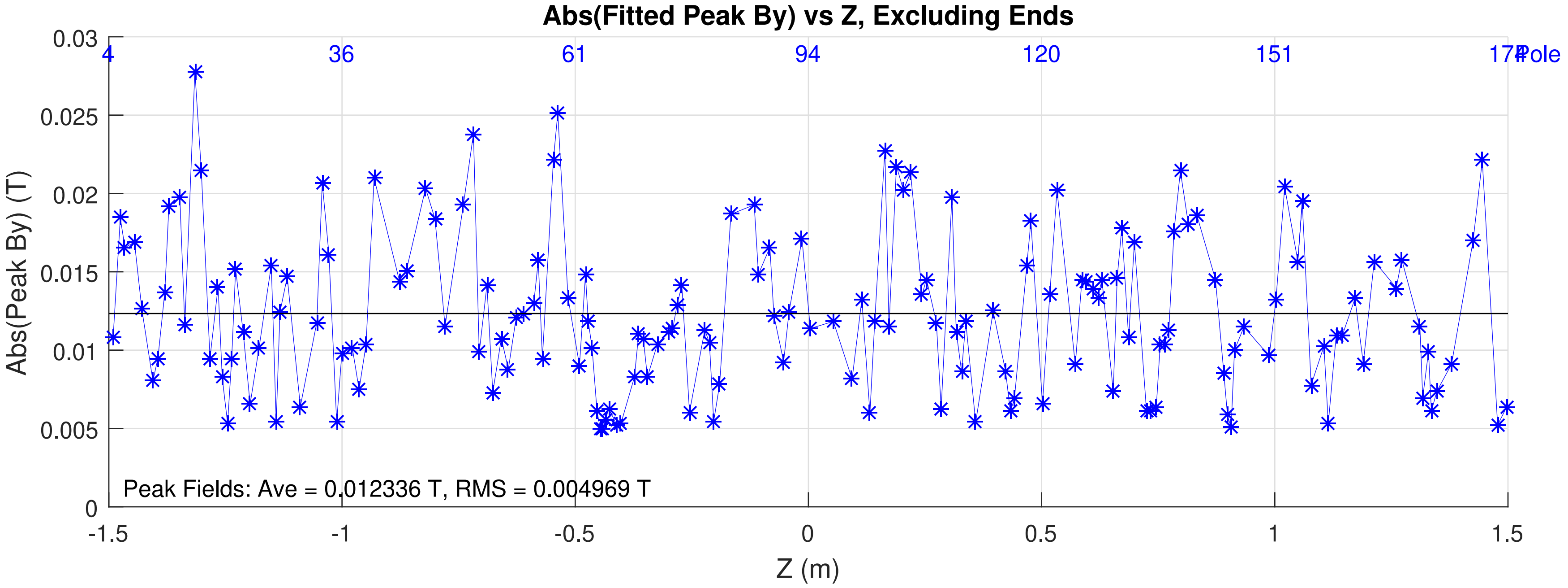

Bx, By, Bz vs Zm
Bx (T)
2
1
0
-1
-2
By (T)
0.4
0.2
0
-0.2
-0.4
Bz (T)
0.04
0.02
0
-0.02
-0.04
0
0.5
1
1.5
2
2.5
3
3.5
4
Zm Measurement Position (m)

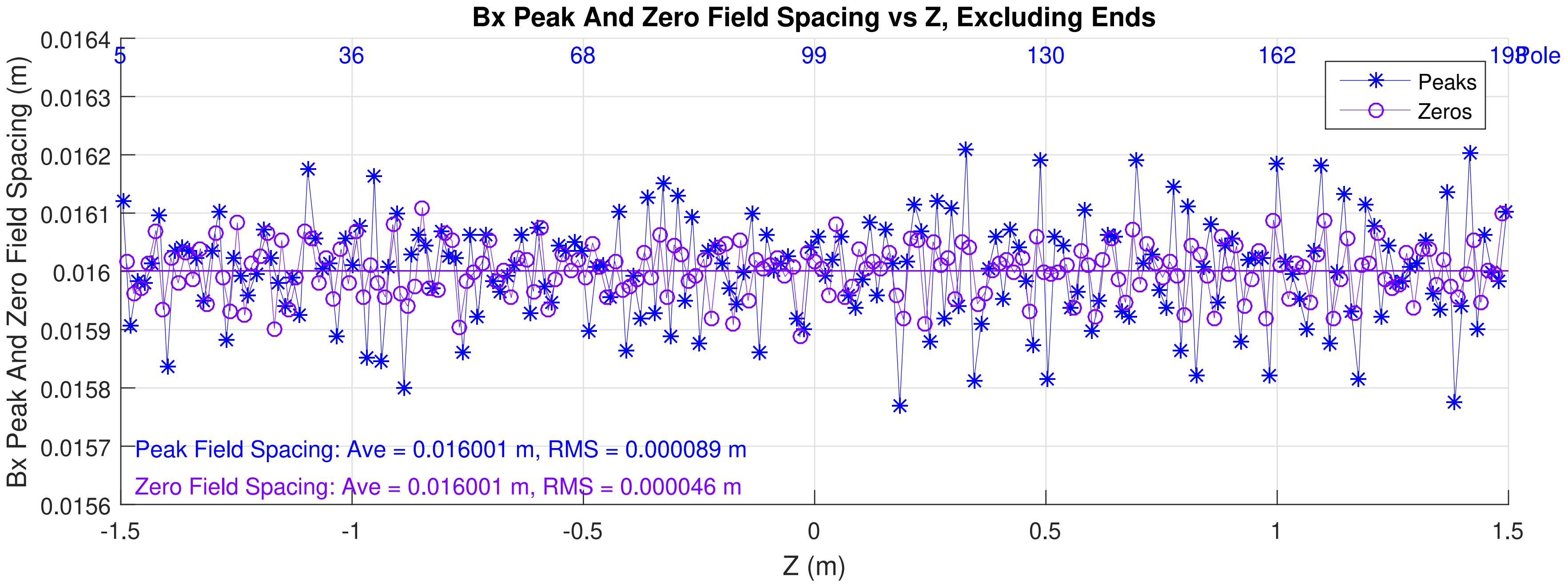

Bx and By vs Z
4
36
61
94
120
151
174
Pole
Bx
By
1.5
1
0.5
0
-0.5
-1
-1.5
Bx, By (T)
-2
-1.5
-1
-0.5
0
0.5
1
1.5
2
Z (m)

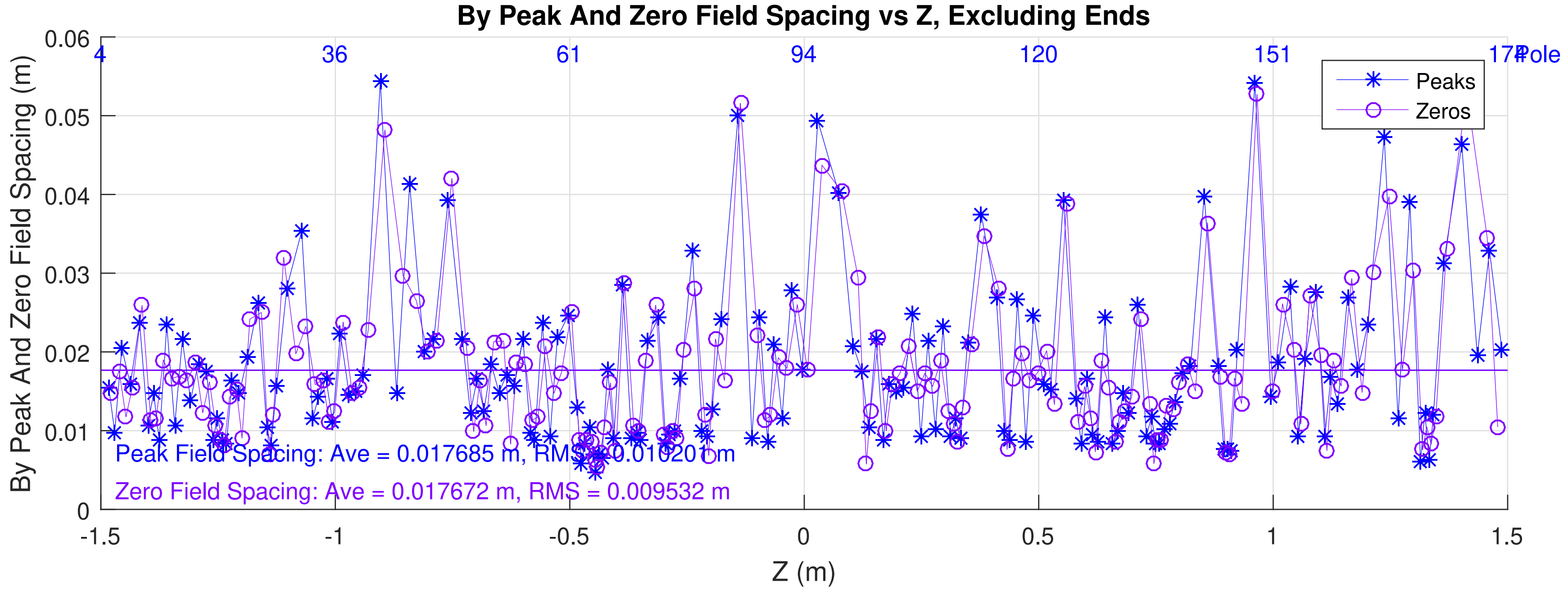

Bx vs Z With Fitted Peaks And Zeros
5
36
68
99
130
162
193
Pole
Bx (T)
Z (m)
2
1.5
1
0.5
0
-0.5
-1
-1.5
-2
-2
-1.5
-1
-0.5
0
0.5
1
1.5
2

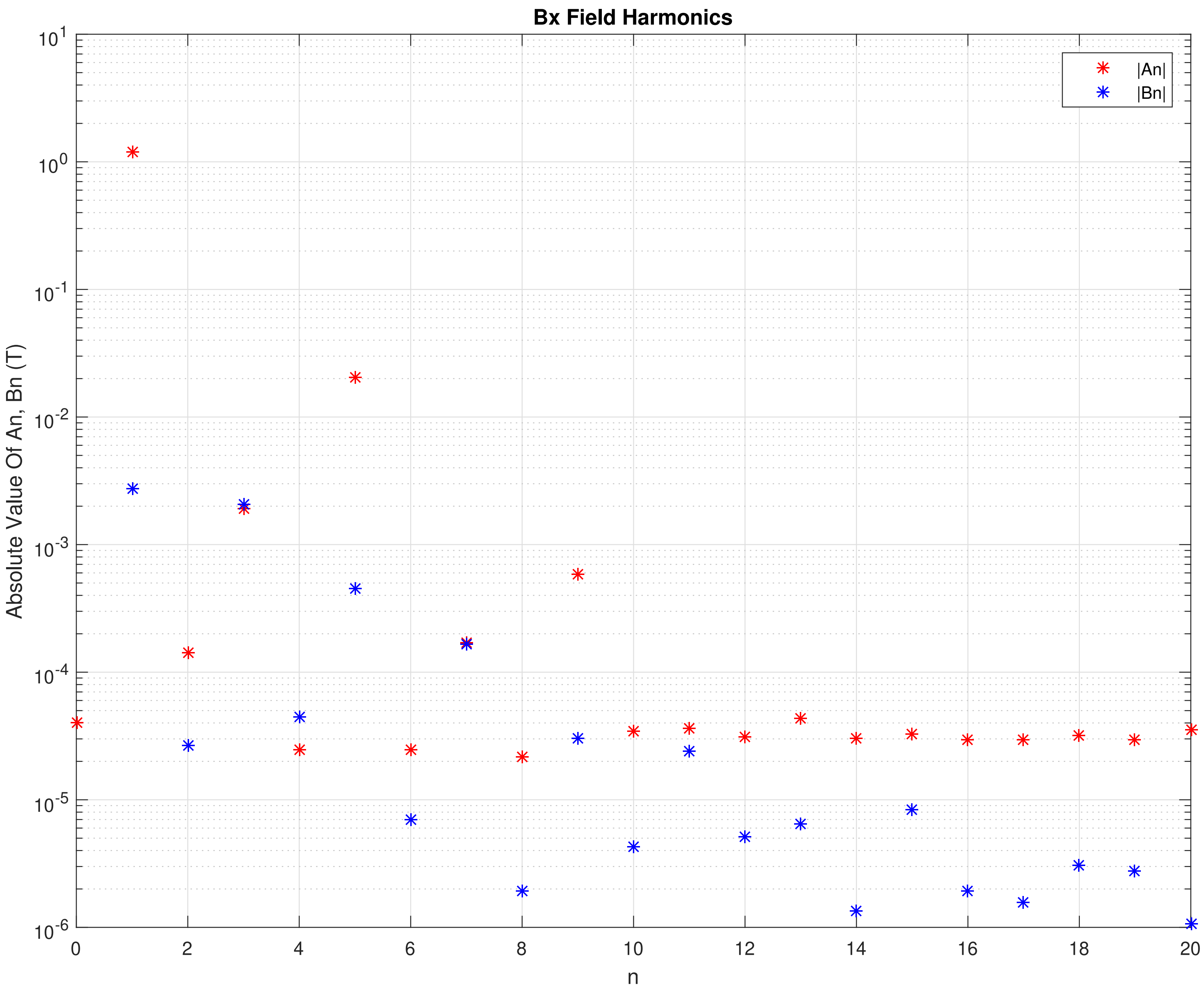

By vs Z With Fitted Peaks And Zeros
4
36
61
94
120
151
174
Pole
By (T)
Z (m)
0.4
0.3
0.2
0.1
0
-0.1
-0.2
-0.3
-0.4
-2
-1.5
-1
-0.5
0
0.5
1
1.5
2

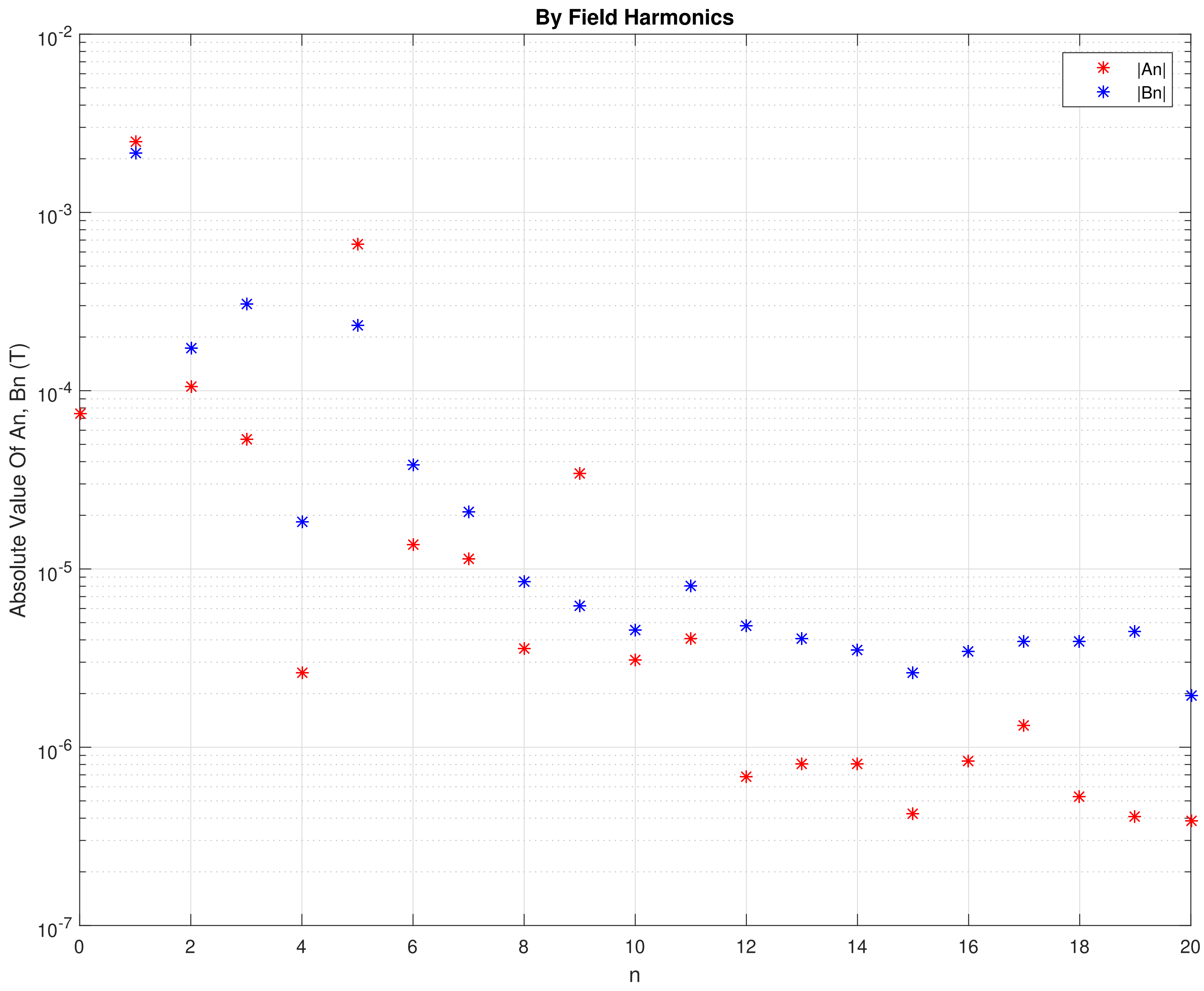

Abs(Fitted Peak Bx) vs Z, Excluding Ends
Abs(Peak Bx) (T)
Z (m)
1.2
1.195
1.19
1.185
1.18
1.175
1.17
1.165
1.16
-2
-1.5
-1
-0.5
0
0.5
1
1.5
2
5
36
68
99
130
162
193
Pole
Peak Fields: Ave = 1.183637 T, RMS = 0.006409 T


Abs(Fitted Peak By) vs Z, Excluding Ends
Abs(Peak By) (T)
Z (m)
0.03
0.025
0.02
0.015
0.01
0.005
0
-1.5
-1
-0.5
0
0.5
1
1.5
4
36
61
94
120
151
179
Pole
Peak Fields: Ave = 0.012336 T, RMS = 0.004969 T

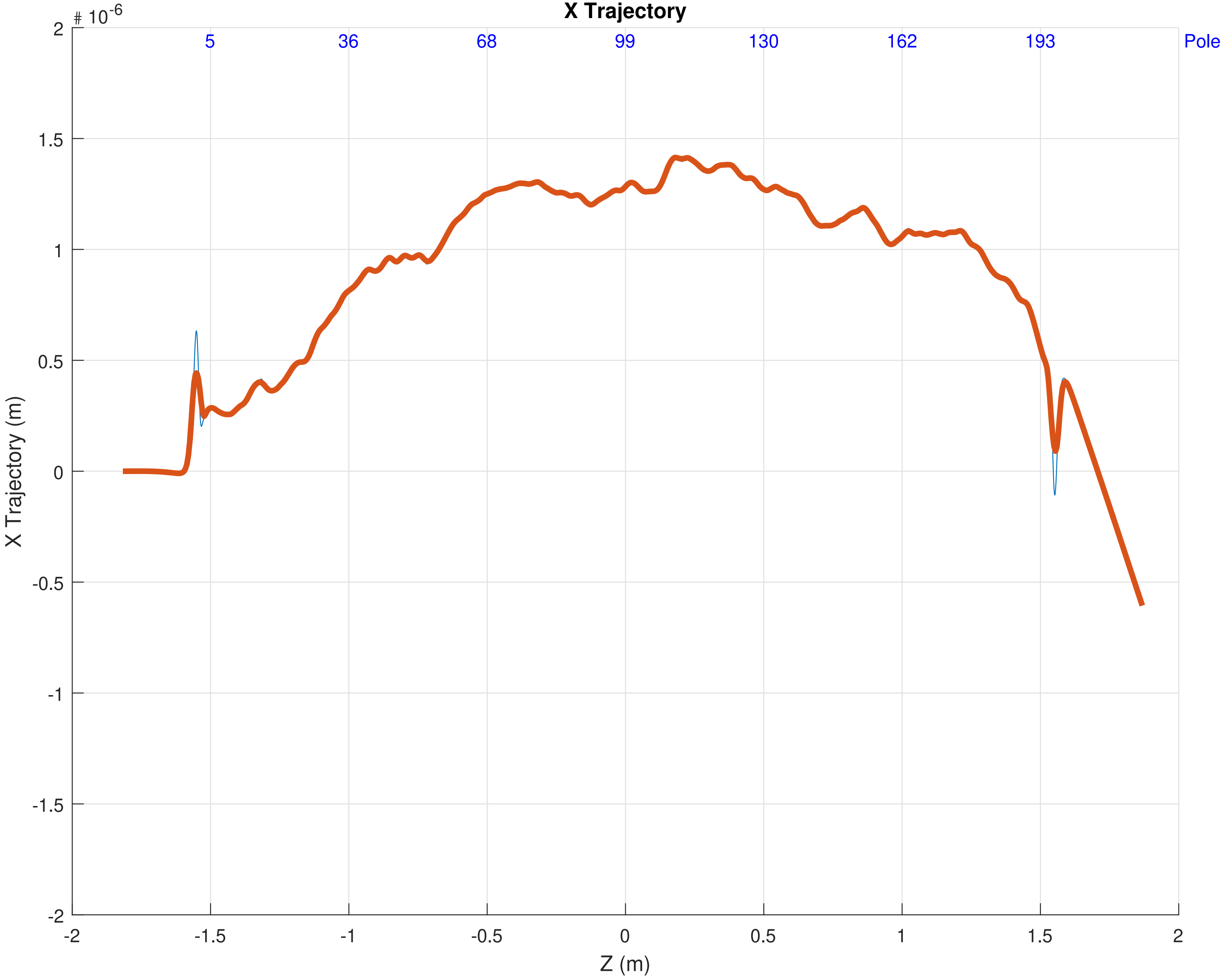

Bx Peak And Zero Field Spacing vs Z, Excluding Ends
Bx Peak And Zero Field Spacing (m)
0.0164
0.0163
0.0162
0.0161
0.016
0.0159
0.0158
0.0157
0.0156
5
36
68
99
130
162
193
Pole
Peaks
Zeros
Peak Field Spacing: Ave = 0.016001 m, RMS = 0.000089 m
Zero Field Spacing: Ave = 0.016001 m, RMS = 0.000046 m
-1.5
-1
-0.5
0
0.5
1
1.5
Z (m)

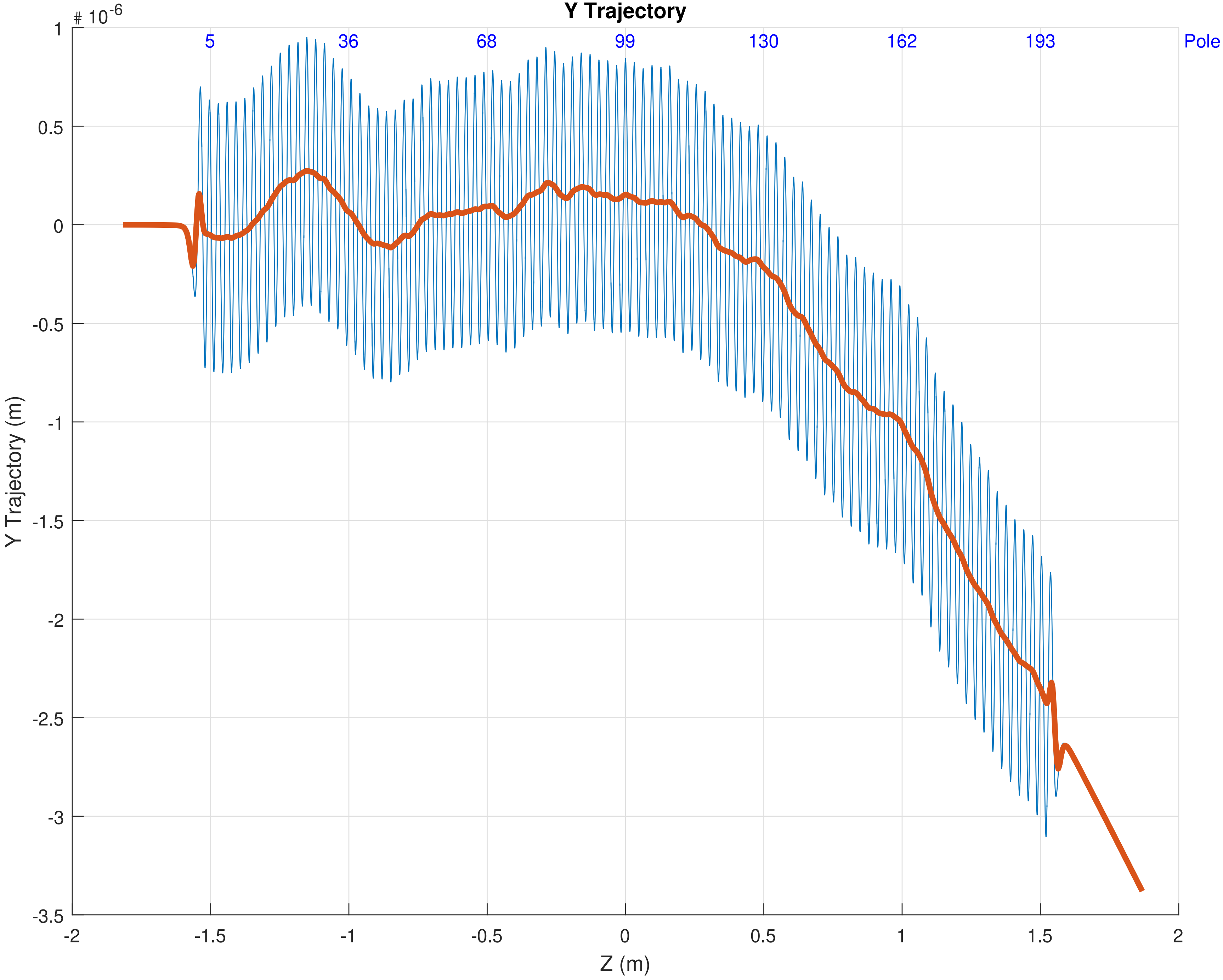

By Peak And Zero Field Spacing vs Z, Excluding Ends
By Peak And Zero Field Spacing (m)
0.06
0.05
0.04
0.03
0.02
0.01
0
4
36
61
94
120
151
174
Pole
Peaks
Zeros
Peak Field Spacing: Ave = 0.017685 m, RMS = 0.010201 m
Zero Field Spacing: Ave = 0.017672 m, RMS = 0.009532 m
-1.5
-1
-0.5
0
0.5
1
1.5
Z (m)

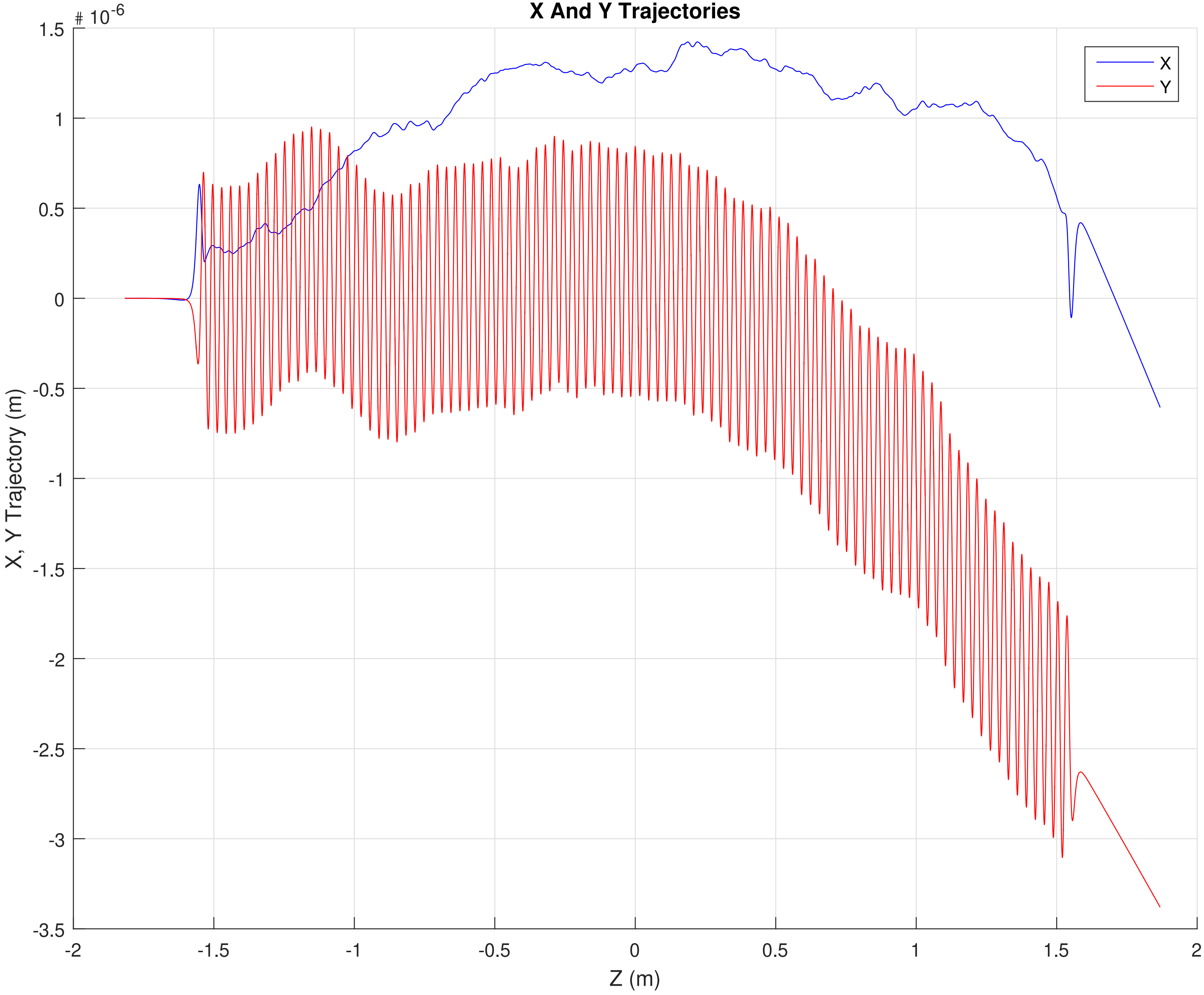

Bx Field Harmonics
Absolute Value Of An, Bn (T)
10^{1}
10^{0}
10^{-1}
10^{-2}
10^{-3}
10^{-4}
10^{-5}
10^{-6}
0
2
4
6
8
10
12
14
16
18
20
n
|An|
|Bn|

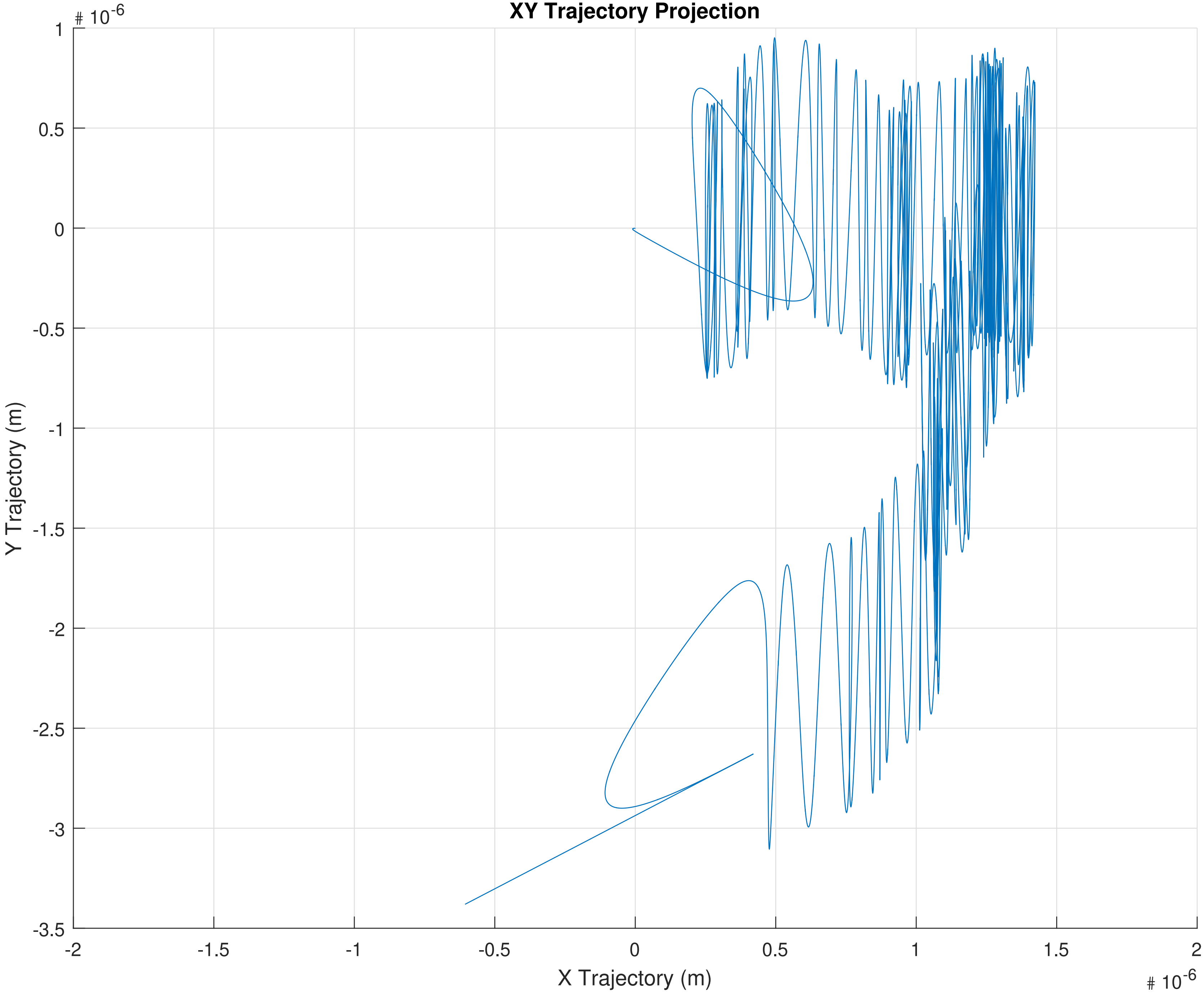


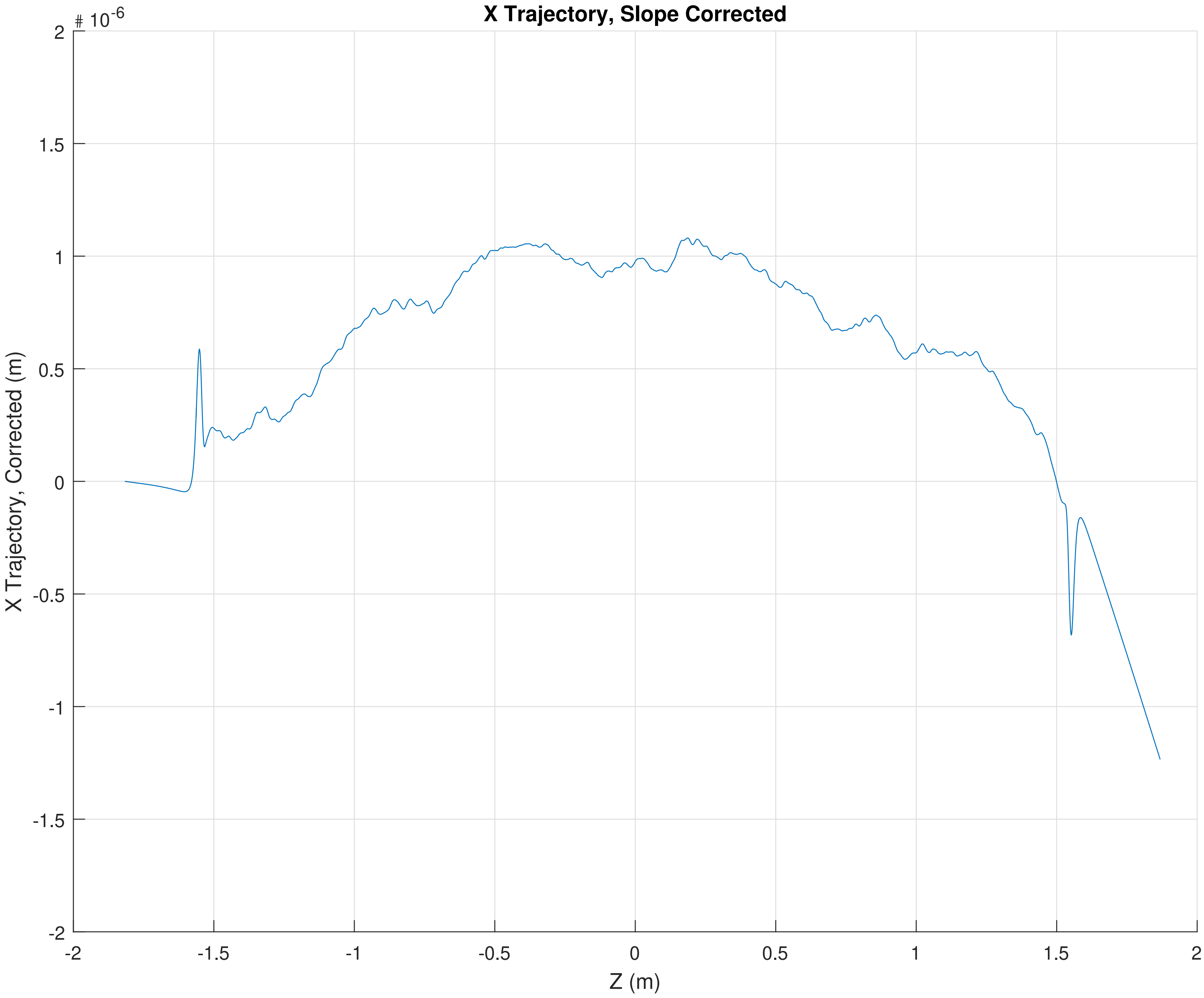
By Field Harmonics
Absolute Value Of An, Bn (T)
n
10^-2
10^-3
10^-4
10^-5
10^-6
10^-7
0
2
4
6
8
10
12
14
16
18
20
|An|
|Bn|

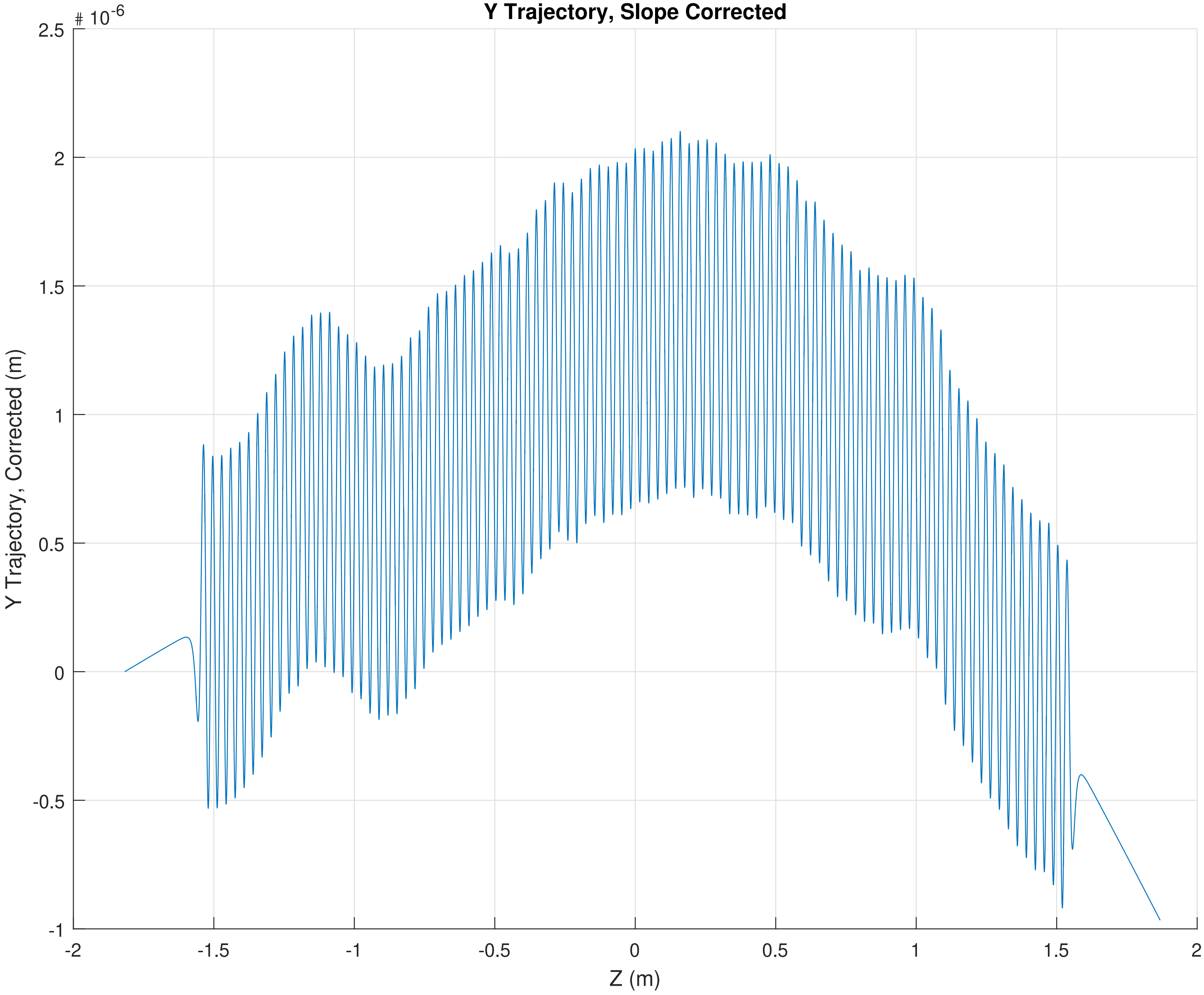

X Trajectory
10^-6
2
1.5
1
0.5
0
-0.5
-1
-1.5
-2
X Trajectory (m)
5
36
68
99
130
162
193
Pole
-2
-1.5
-1
-0.5
0
0.5
1
1.5
2
Z (m)

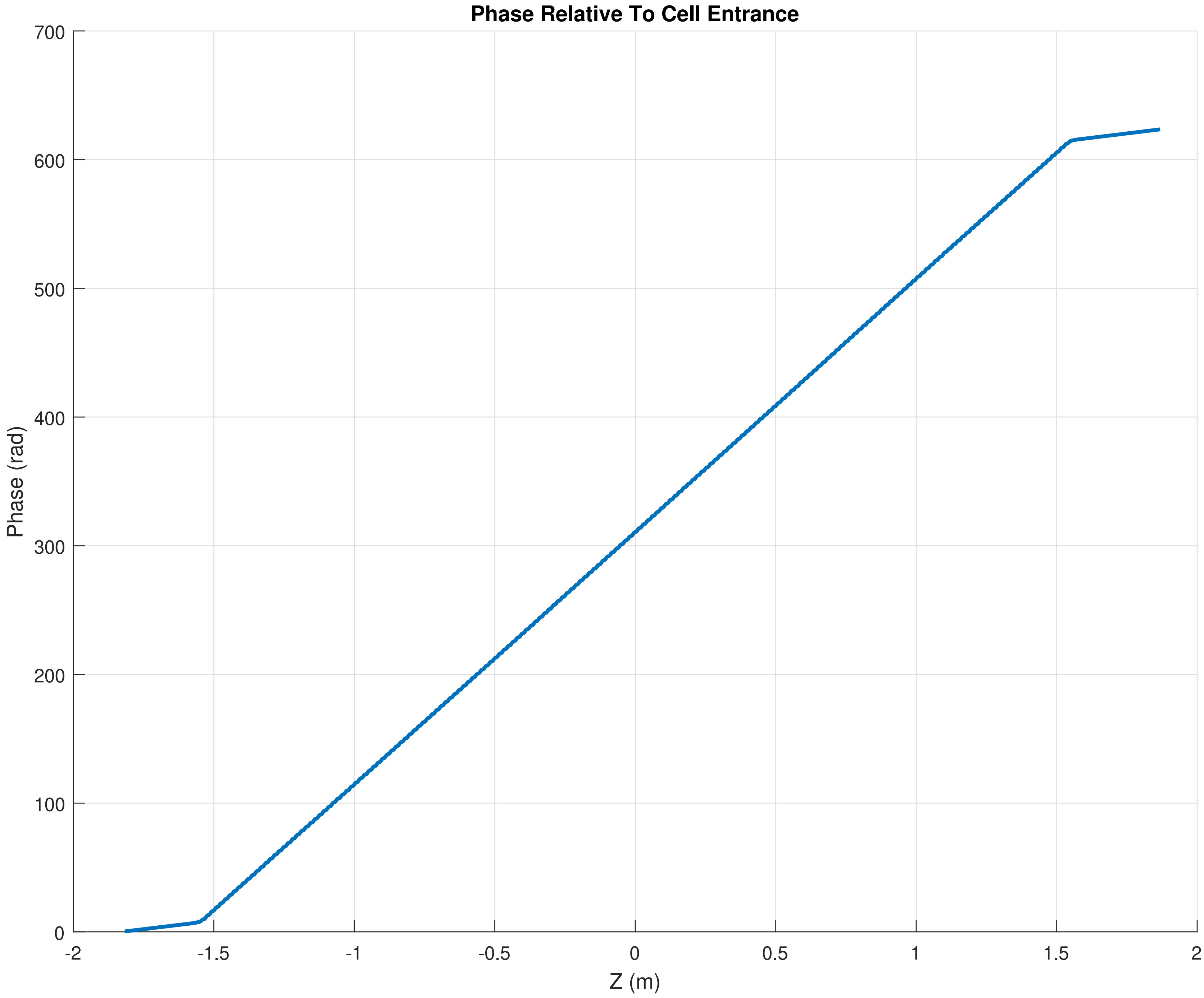

Y Trajectory
10^-6
1
0.5
0
-0.5
-1
-1.5
-2
-2.5
-3
-3.5
Y Trajectory (m)
5
36
68
99
130
162
193
Pole
-2
-1.5
-1
-0.5
0
0.5
1
1.5
2
Z (m)

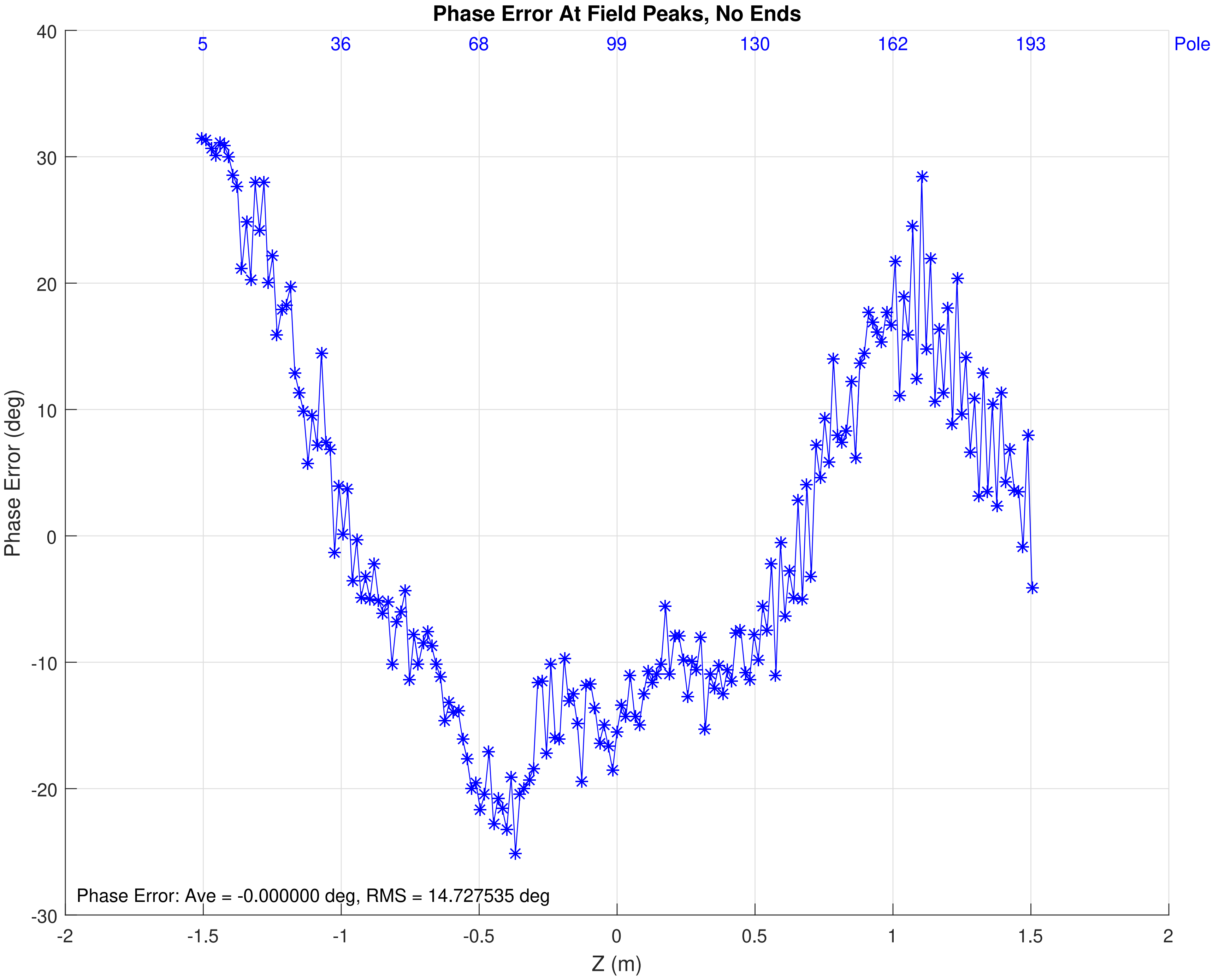

X And Y Trajectories
10^-6
1.5
1
0.5
0
-0.5
-1
-1.5
-2
-2.5
-3
-3.5
X, Y Trajectory (m)
-2
-1.5
-1
-0.5
0
0.5
1
1.5
2
Z (m)
X
Y

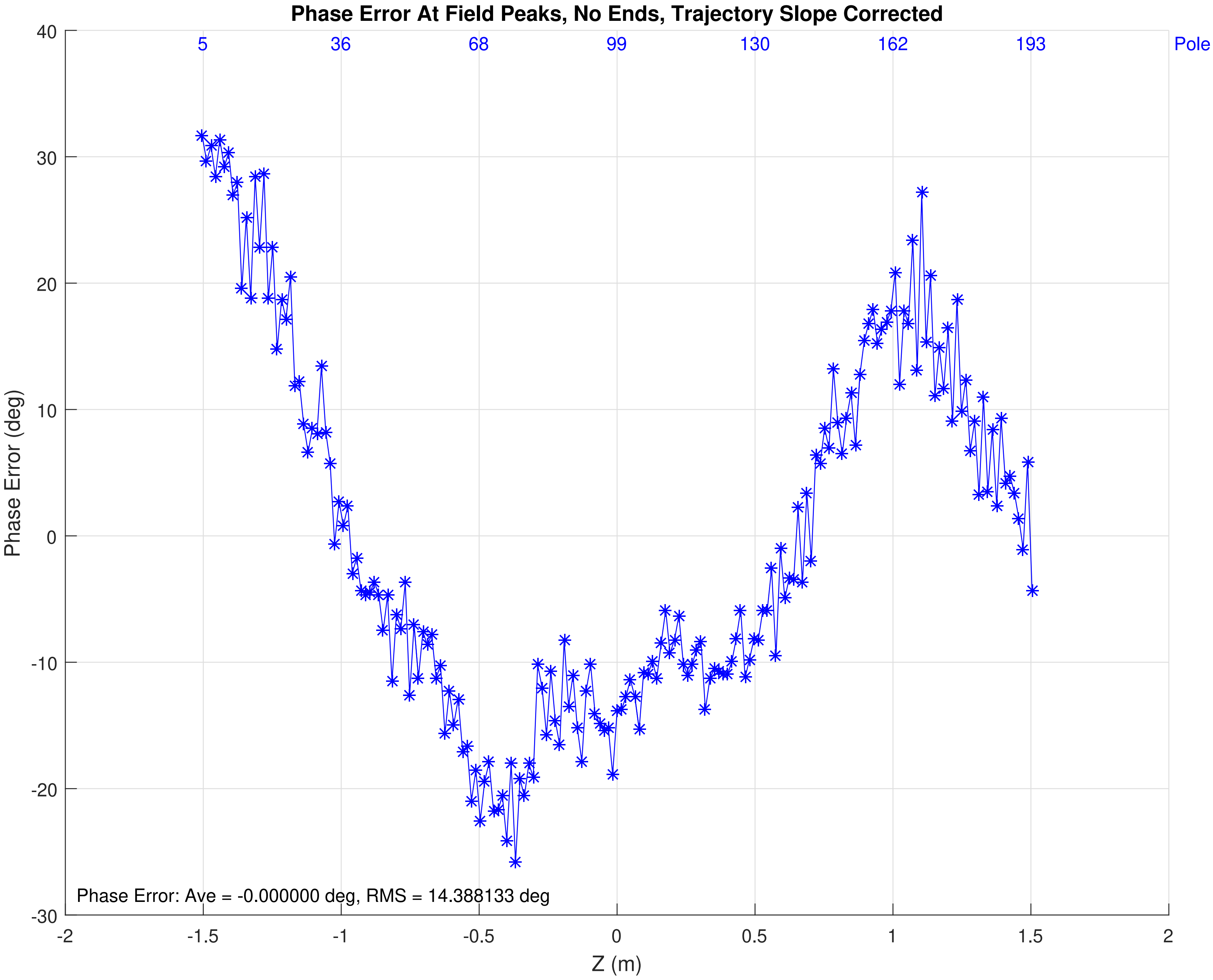

XY Trajectory Projection
10^-6
1
0.5
0
-0.5
-1
-1.5
-2
-2.5
-3
-3.5
Y Trajectory (m)
-2
-1.5
-1
-0.5
0
0.5
1
1.5
2
X Trajectory (m)
10^-6

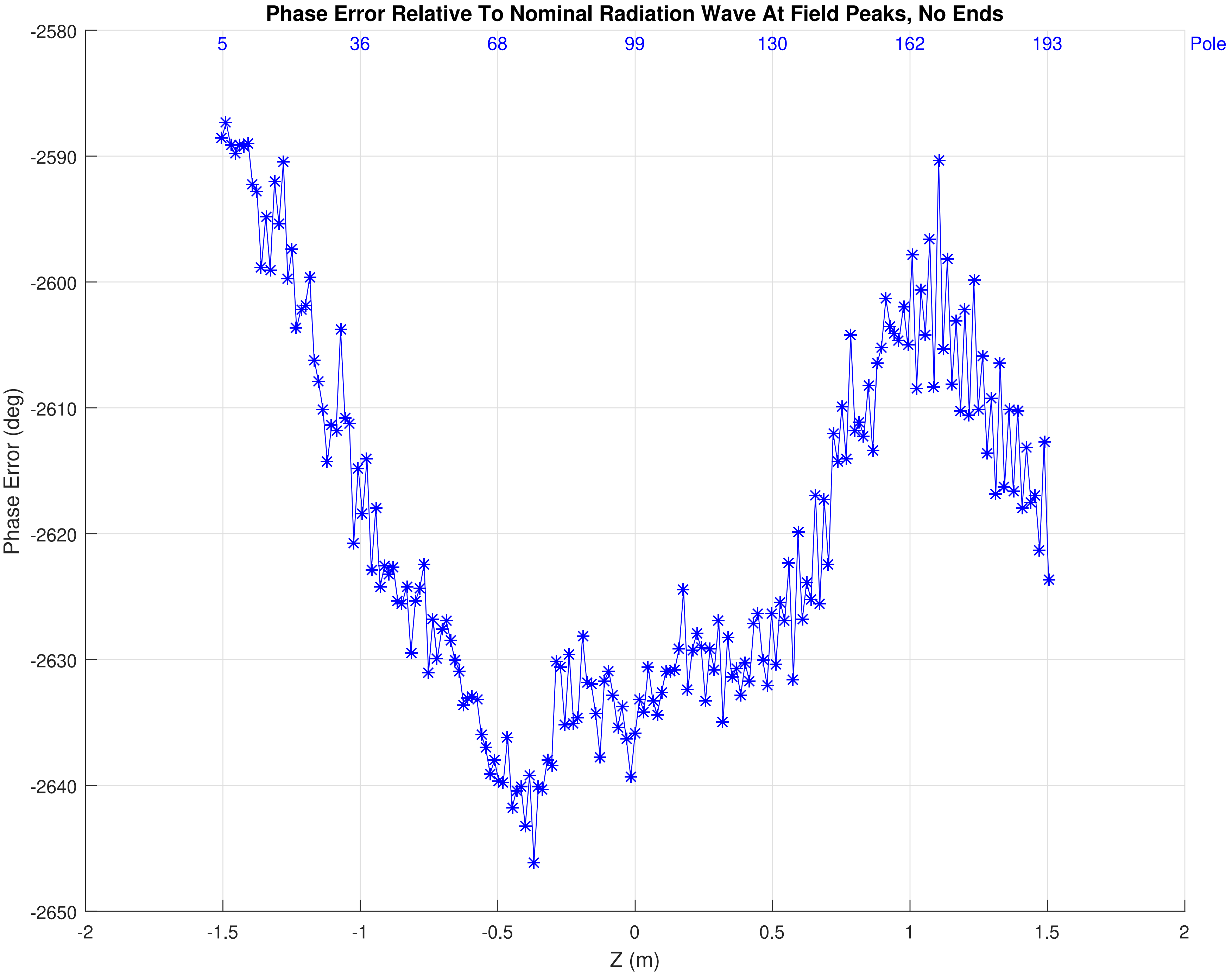

X Trajectory, Slope Corrected
10-6
2
1.5
1
0.5
0
-0.5
-1
-1.5
-2
X Trajectory, Corrected (m)
-2
-1.5
-1
-0.5
0
0.5
1
1.5
2
Z (m)

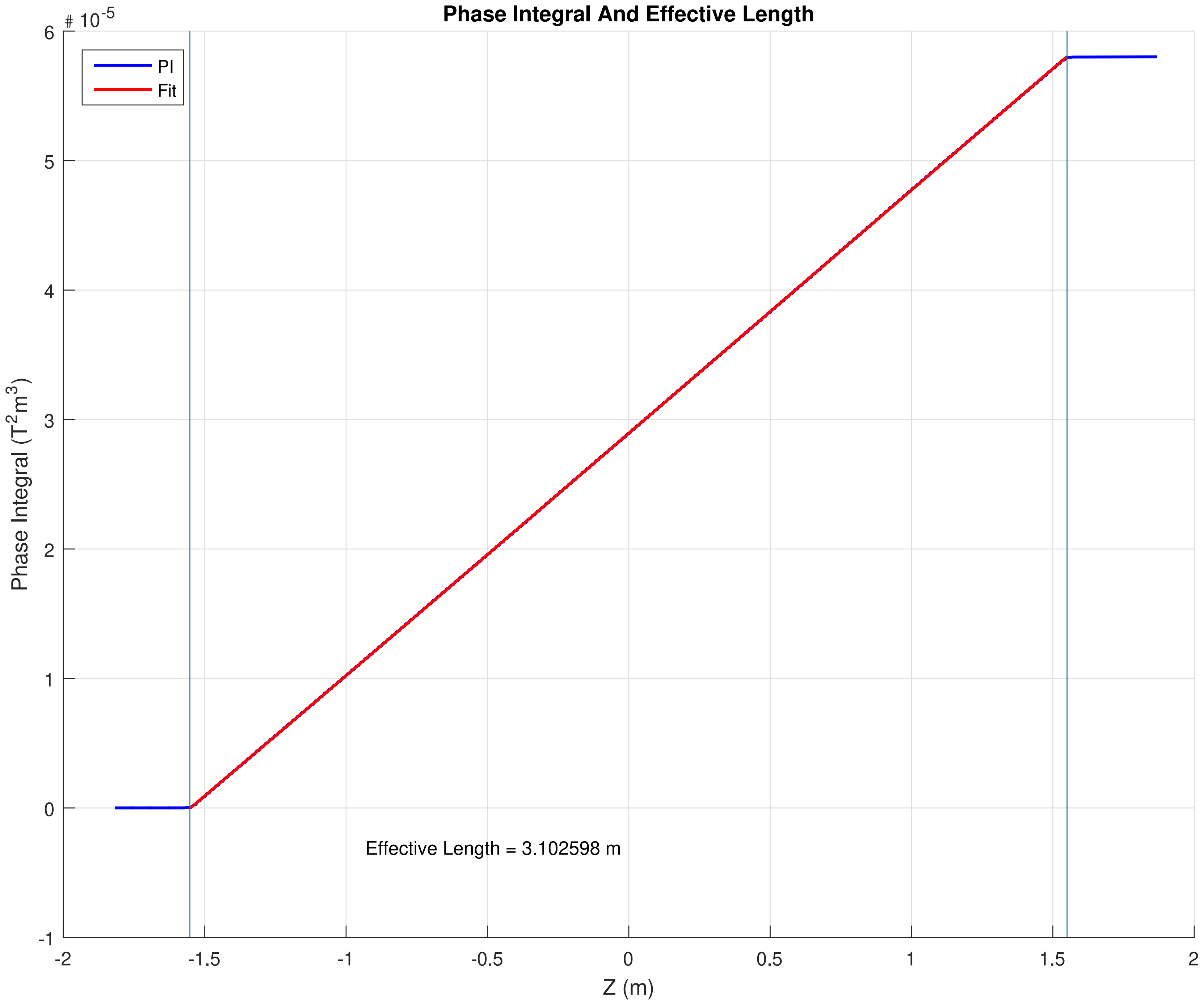

Y Trajectory, Slope Corrected
10^{-6}
2.5
2
1.5
1
0.5
0
-0.5
-1
Y Trajectory, Corrected (m)
-2
-1.5
-1
-0.5
0
0.5
1
1.5
2
Z (m)


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

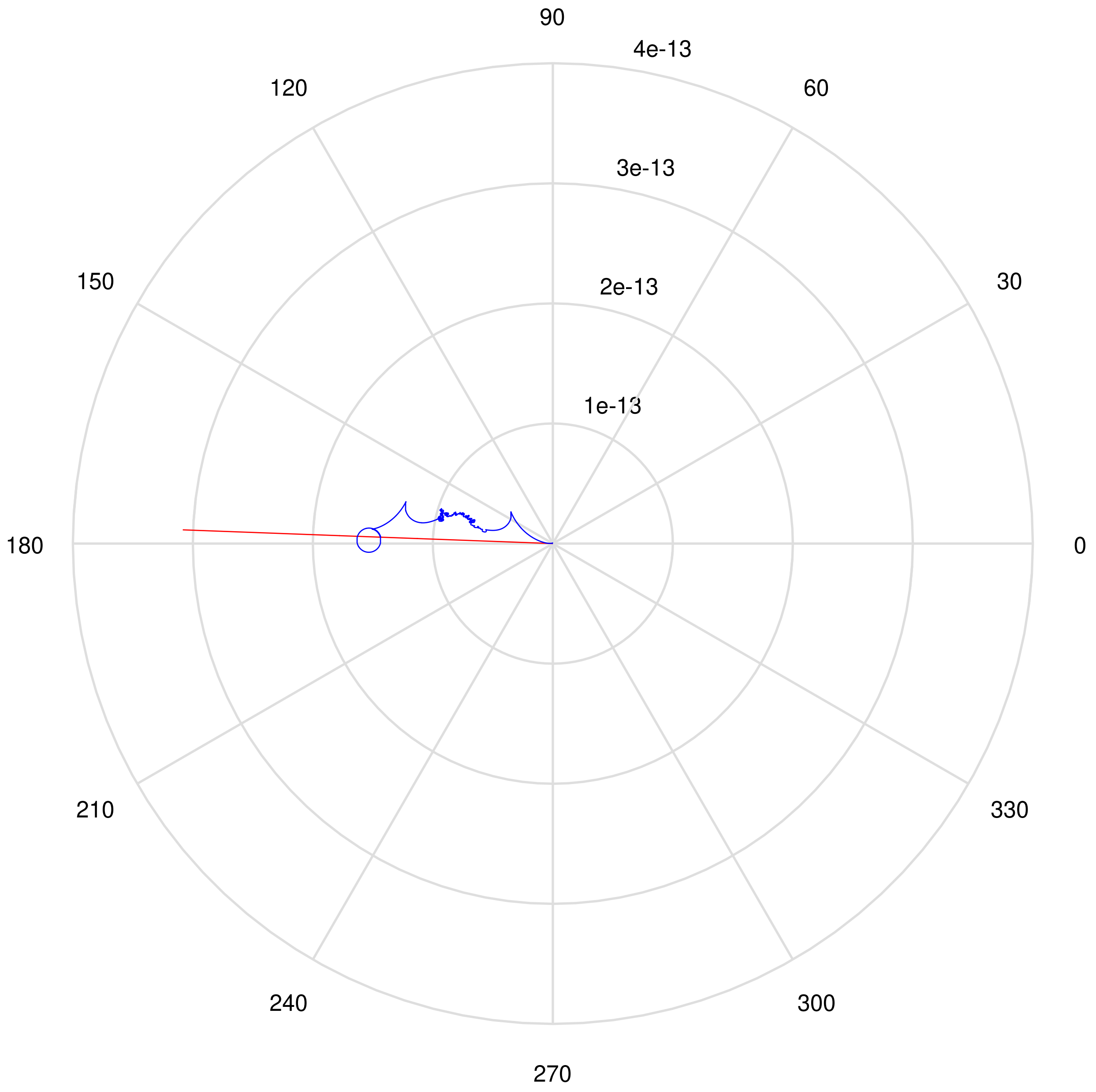

Phase Error At Field Peaks, No Ends
5
36
68
99
130
162
193
Pole
40
30
20
10
0
-10
-20
-30
Phase Error (deg)
-2
-1.5
-1
-0.5
0
0.5
1
1.5
2
Z (m)
Phase Error: Ave = -0.000000 deg, RMS = 14.727535 deg


Phase Error At Field Peaks, No Ends, Trajectory Slope Corrected
5
36
68
99
130
162
193
Pole
40
30
20
10
0
-10
-20
-30
Phase Error (deg)
-2
-1.5
-1
-0.5
0
0.5
1
1.5
2
Z (m)
Phase Error: Ave = -0.000000 deg, RMS = 14.388133 deg

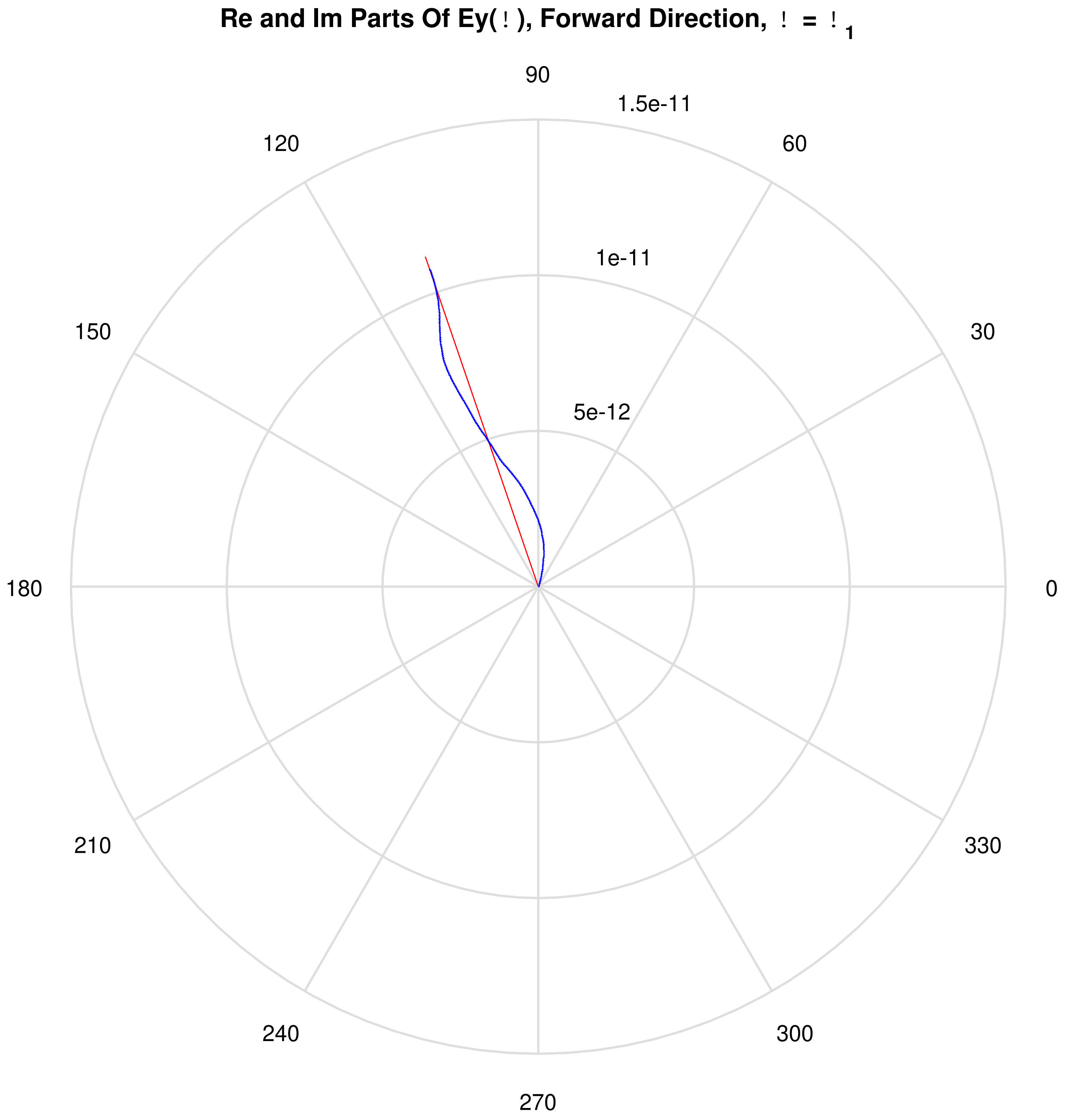

Phase Error Relative To Nominal Radiation Wave At Field Peaks, No Ends
Phase Error (deg)
-2580
-2590
-2600
-2610
-2620
-2630
-2640
-2650
Z (m)
-2
-1.5
-1
-0.5
0
0.5
1
1.5
2
5
36
68
99
130
162
193
Pole



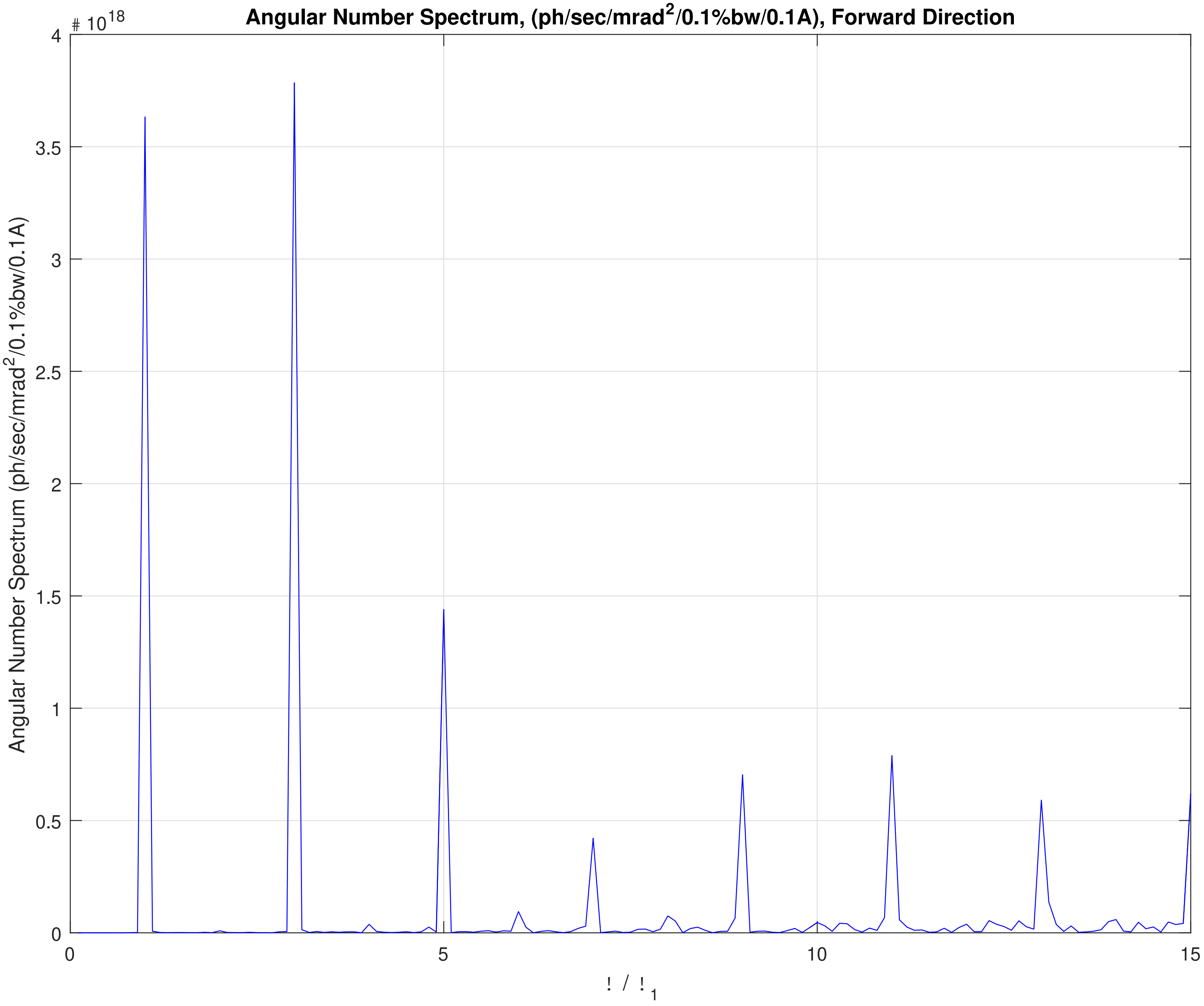
Phase Integral And Effective Length



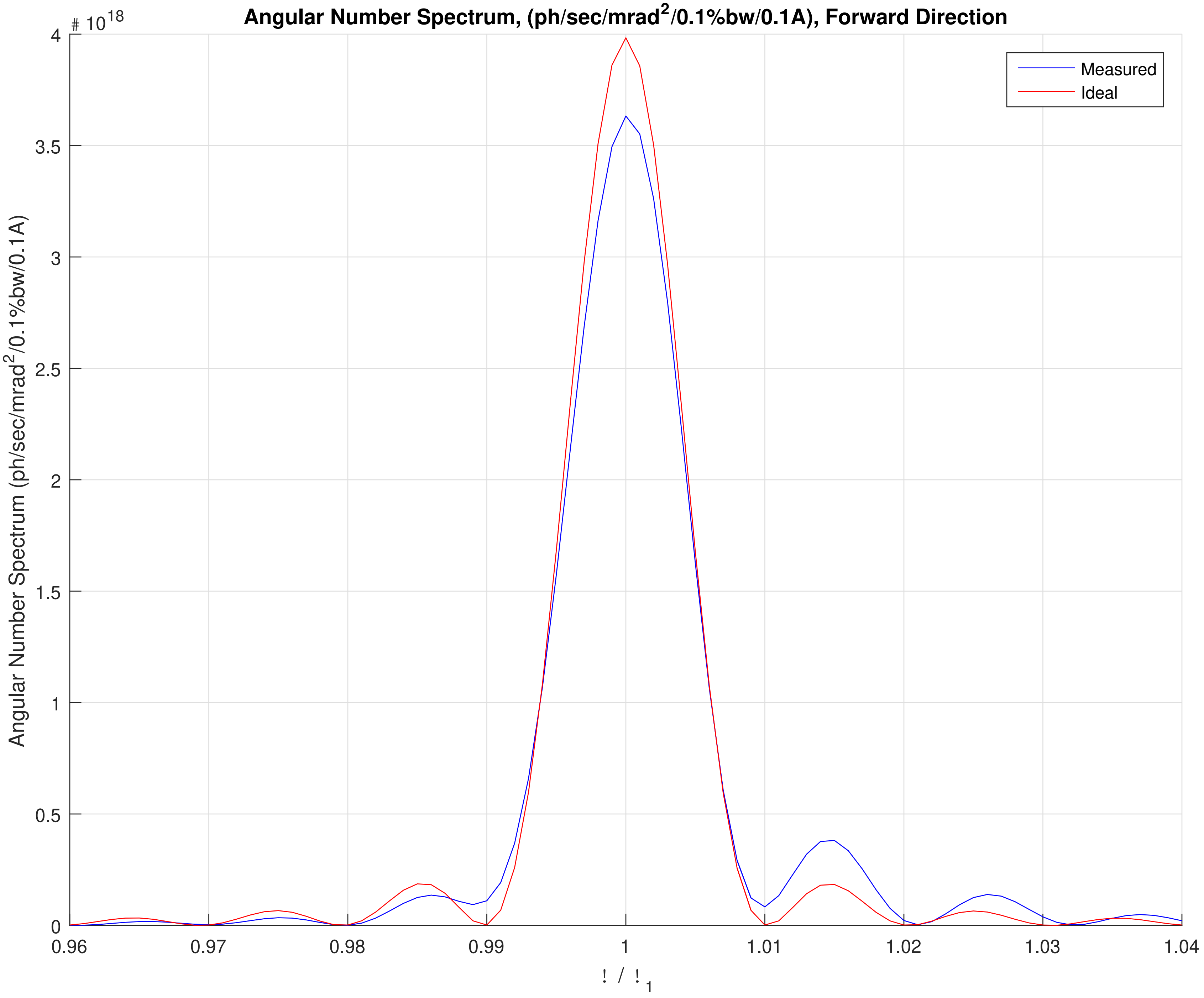
Re and Im Parts Of Ex(!), Forward Direction, ! = ! $_1$

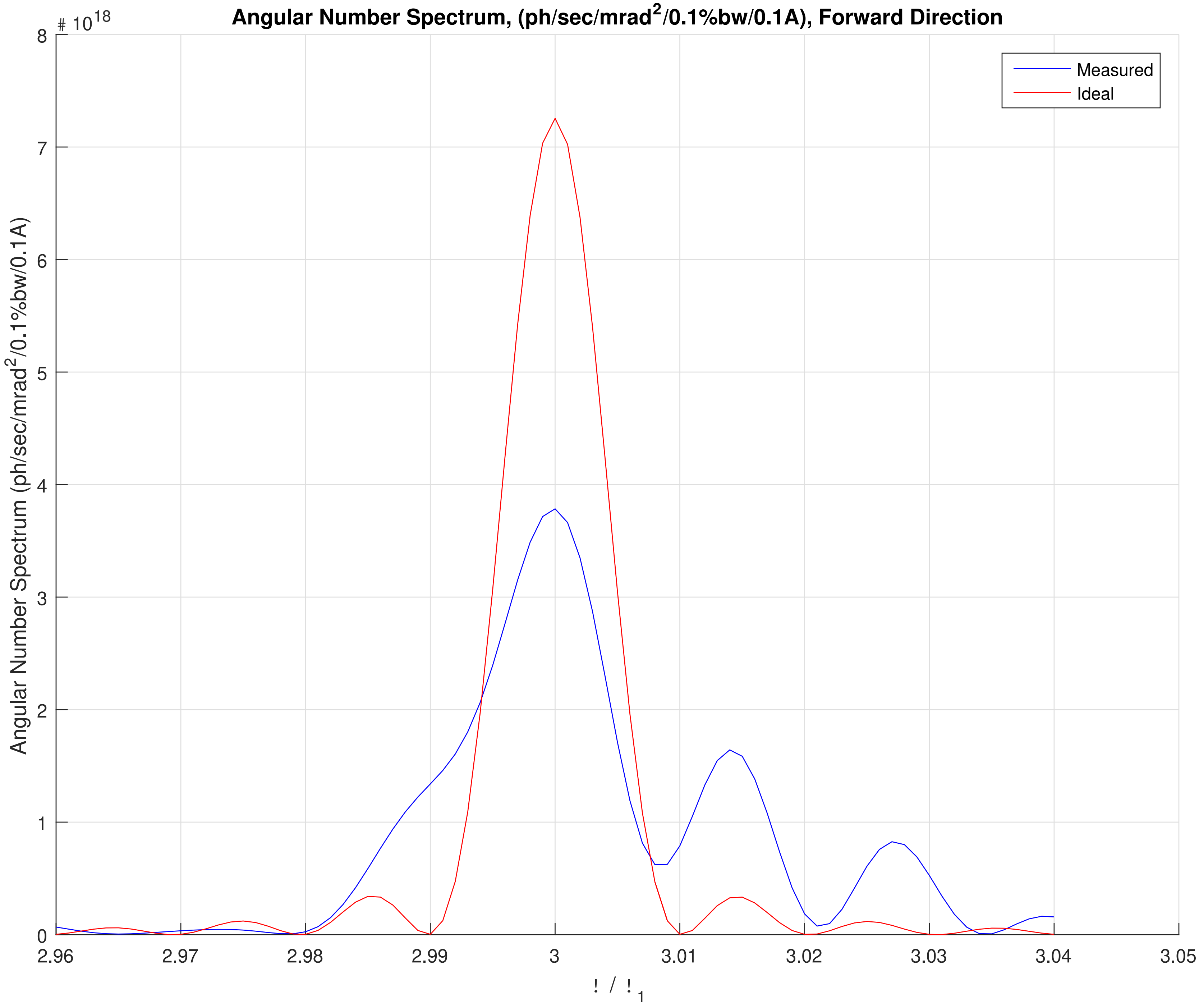


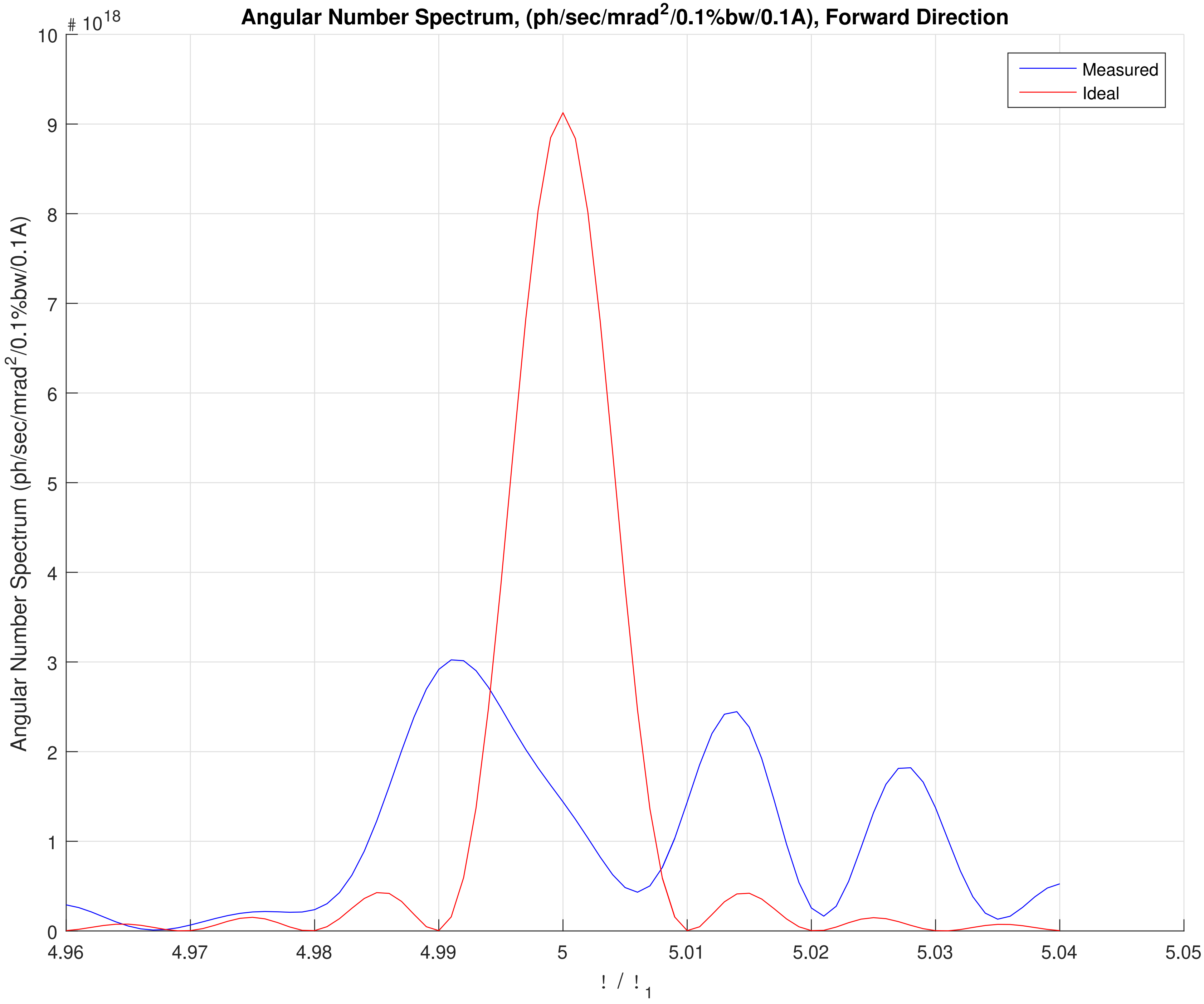
Re and Im Parts Of Ey(!), Forward Direction, $! = !_1$



Angular Number Spectrum, (ph/sec/mrad^2/0.1%bw/0.1A), Forward Direction
10^{18}
4
3.5
3
2.5
2
1.5
1
0.5
0
Angular Number Spectrum (ph/sec/mrad^2/0.1%bw/0.1A)
0
5
10
15
! / !$_1$


Angular Number Spectrum, (ph/sec/mrad^2/0.1%bw/0.1A), Forward Direction
10^{18}
4
3.5
3
2.5
2
1.5
1
0.5
0
Angular Number Spectrum (ph/sec/mrad^2/0.1%bw/0.1A)
0.96
0.97
0.98
0.99
1
1.01
1.02
1.03
1.04
! / !$_1$
Measured
Ideal


Angular Number Spectrum, (ph/sec/mrad^2/0.1%bw/0.1A), Forward Direction
10^{18}
8
7
6
5
4
3
2
1
0
Angular Number Spectrum (ph/sec/mrad^2/0.1%bw/0.1A)
2.96
2.97
2.98
2.99
3
3.01
3.02
3.03
3.04
3.05
! / !$_1$
Measured
Ideal


Angular Number Spectrum, (ph/sec/mrad^2/0.1%bw/0.1A), Forward Direction
10^{18}
10
9
8
7
6
5
4
3
2
1
0
Angular Number Spectrum (ph/sec/mrad^2/0.1%bw/0.1A)
Measured
Ideal
4.96
4.97
4.98
4.99
5
5.01
5.02
5.03
5.04
5.05
! / ! $_1$