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SLAC Magnetic Measurements

EPU Analysis
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INPUT-FILE-NAME =hall2-anal-probe1-field.dat
INPUT-FILE-TYPE =ZBXYZH
CORR-REQUIRED =0
GAMMA =26671.59
NOM-LAMBDA-U =0
NOM-K-VALUE =0
NOM-LAMBDA-R =0
NUM-POLES =196
NUM-END-POLES =4
CELL-LENGTH =3.656
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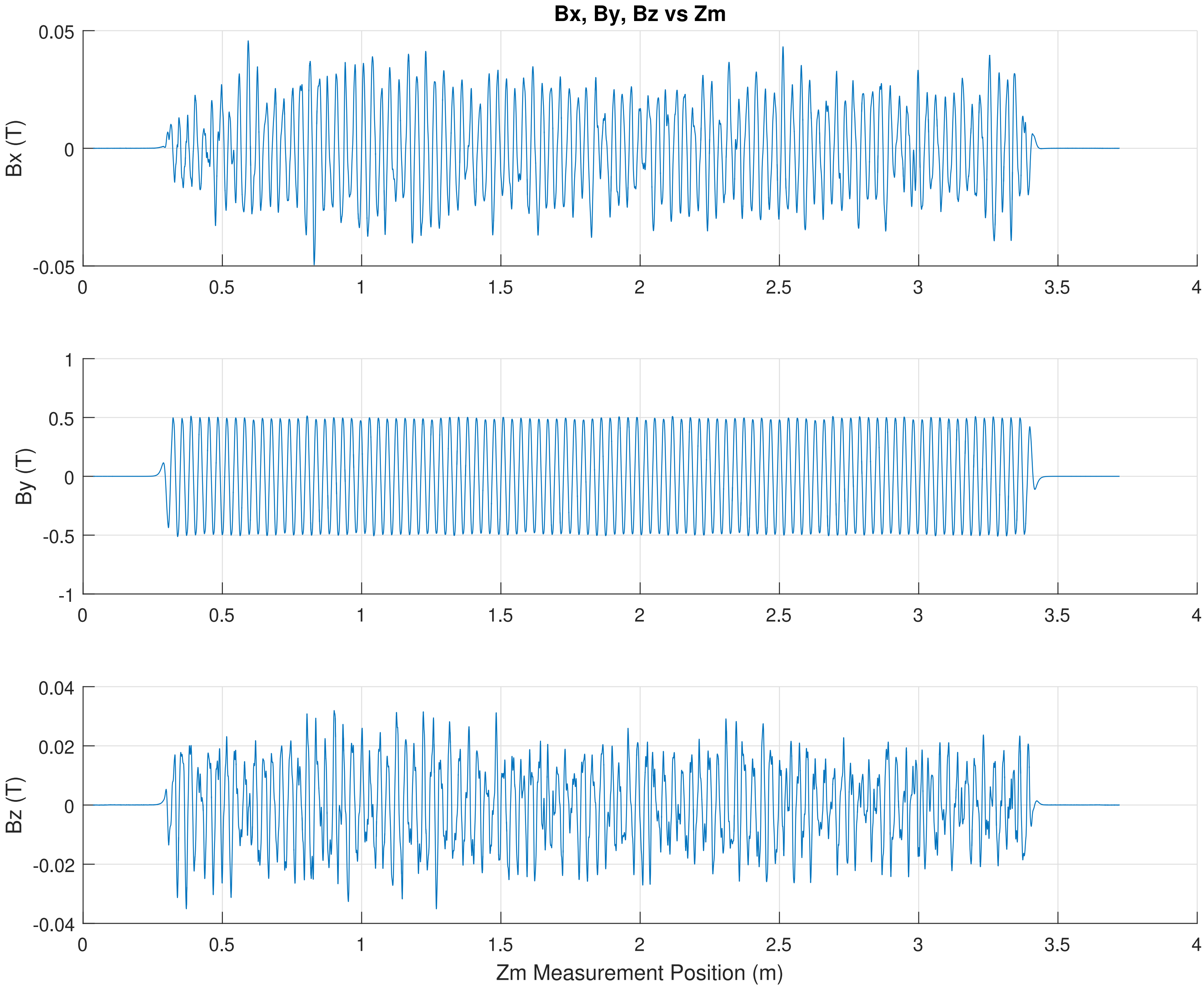
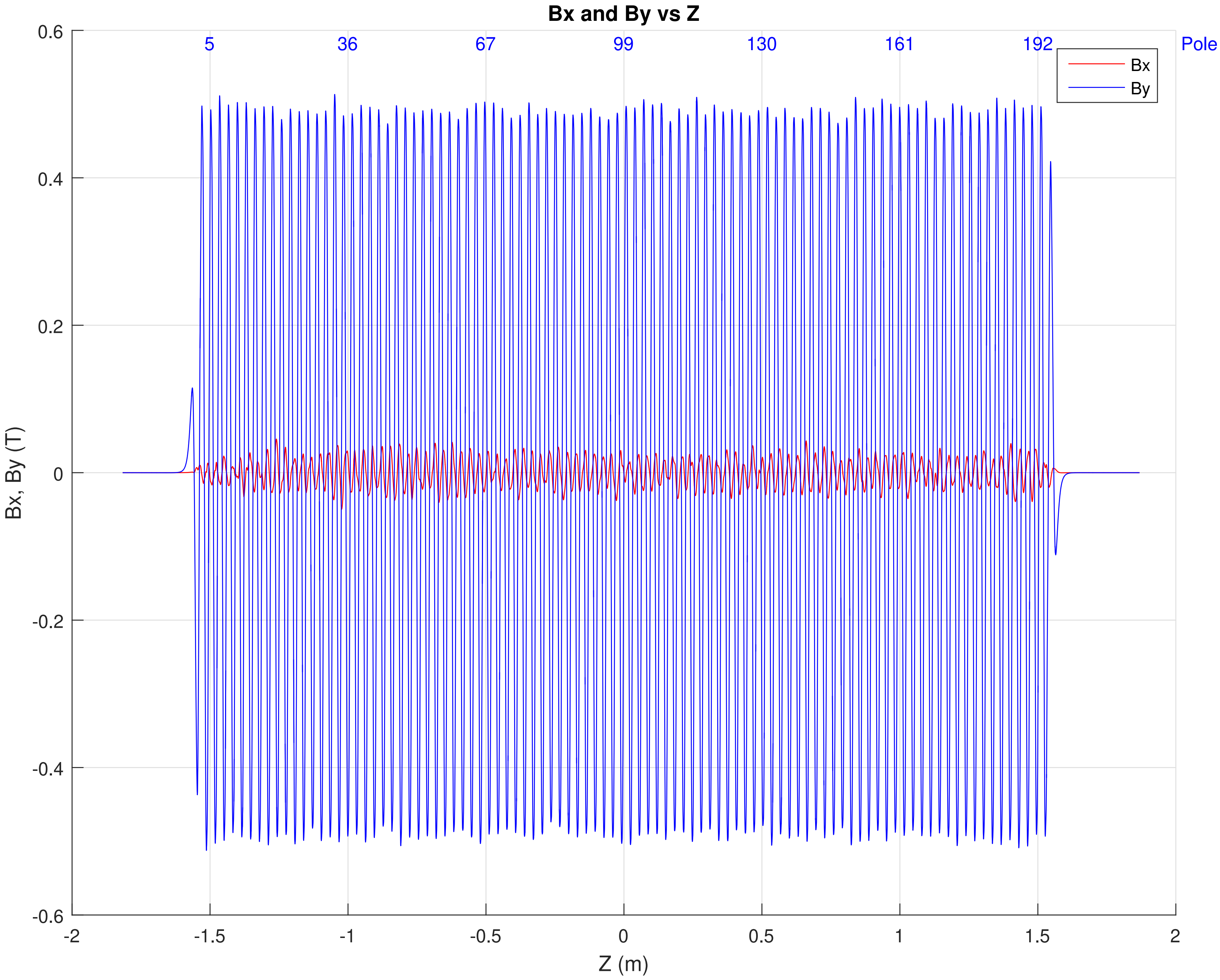
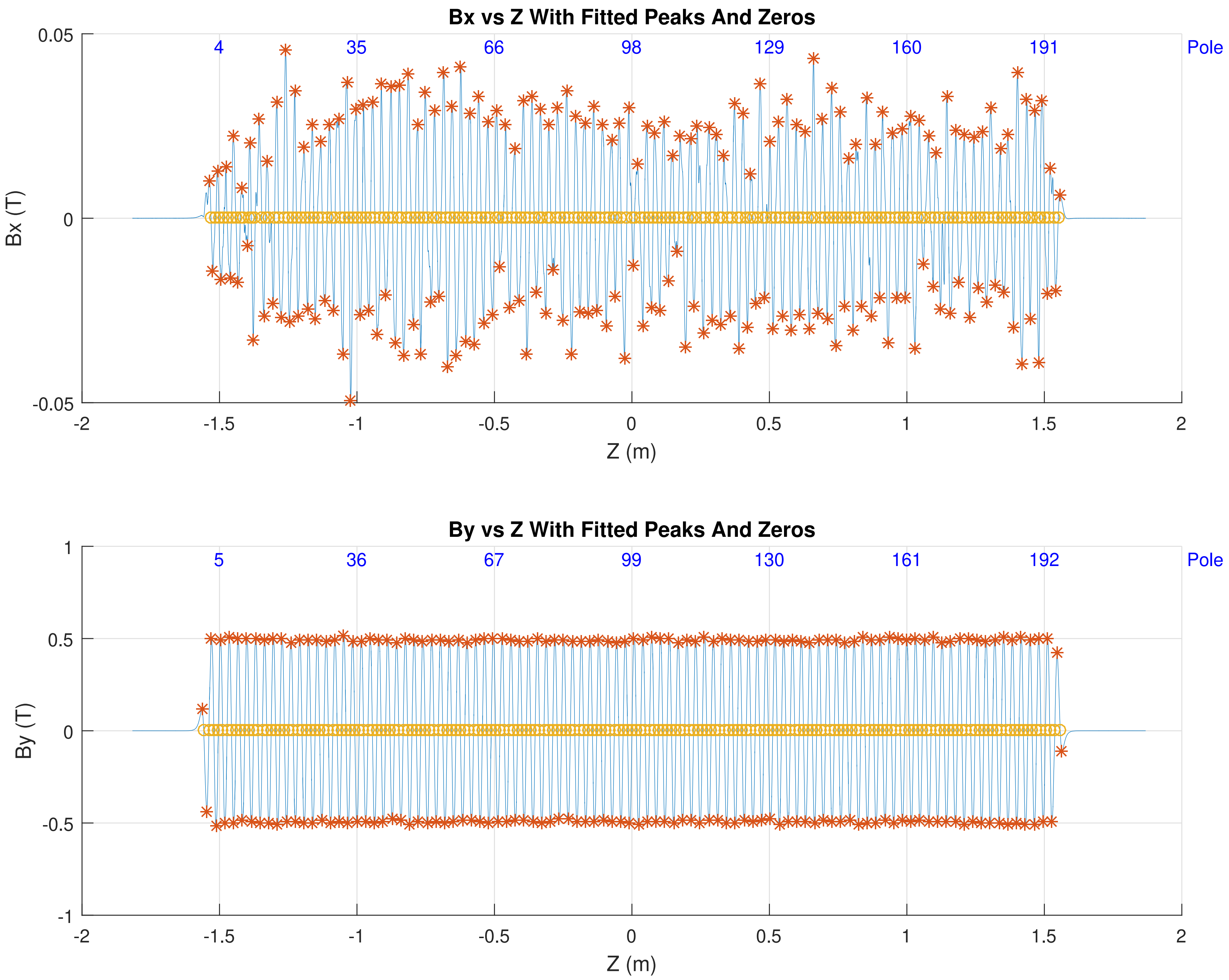


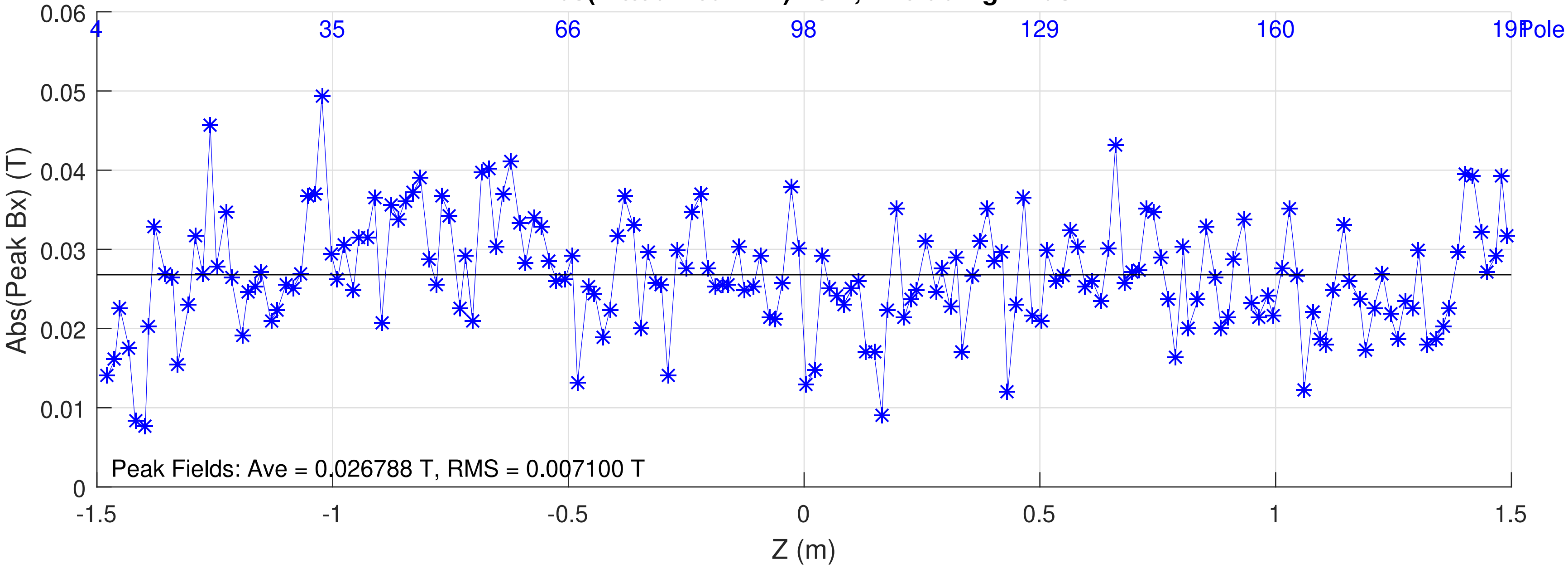
Bx, By, Bz vs Zm
Bx (T)
0.05
0
-0.05
By (T)
1
0.5
0
-0.5
-1
Bz (T)
0.04
0.02
0
-0.02
-0.04
0
0.5
1
1.5
2
2.5
3
3.5
4
Zm Measurement Position (m)


Bx and By vs Z
5
36
67
99
130
161
192
Pole
Bx
By
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
Bx, By (T)
-2
-1.5
-1
-0.5
0
0.5
1
1.5
2
Z (m)



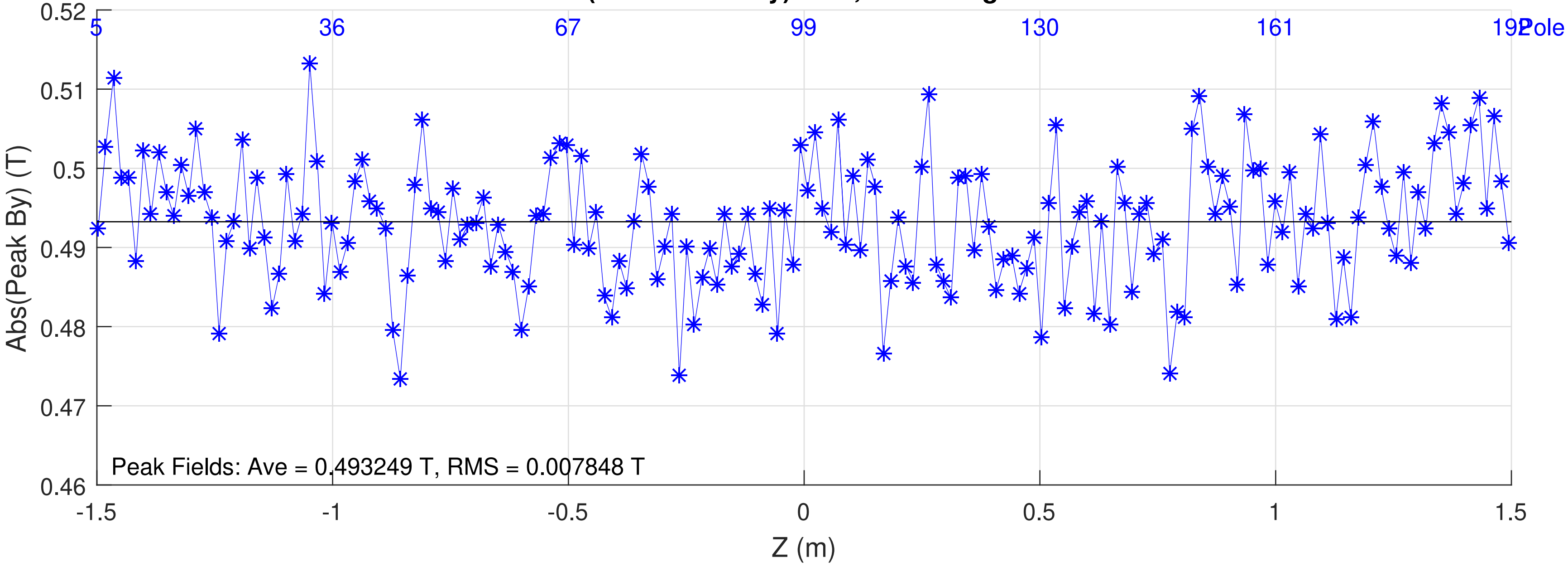
Bx vs Z With Fitted Peaks And Zeros

By vs Z With Fitted Peaks And Zeros



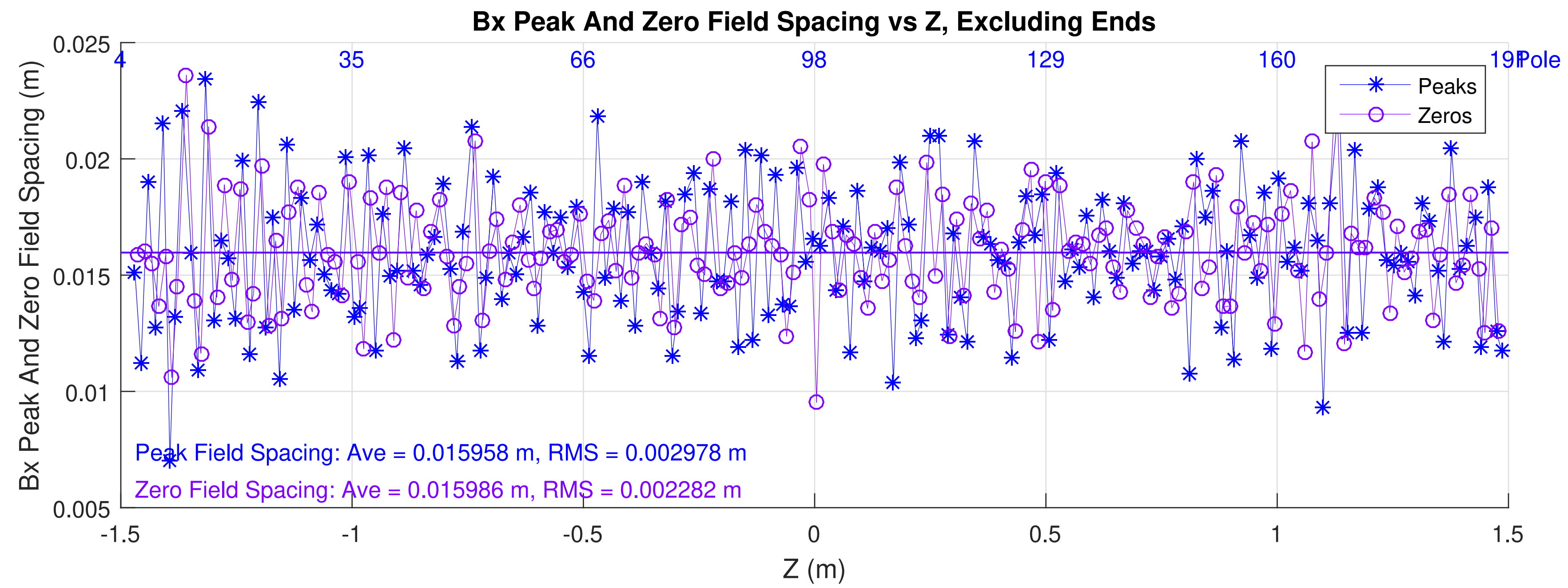
Abs(Fitted Peak Bx) vs Z, Excluding Ends

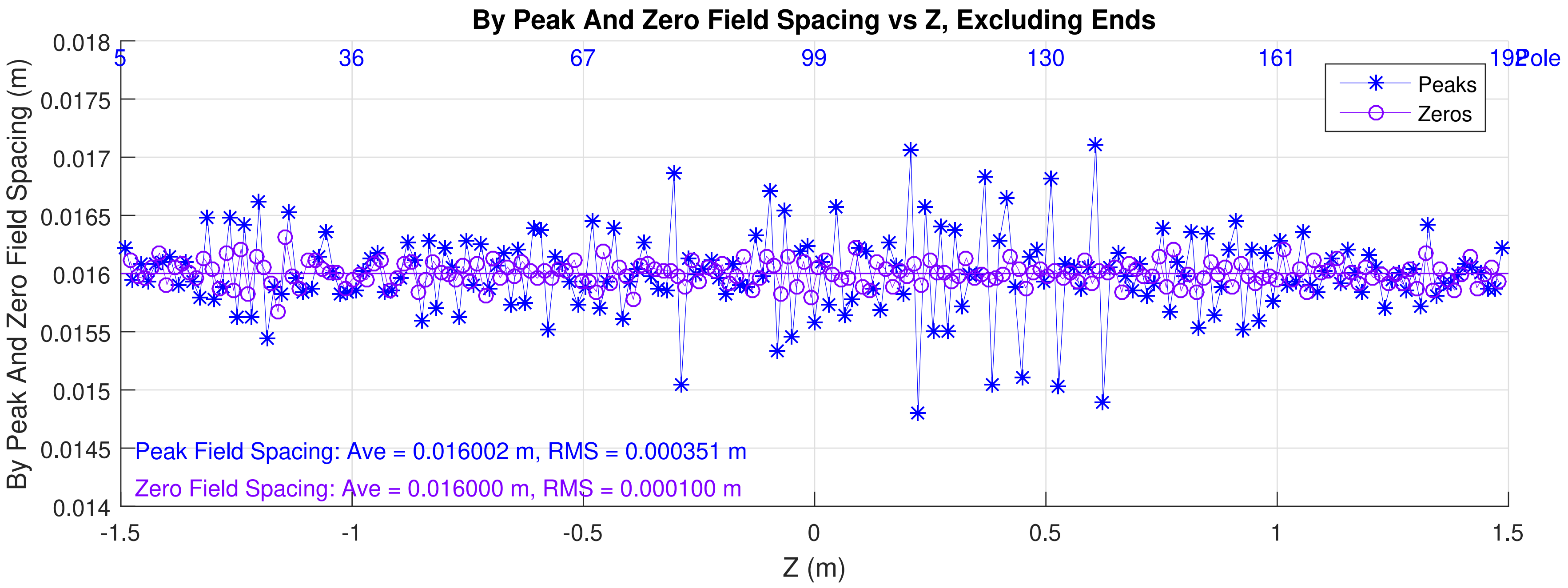
Peak Fields: Ave = 0.026788 T, RMS = 0.007100 T

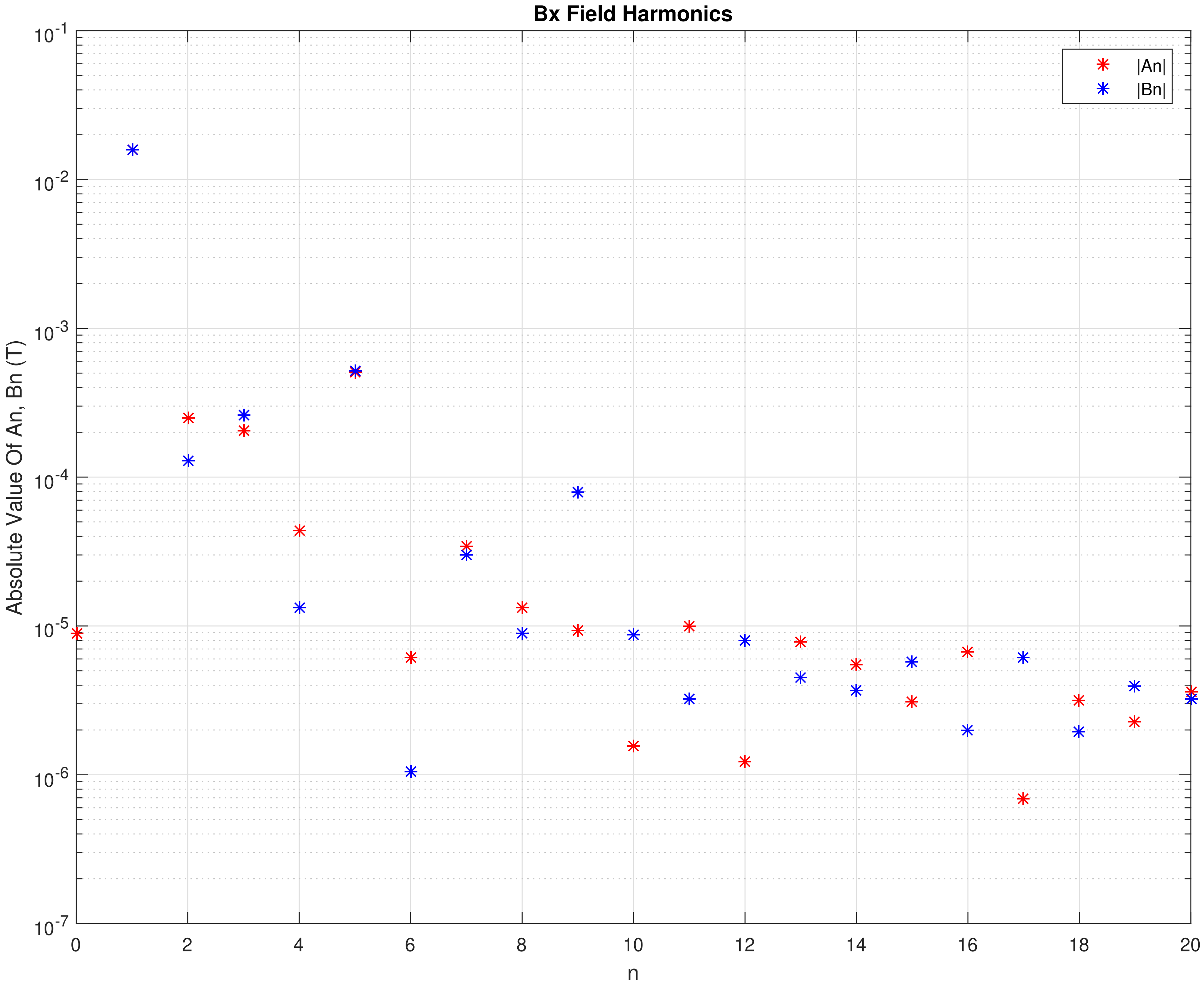


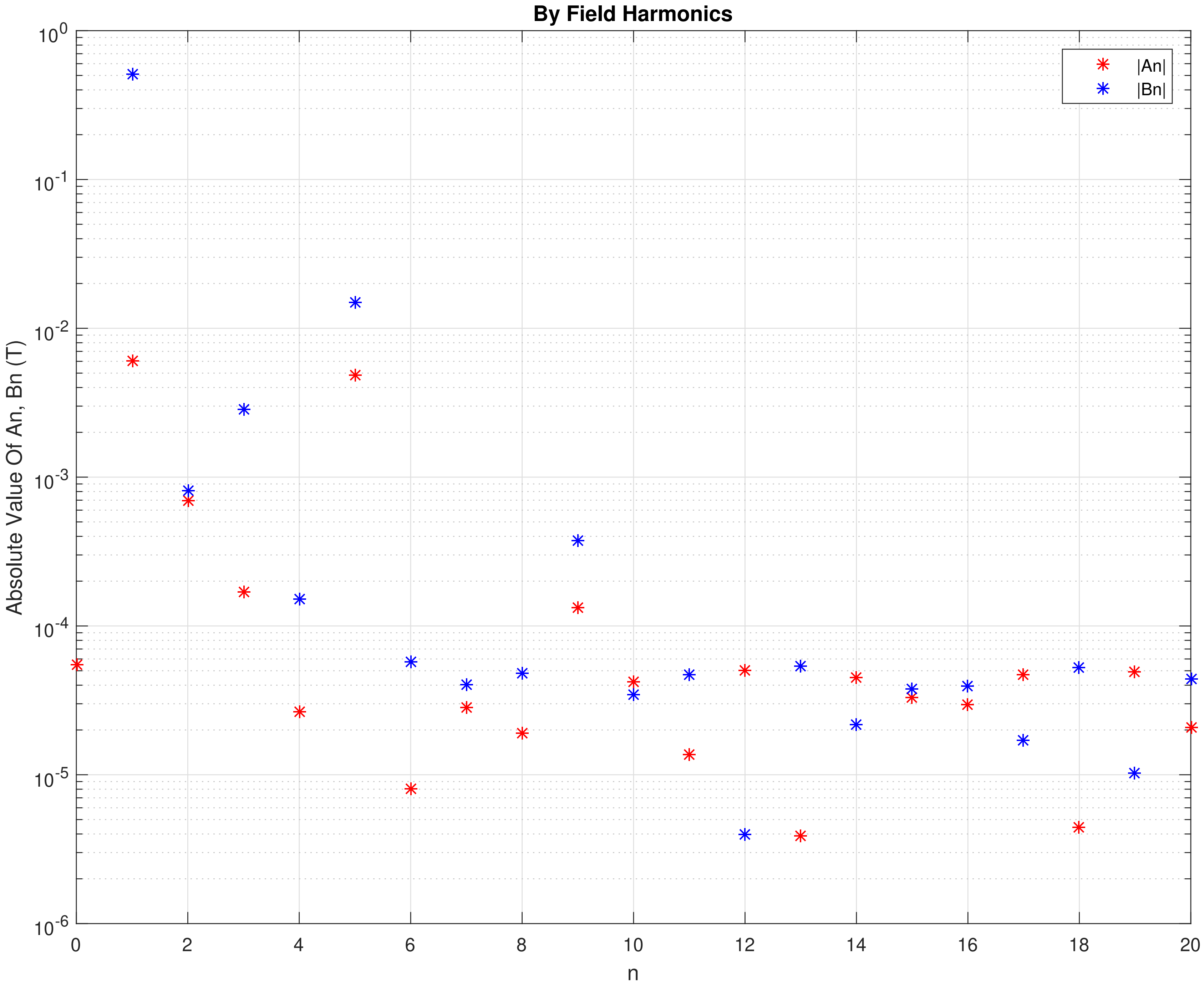
Abs(Fitted Peak By) vs Z, Excluding Ends

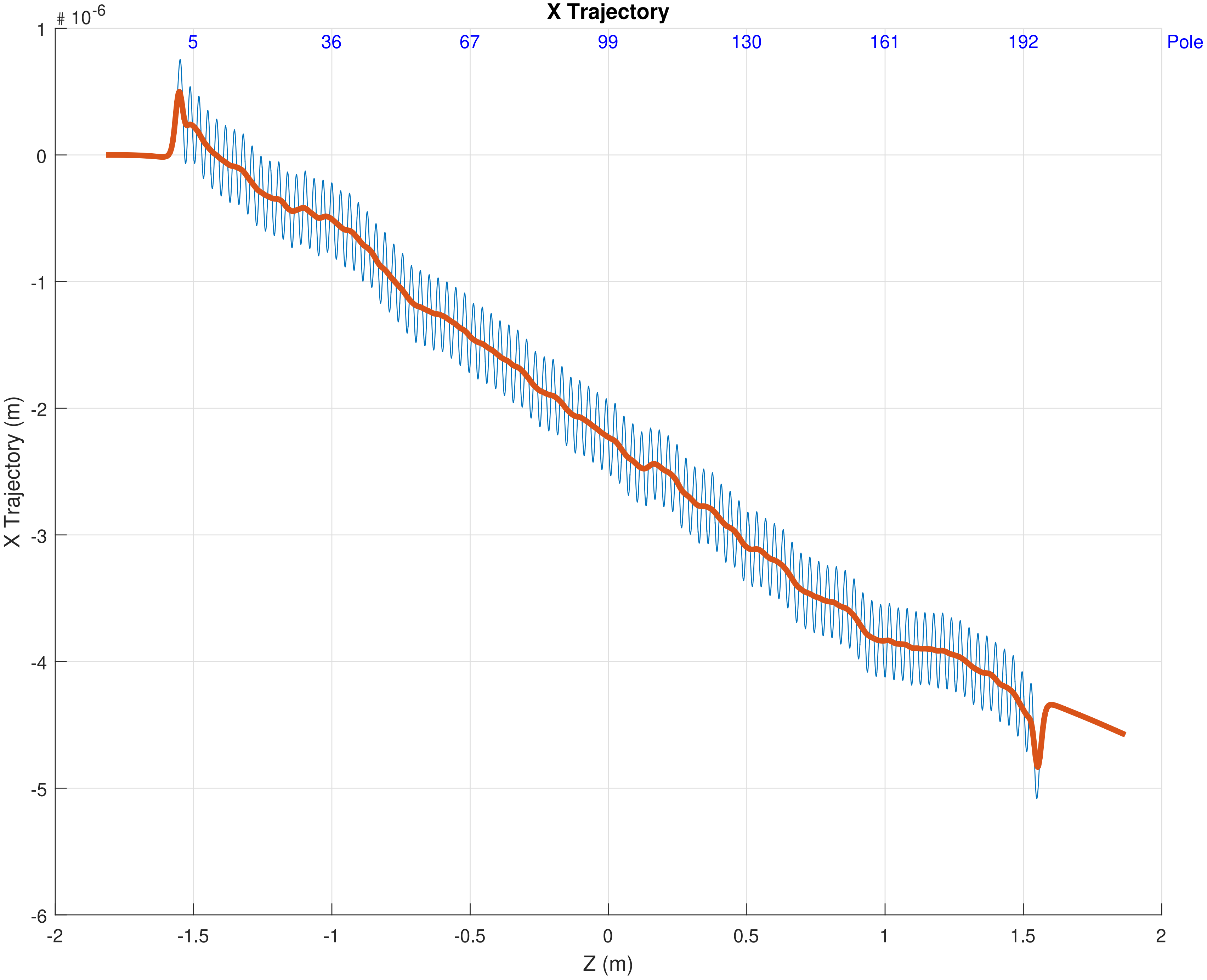
Peak Fields: Ave = 0.493249 T, RMS = 0.007848 T

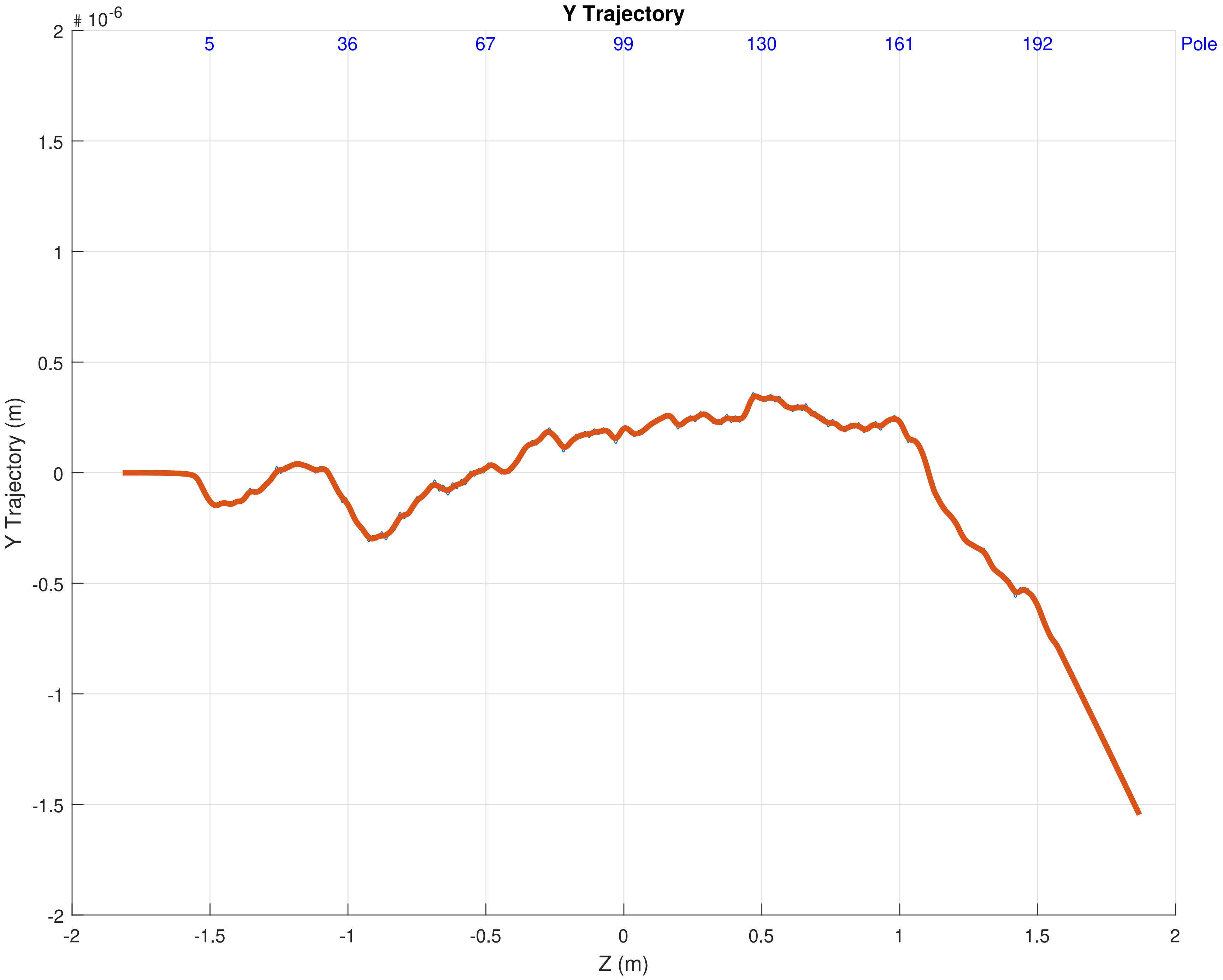

Bx Peak And Zero Field Spacing vs Z, Excluding Ends
Bx Peak And Zero Field Spacing (m)
0.025
0.02
0.015
0.01
0.005
4
35
66
98
129
160
191
Pole
Peaks
Zeros
Peak Field Spacing: Ave = 0.015958 m, RMS = 0.002978 m
Zero Field Spacing: Ave = 0.015986 m, RMS = 0.002282 m
-1.5
-1
-0.5
0
0.5
1
1.5
Z (m)

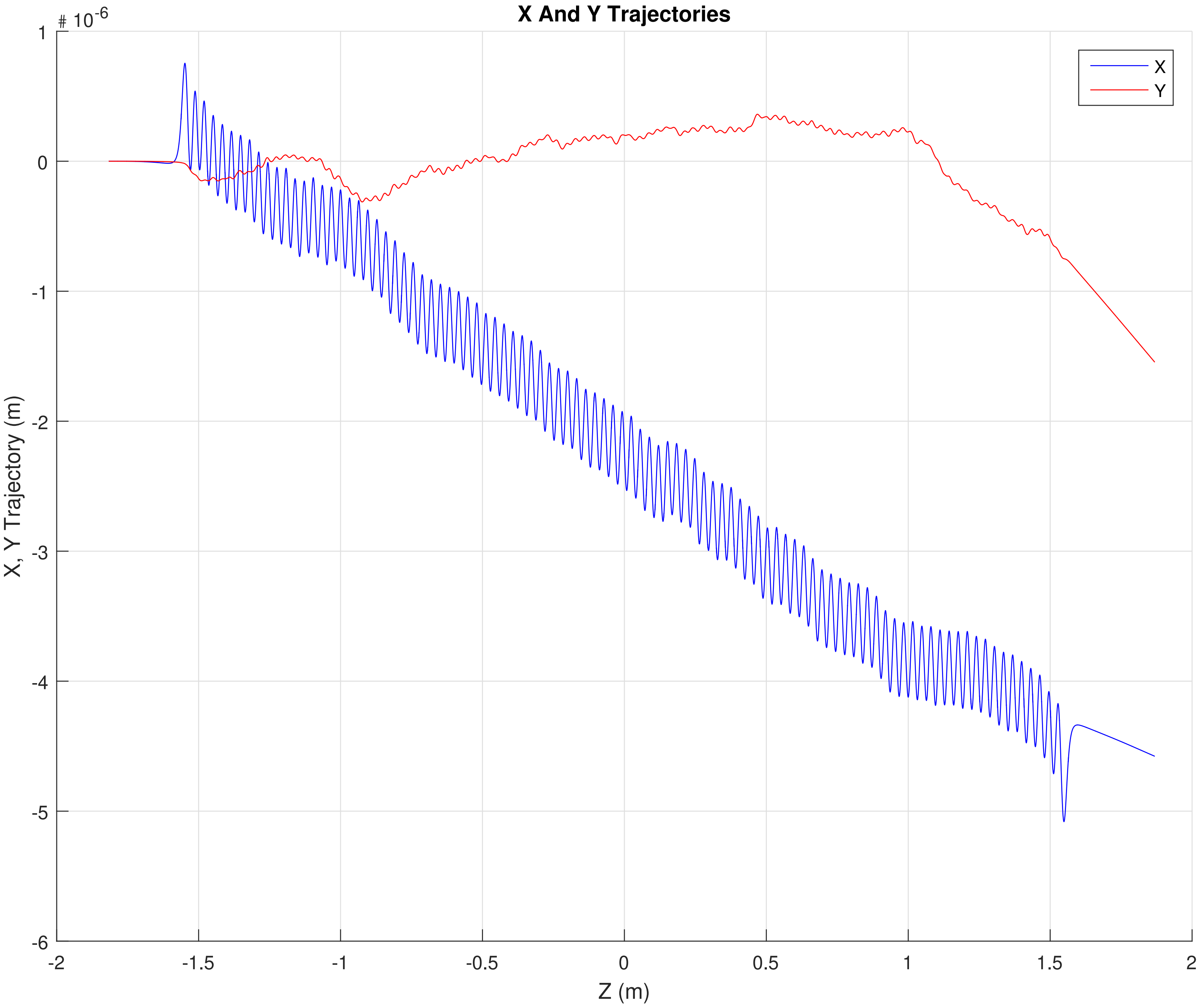

By Peak And Zero Field Spacing vs Z, Excluding Ends
By Peak And Zero Field Spacing (m)
0.018
0.0175
0.017
0.0165
0.016
0.0155
0.015
0.0145
0.014
5
36
67
99
130
161
192
Pole
Peaks
Zeros
Peak Field Spacing: Ave = 0.016002 m, RMS = 0.000351 m
Zero Field Spacing: Ave = 0.016000 m, RMS = 0.000100 m
-1.5
-1
-0.5
0
0.5
1
1.5
Z (m)

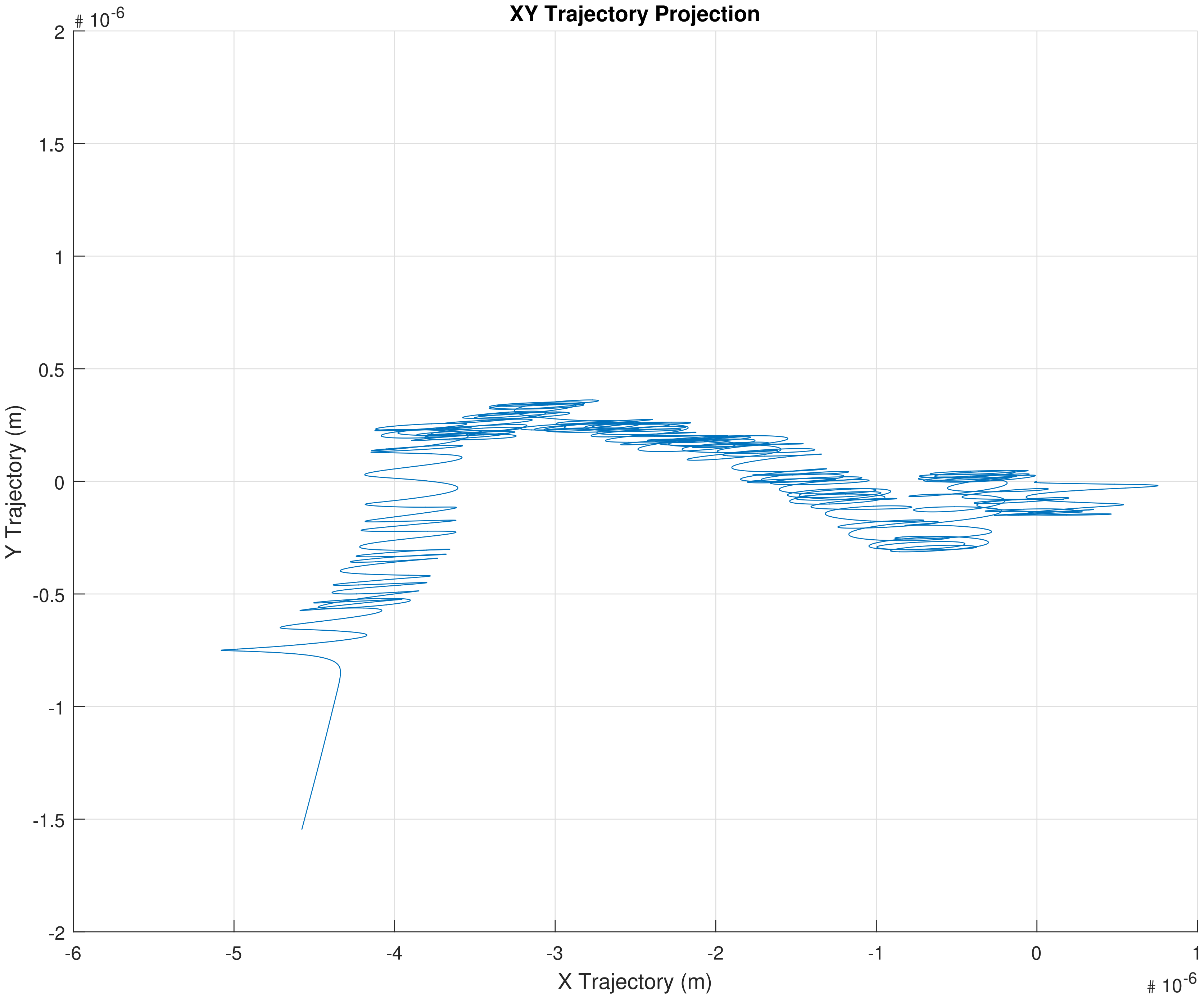

Bx Field Harmonics
Absolute Value Of An, Bn (T)
n
|An|
|Bn|
10^{-1}
10^{-2}
10^{-3}
10^{-4}
10^{-5}
10^{-6}
10^{-7}
0
2
4
6
8
10
12
14
16
18
20

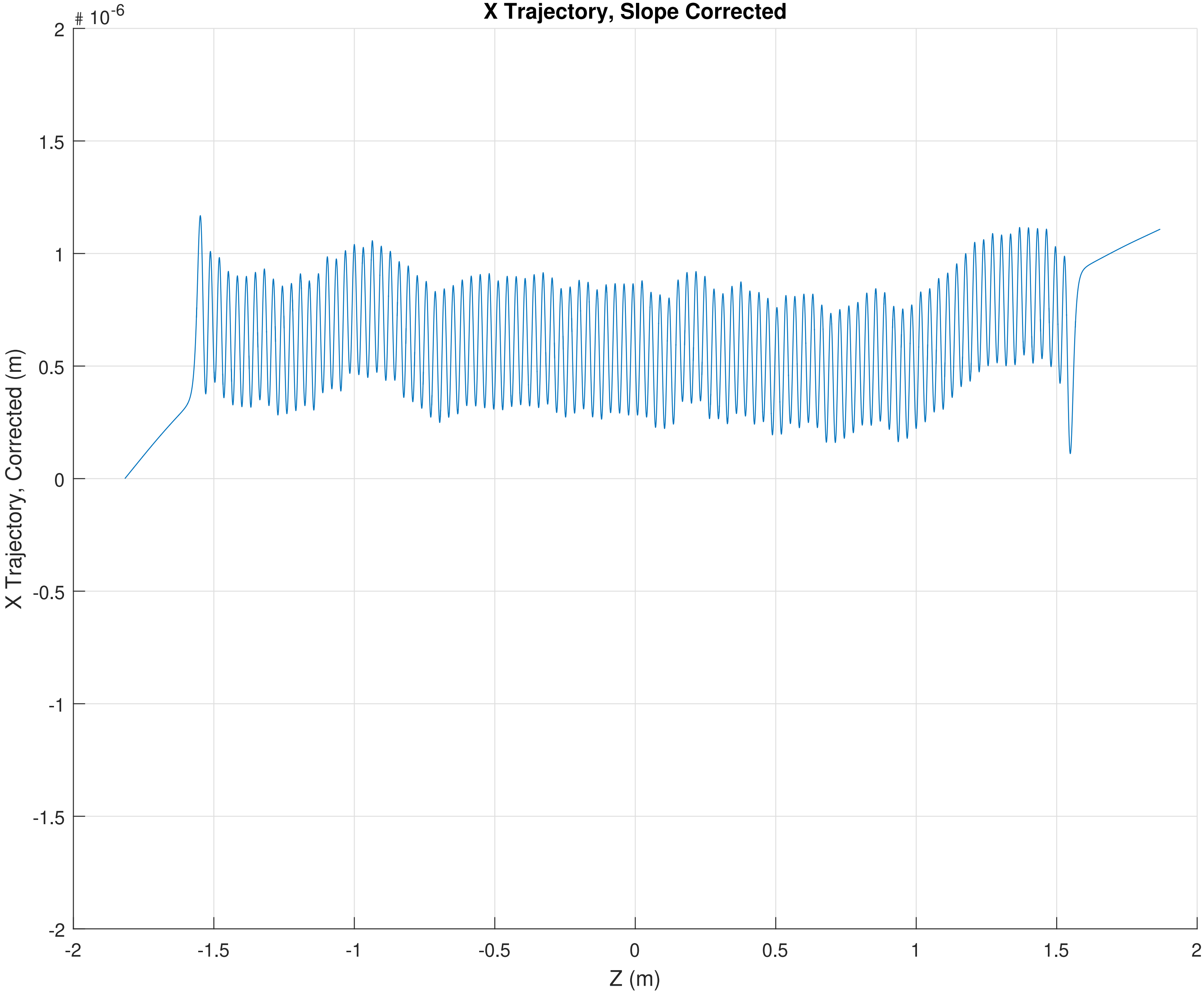

By Field Harmonics
Absolute Value Of An, Bn (T)
n
10^{0}
10^{-1}
10^{-2}
10^{-3}
10^{-4}
10^{-5}
10^{-6}
0
2
4
6
8
10
12
14
16
18
20
|An|
|Bn|

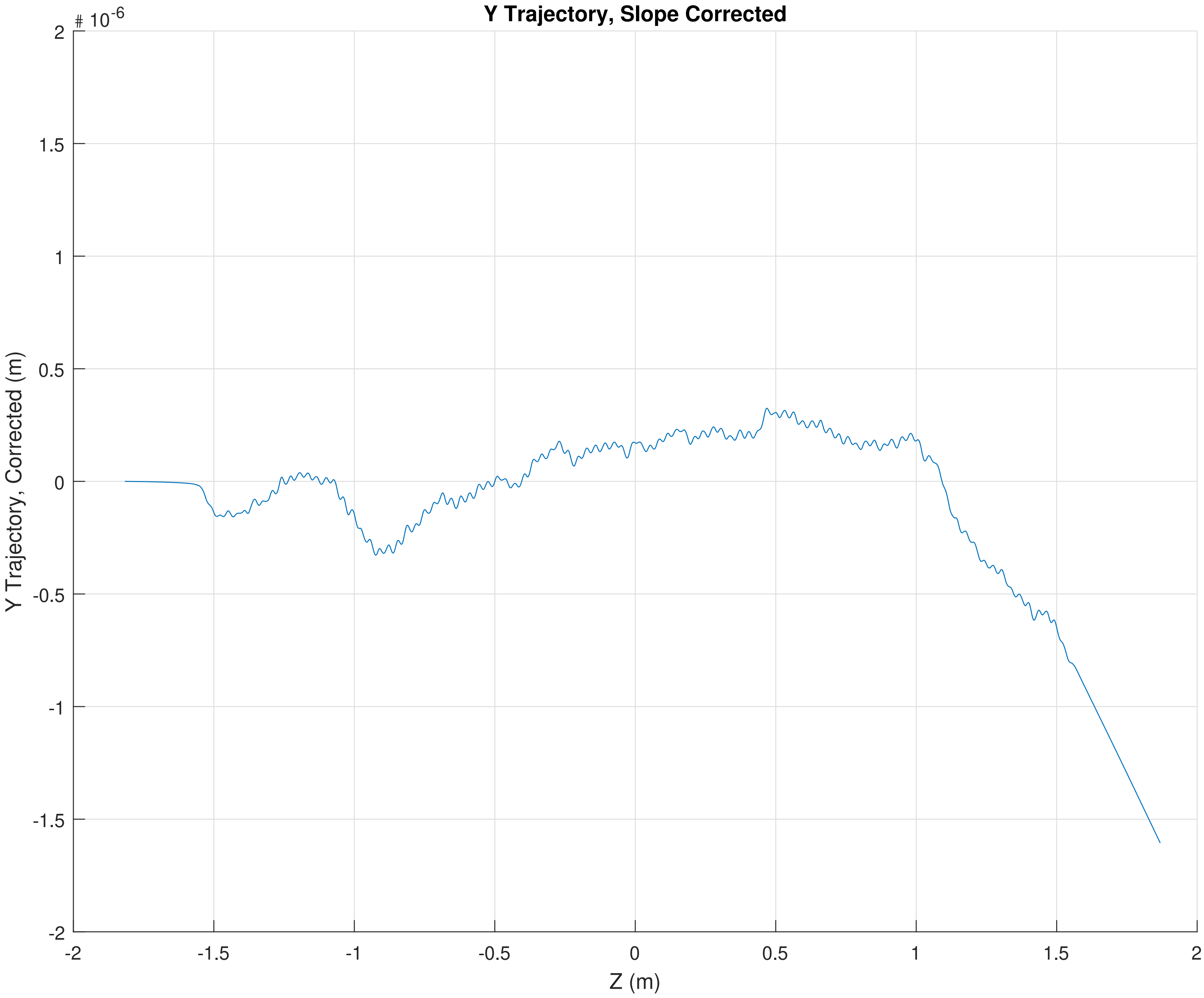

X Trajectory
10^-6
1
0
-1
-2
-3
-4
-5
-6
5
36
67
99
130
161
192
Pole
-2
-1.5
-1
-0.5
0
0.5
1
1.5
2
Z (m)
X Trajectory (m)

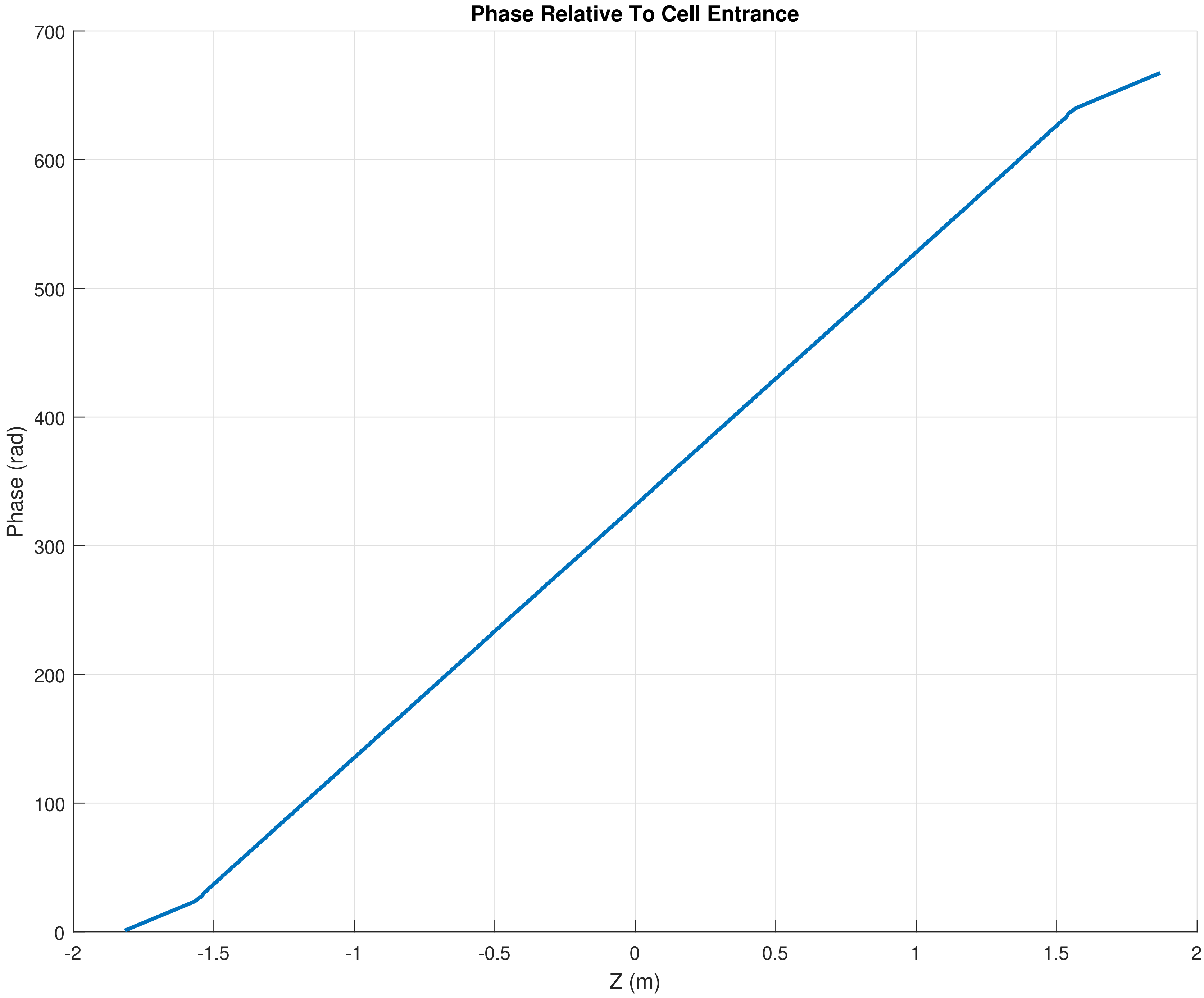

Y Trajectory
10^-6
2
1.5
1
0.5
0
-0.5
-1
-1.5
-2
5
36
67
99
130
161
192
Pole
Y Trajectory (m)
-2
-1.5
-1
-0.5
0
0.5
1
1.5
2
Z (m)

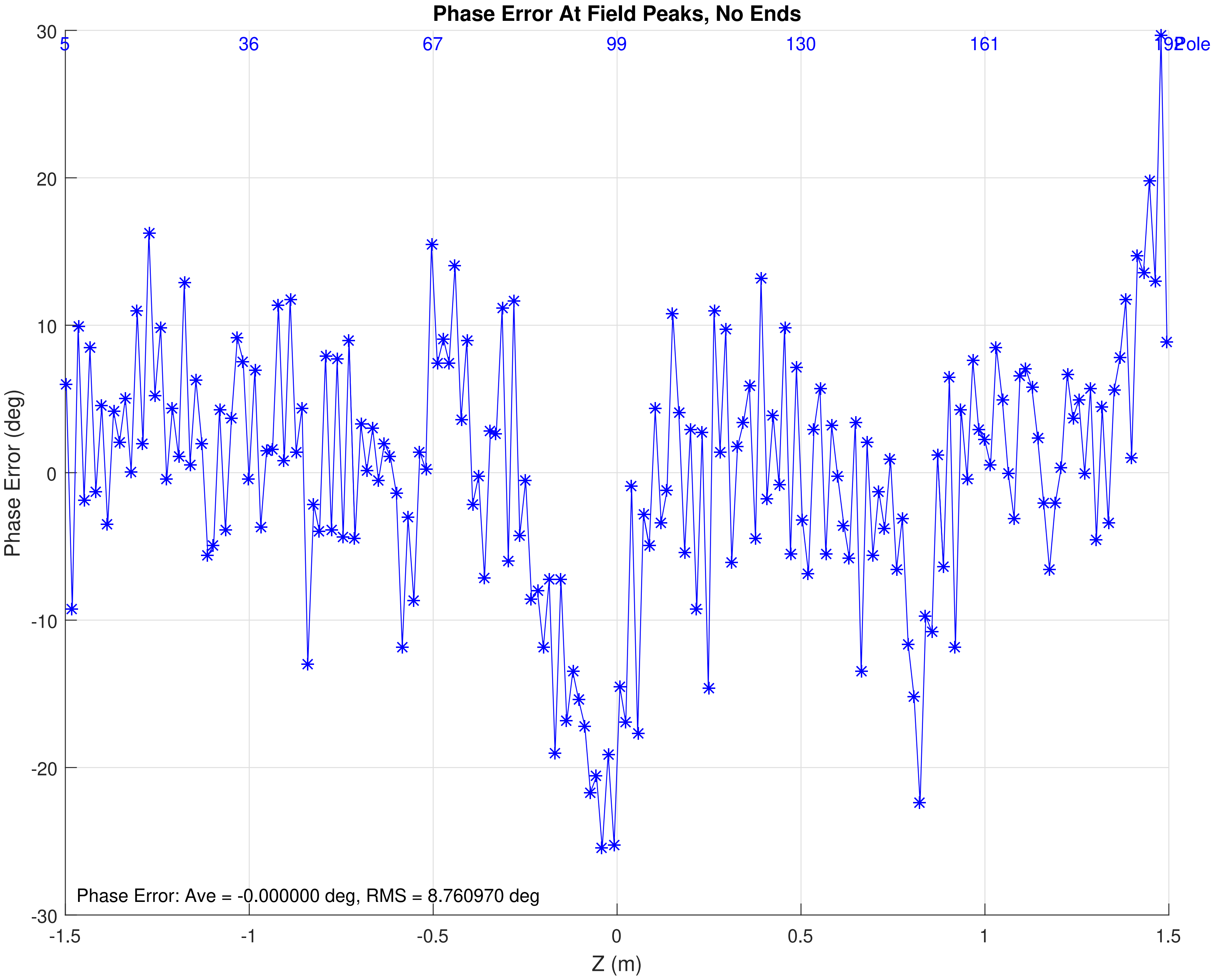

X And Y Trajectories
10^-6
1
0
-1
-2
-3
-4
-5
-6
X, Y Trajectory (m)
-2
-1.5
-1
-0.5
0
0.5
1
1.5
2
Z (m)
X
Y

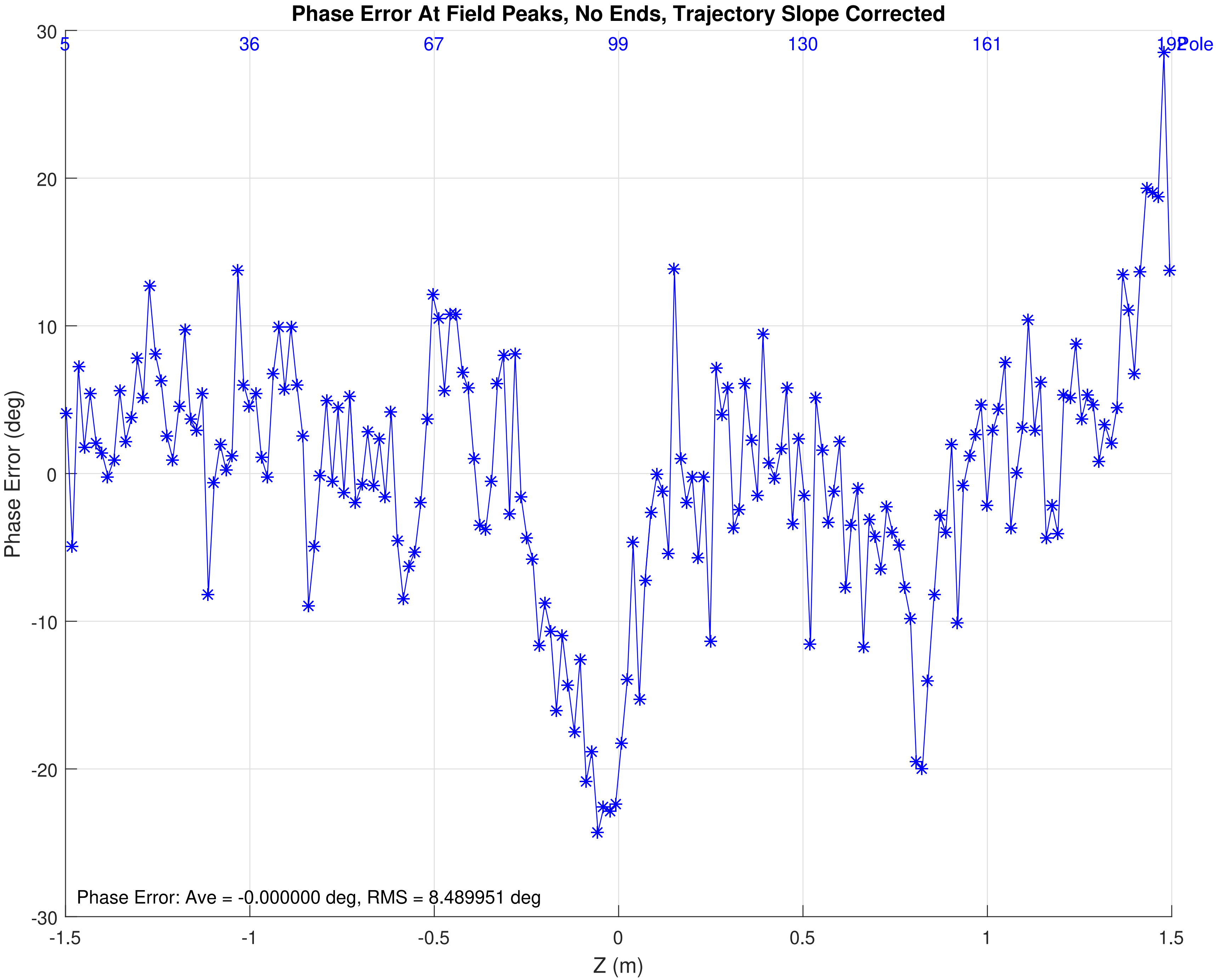

XY Trajectory Projection
10-6
2
1.5
1
0.5
0
-0.5
-1
-1.5
-2
Y Trajectory (m)
-6
-5
-4
-3
-2
-1
0
1
X Trajectory (m)
10-6

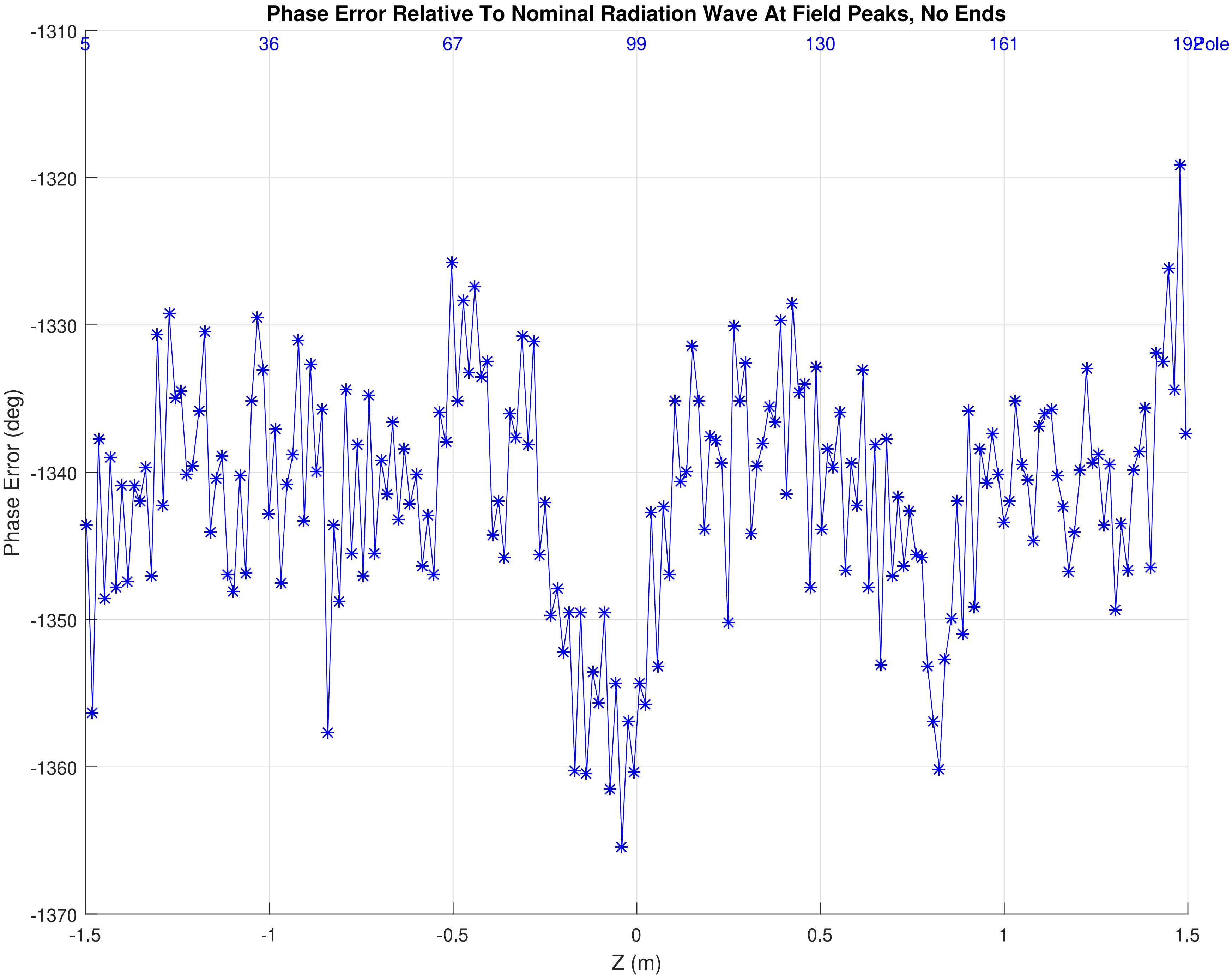

X Trajectory, Slope Corrected
10-6
2
1.5
1
0.5
0
-0.5
-1
-1.5
-2
X Trajectory, Corrected (m)
-2
-1.5
-1
-0.5
0
0.5
1
1.5
2
Z (m)

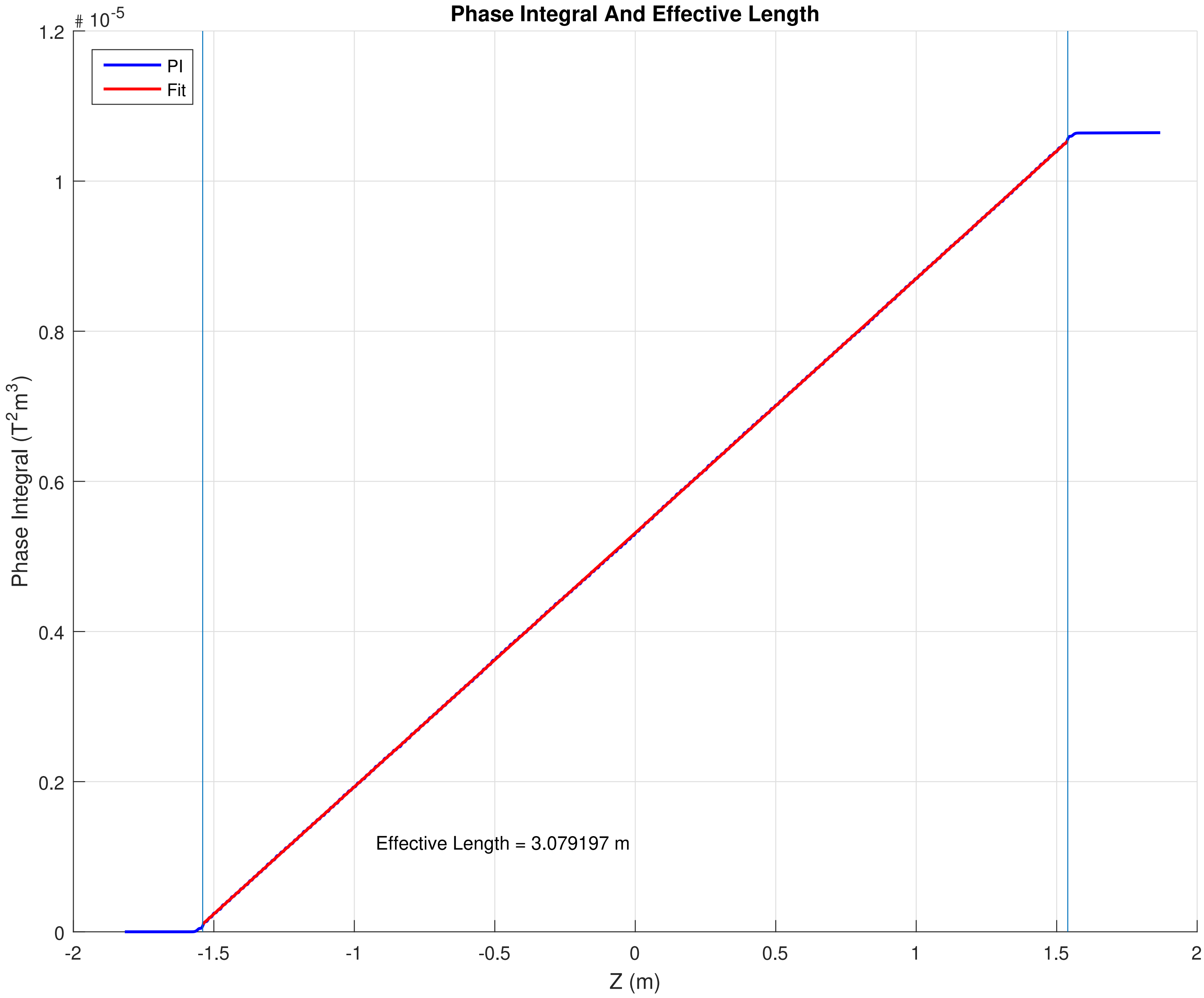

Y Trajectory, Slope Corrected
10^-6
2
1.5
1
0.5
0
-0.5
-1
-1.5
-2
Y Trajectory, Corrected (m)
-2
-1.5
-1
-0.5
0
0.5
1
1.5
2
Z (m)


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

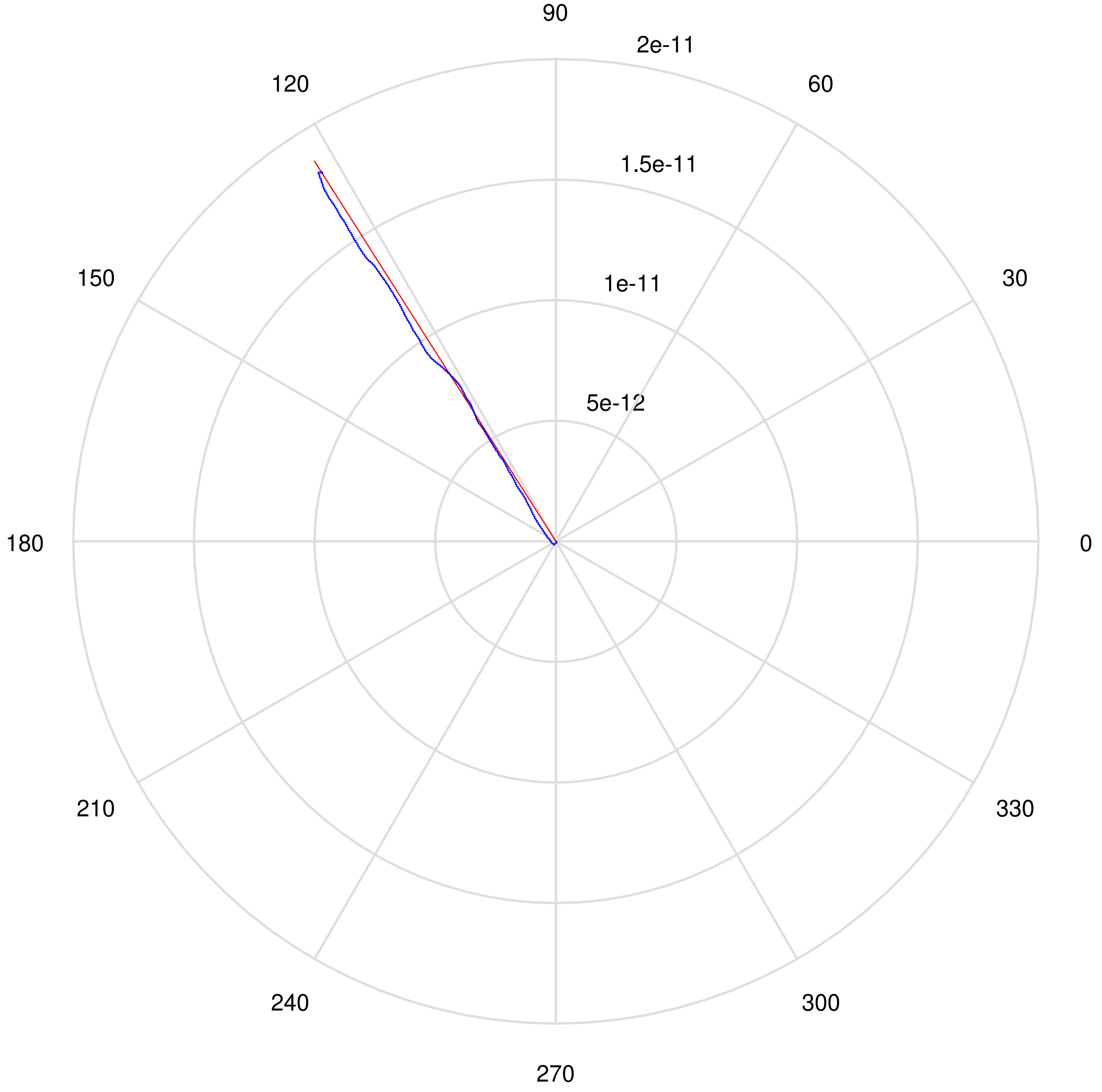

Phase Error At Field Peaks, No Ends
5
36
67
99
130
161
192
Pole
30
20
10
0
-10
-20
-30
Phase Error (deg)
-1.5
-1
-0.5
0
0.5
1
1.5
Z (m)
Phase Error: Ave = -0.000000 deg, RMS = 8.760970 deg

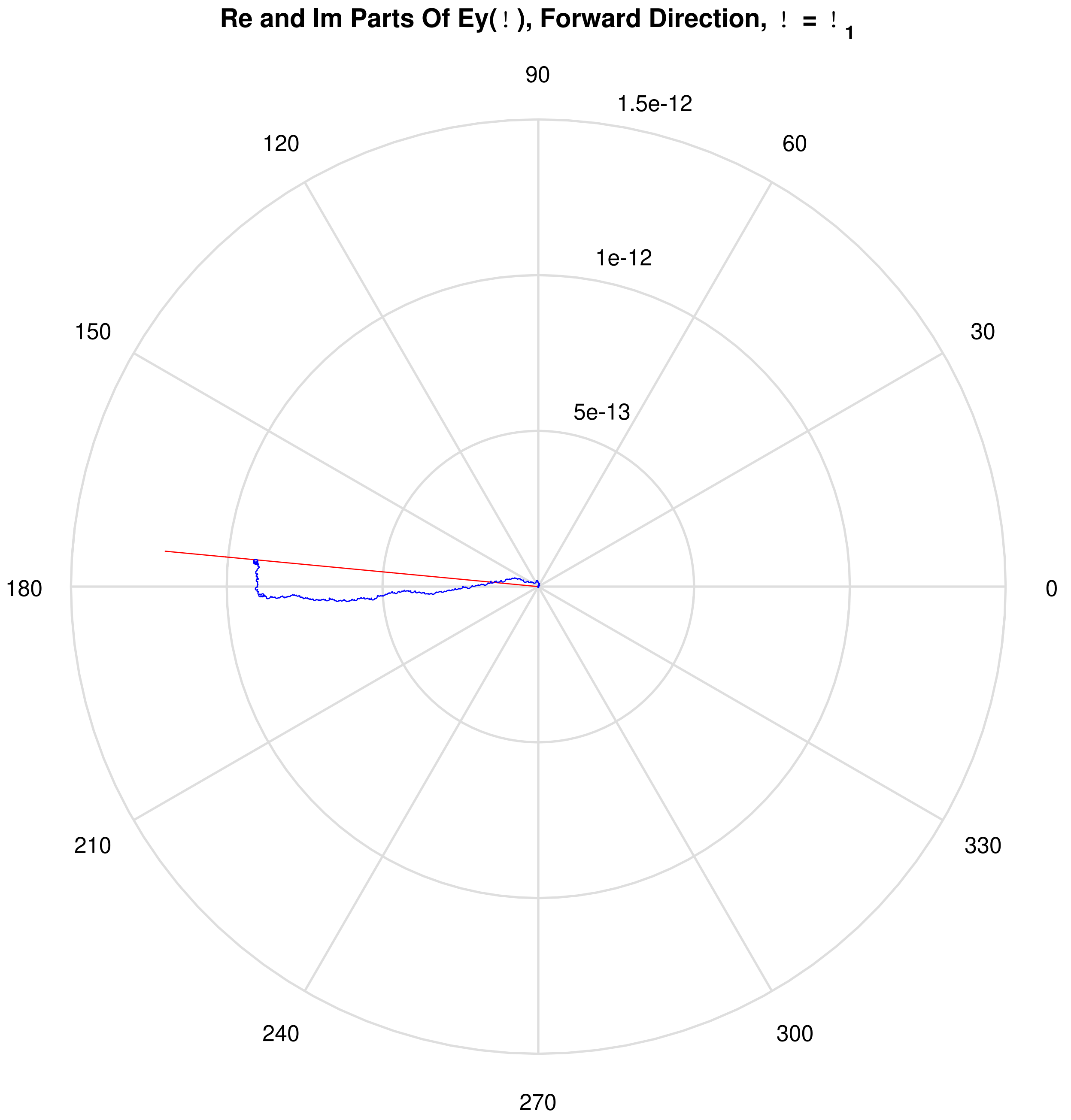

Phase Error At Field Peaks, No Ends, Trajectory Slope Corrected
5
36
67
99
130
161
192
Pole
Phase Error (deg)
30
20
10
0
-10
-20
-30
Phase Error: Ave = -0.000000 deg, RMS = 8.489951 deg
-1.5
-1
-0.5
0
0.5
1
1.5
Z (m)

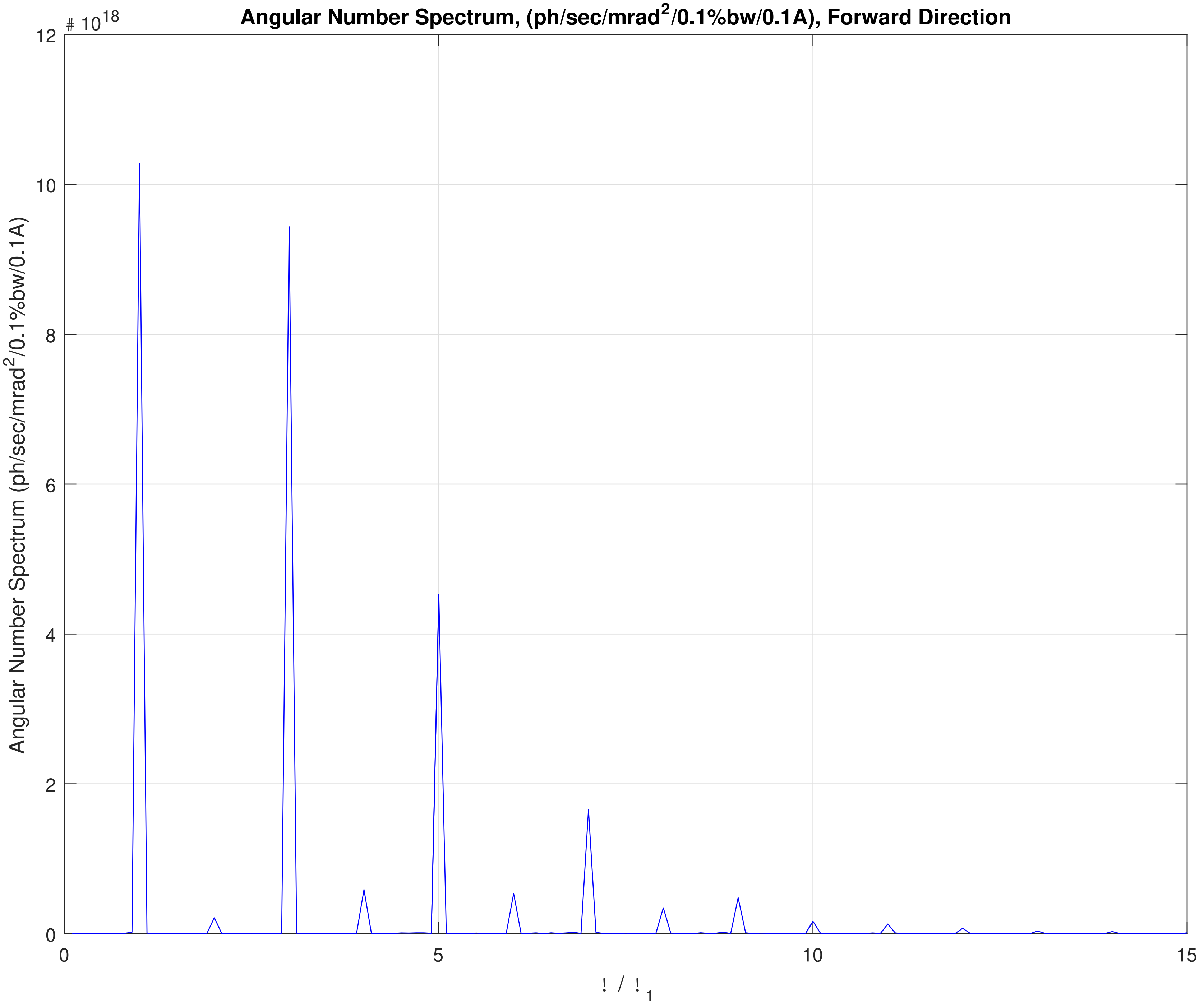

Phase Error Relative To Nominal Radiation Wave At Field Peaks, No Ends
-1310
-1320
-1330
-1340
-1350
-1360
-1370
Phase Error (deg)
5
36
67
99
130
161
192
Pole
-1.5
-1
-0.5
0
0.5
1
1.5
Z (m)


Phase Integral And Effective Length
10^-5
1.2
1
0.8
0.6
0.4
0.2
0
Phase Integral (T^2m^3)
PI
Fit
Effective Length = 3.079197 m
-2
-1.5
-1
-0.5
0
0.5
1
1.5
2
Z (m)

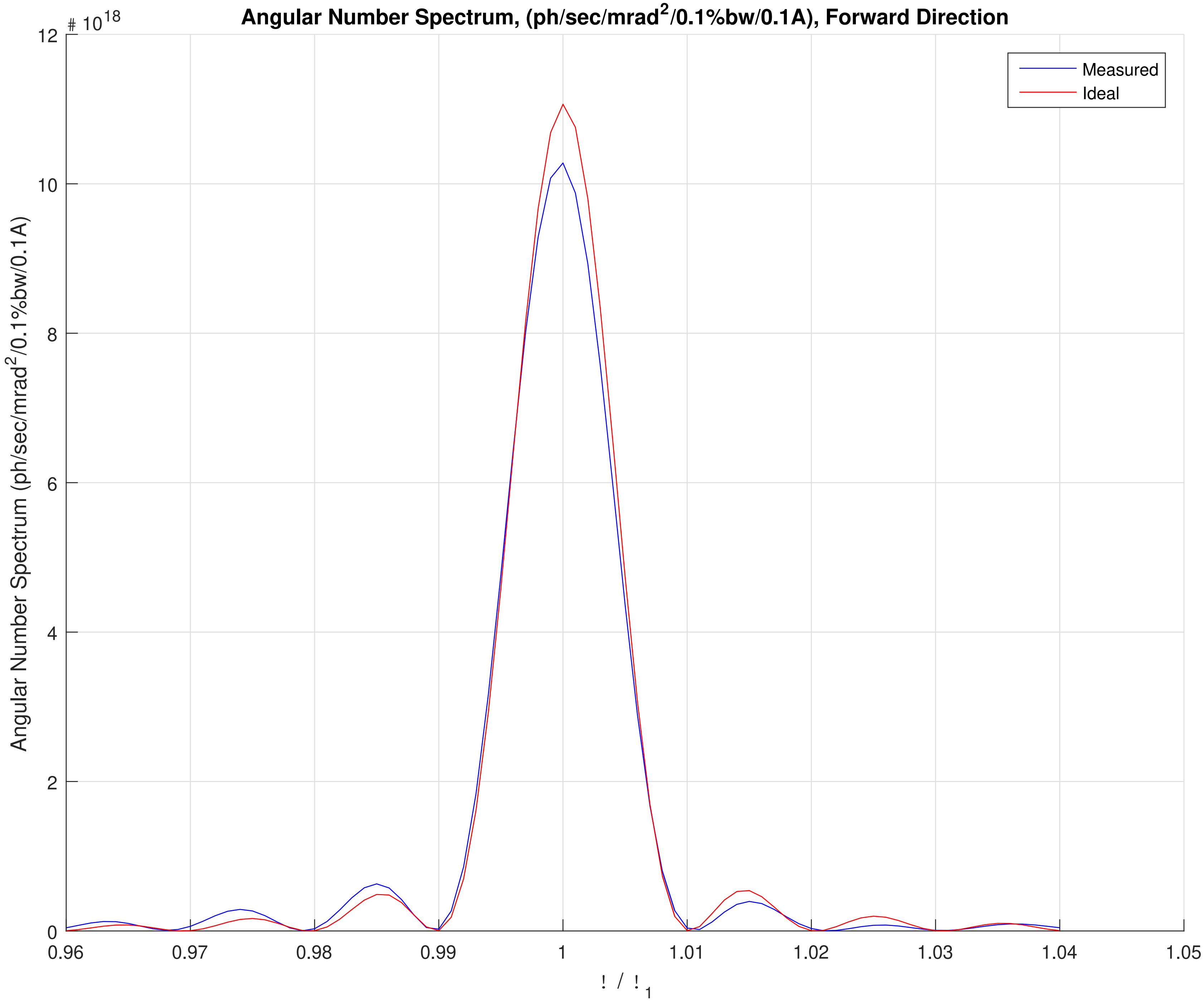
Re and Im Parts Of Ex(!), Forward Direction, ! = !$_1$

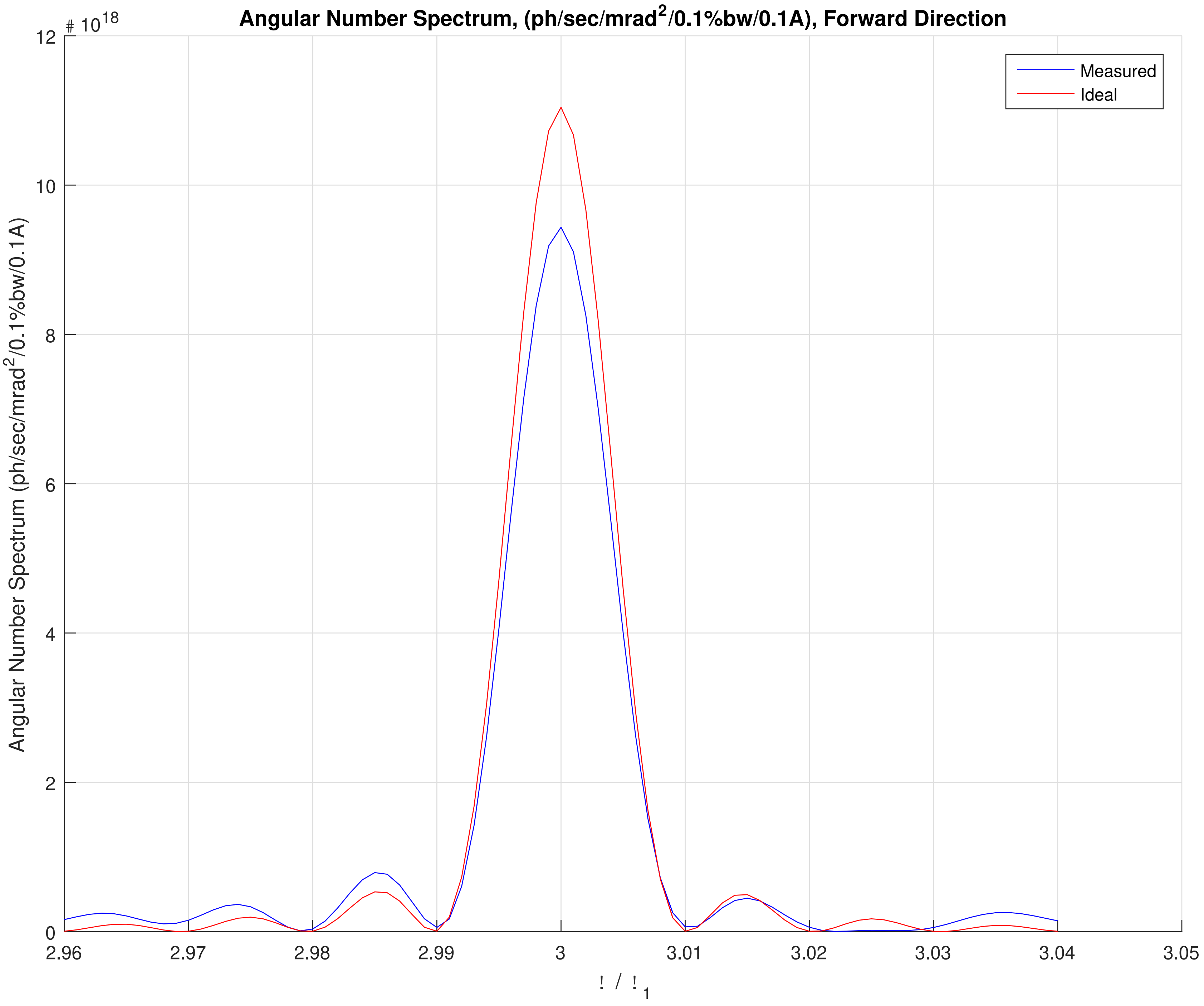


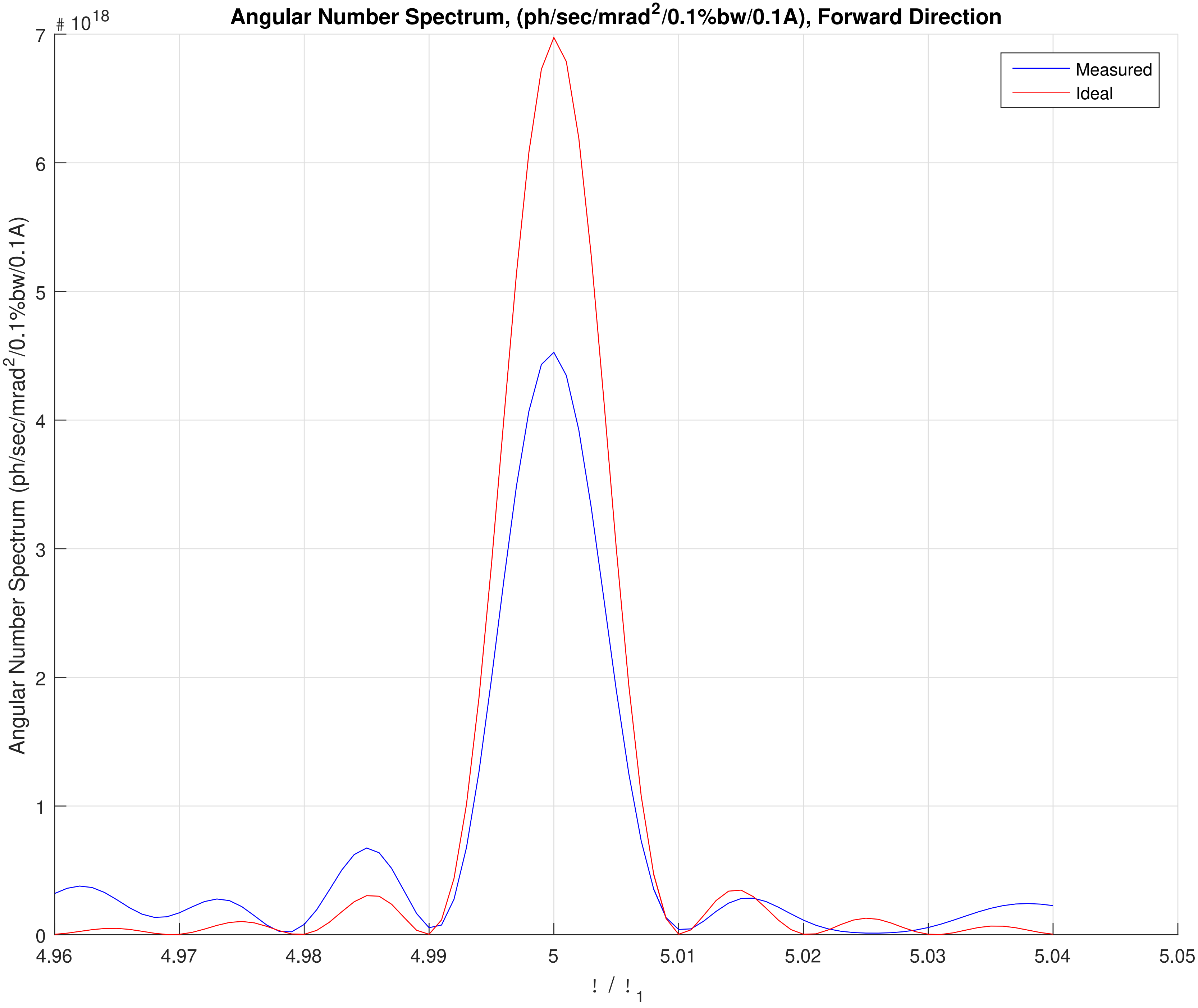

Re and Im Parts Of Ey(!), Forward Direction, ! = !$_1$
90
1.5e-12
120
60
1e-12
150
30
5e-13
180
0
210
330
240
300
270



Angular Number Spectrum, (ph/sec/mrad^2/0.1%bw/0.1A), Forward Direction


Angular Number Spectrum, (ph/sec/mrad^2/0.1%bw/0.1A), Forward Direction
10^{18}
12
10
8
6
4
2
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
1.05
! / !$_1$
Measured
Ideal


Angular Number Spectrum, (ph/sec/mrad^2/0.1%bw/0.1A), Forward Direction
10^{18}
12
10
8
6
4
2
0
Angular Number Spectrum (ph/sec/mrad^2/0.1%bw/0.1A)
Measured
Ideal
2.96
2.97
2.98
2.99
3
3.01
3.02
3.03
3.04
3.05
! / !$_1$



Angular Number Spectrum, (ph/sec/mrad^2/0.1%bw/0.1A), Forward Direction