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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
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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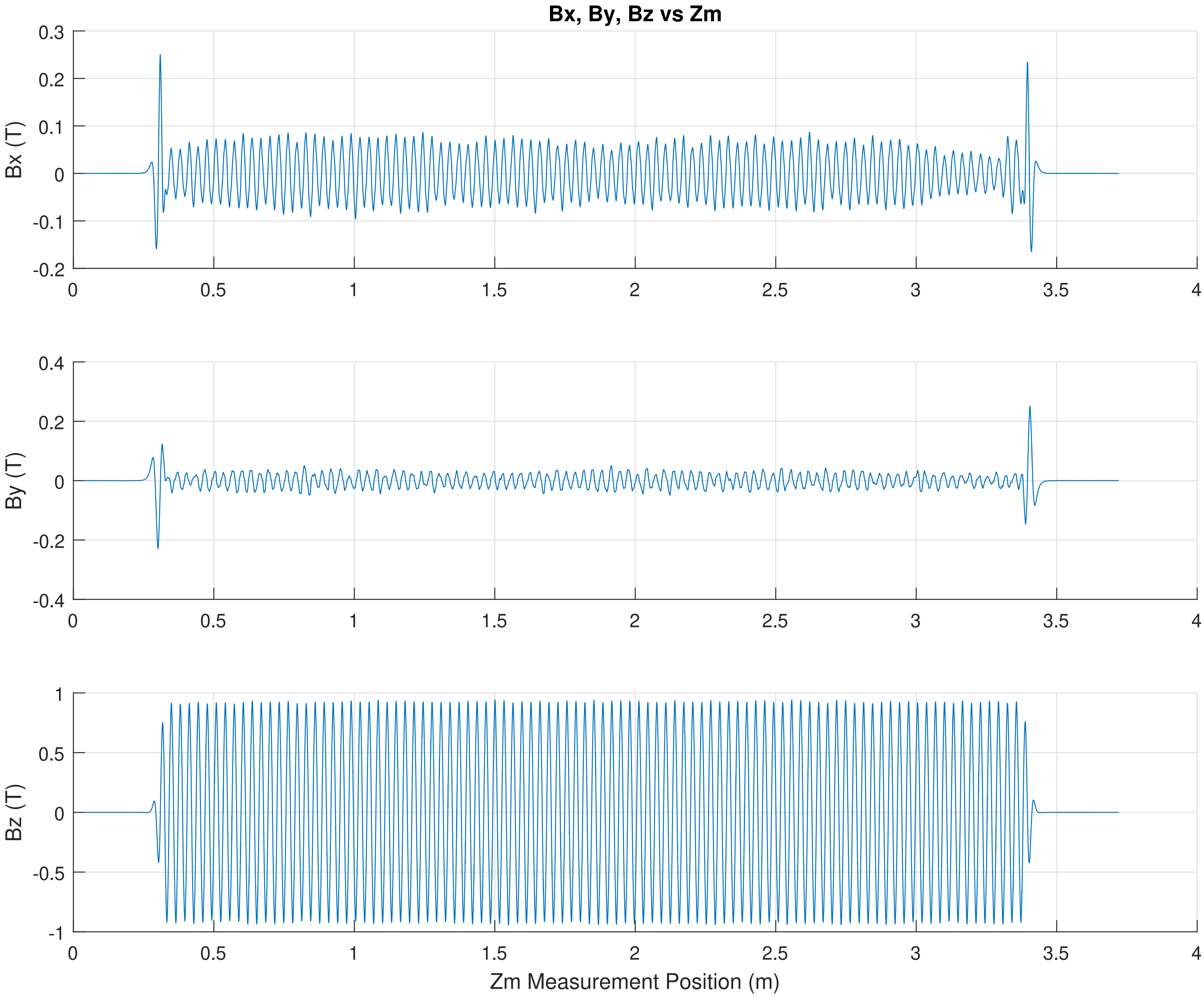
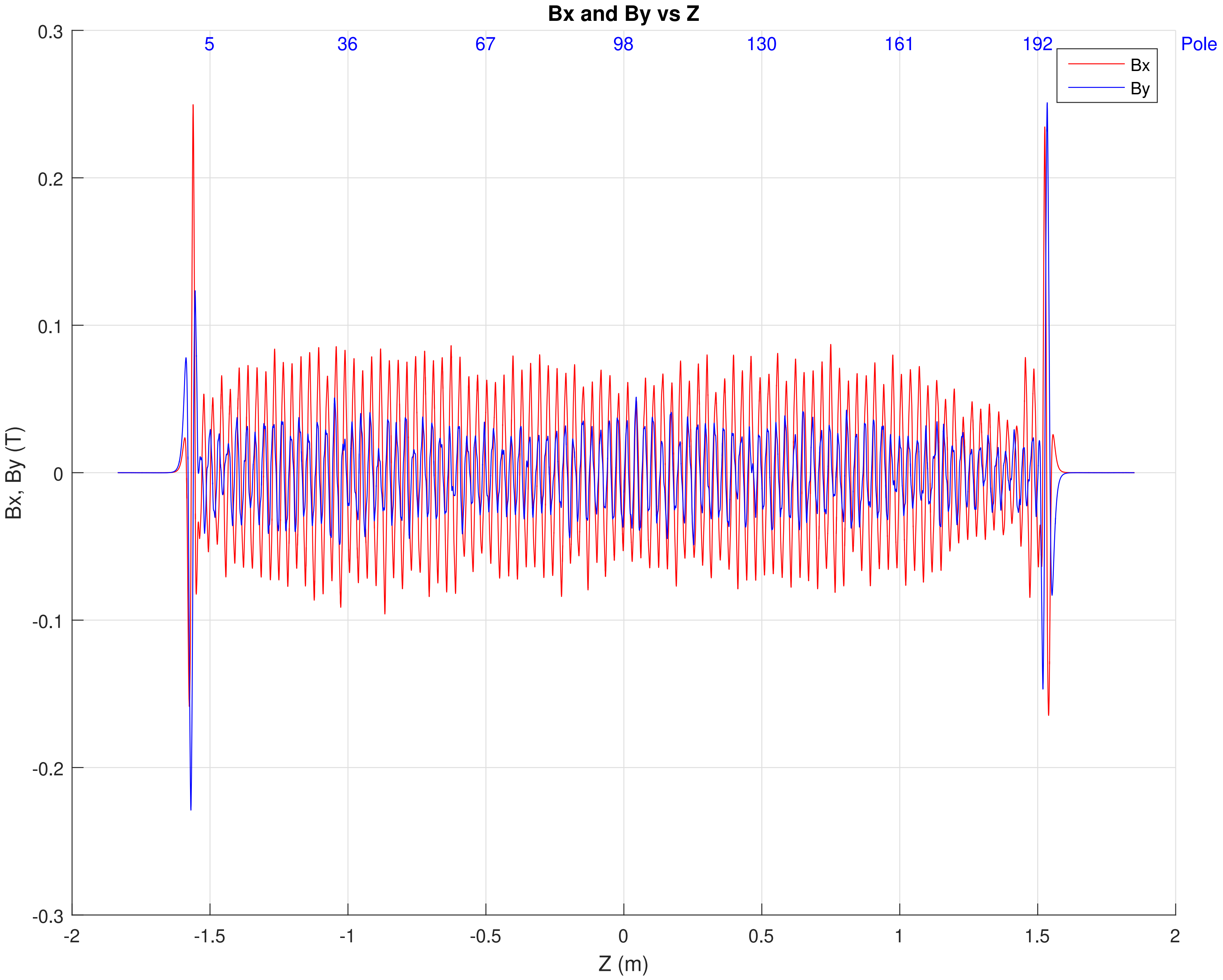
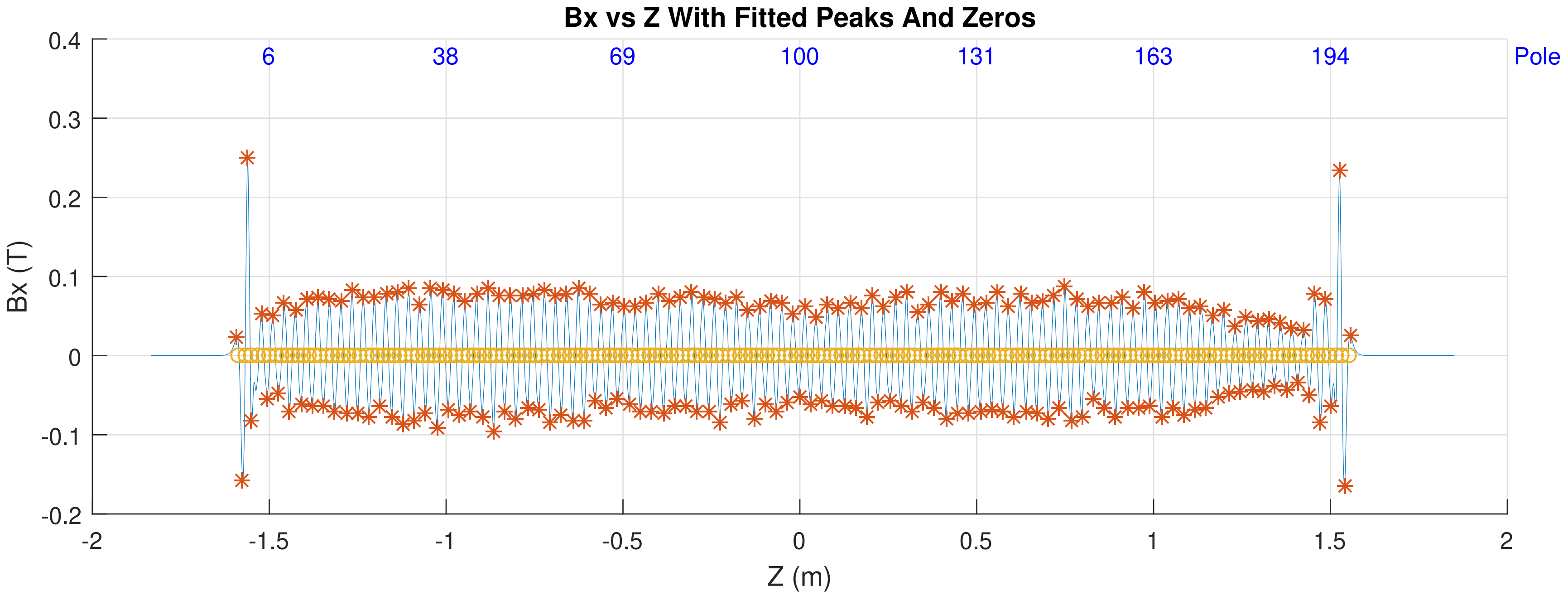
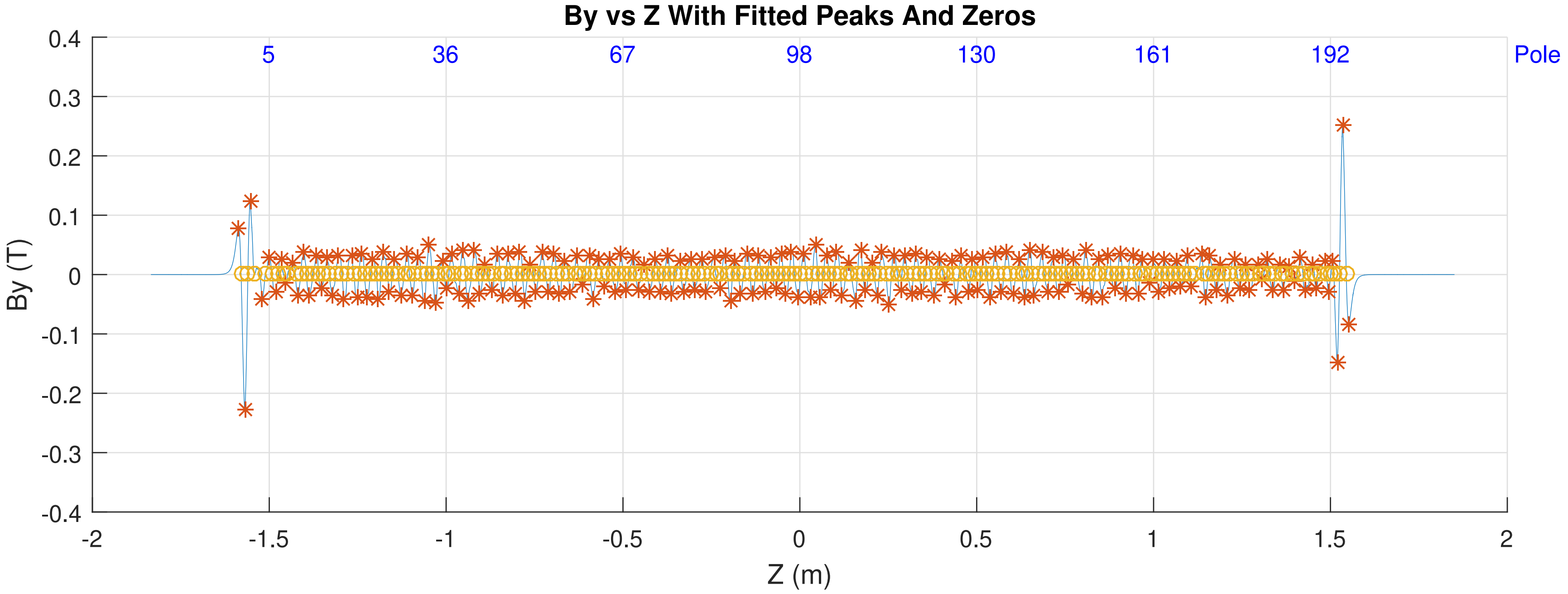


Bx, By, Bz vs Zm
Bx (T)
0.3
0.2
0.1
0
-0.1
-0.2
By (T)
0.4
0.2
0
-0.2
-0.4
Bz (T)
1
0.5
0
-0.5
-1
0
0.5
1
1.5
2
2.5
3
3.5
4
Zm Measurement Position (m)

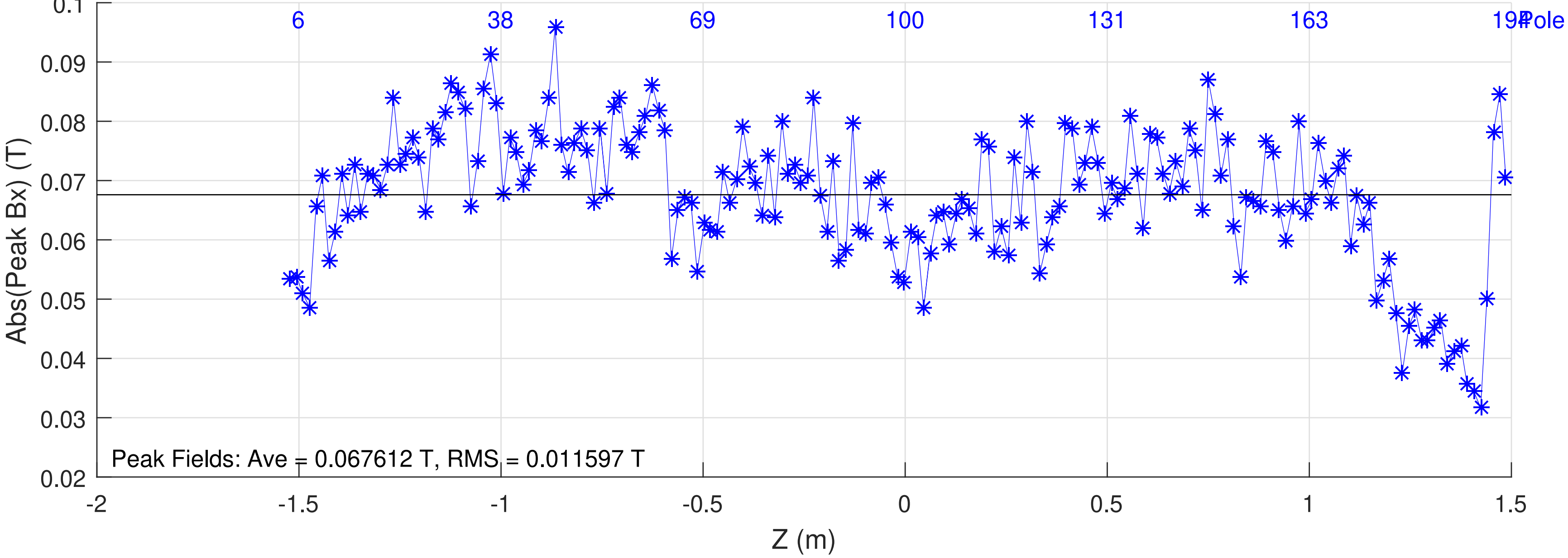

Bx and By vs Z
5
36
67
98
130
161
192
Pole
Bx
By
0.3
0.2
0.1
0
-0.1
-0.2
-0.3
Bx, By (T)
-2
-1.5
-1
-0.5
0
0.5
1
1.5
2
Z (m)



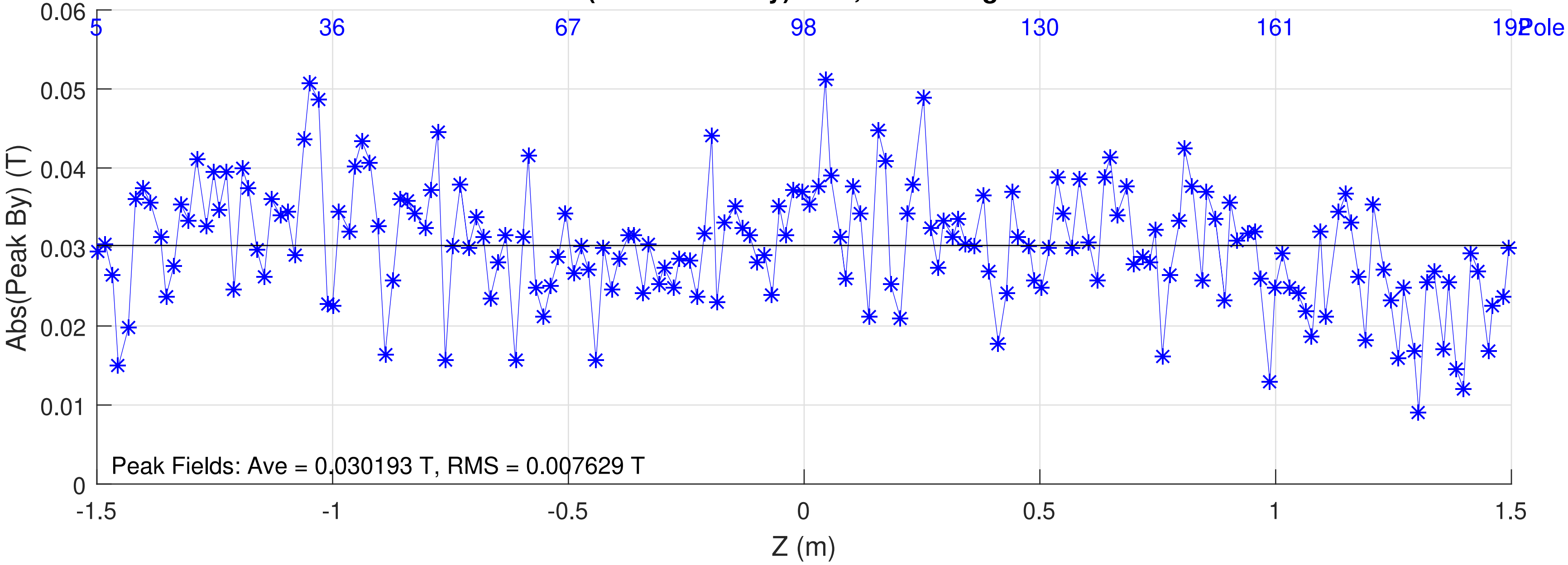
Bx vs Z With Fitted Peaks And Zeros



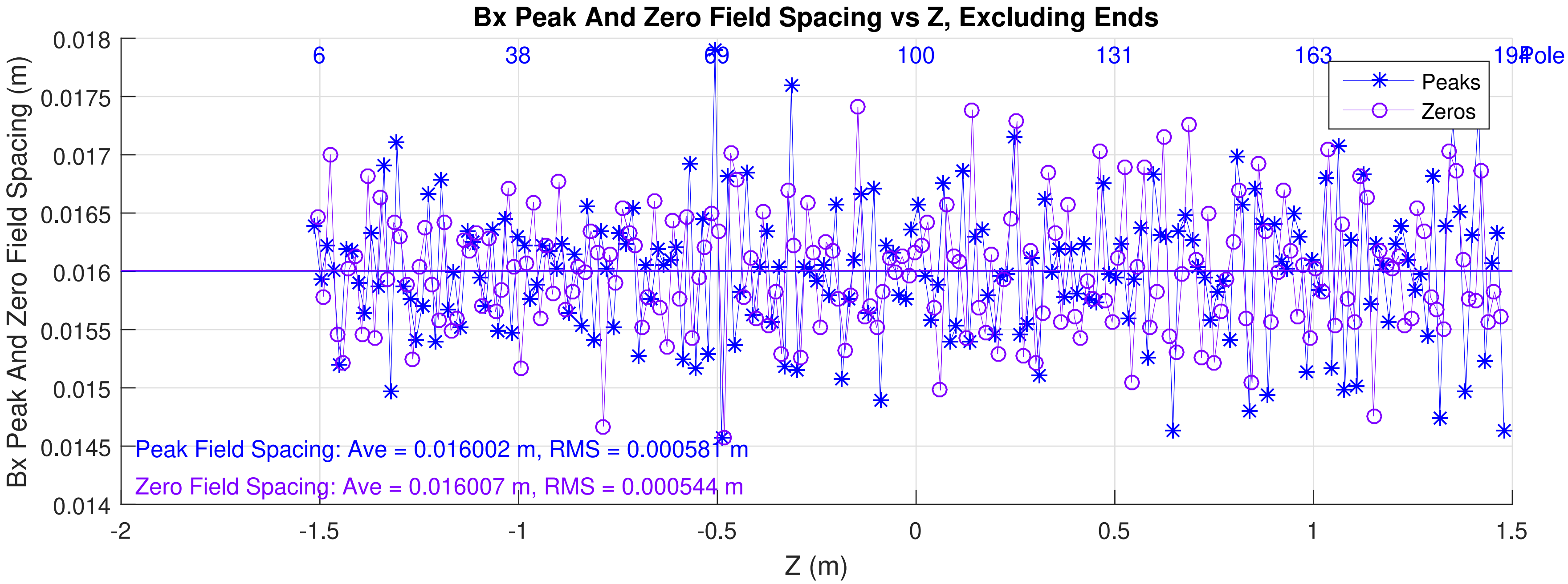
By vs Z With Fitted Peaks And Zeros



Abs(Fitted Peak Bx) vs Z, Excluding Ends



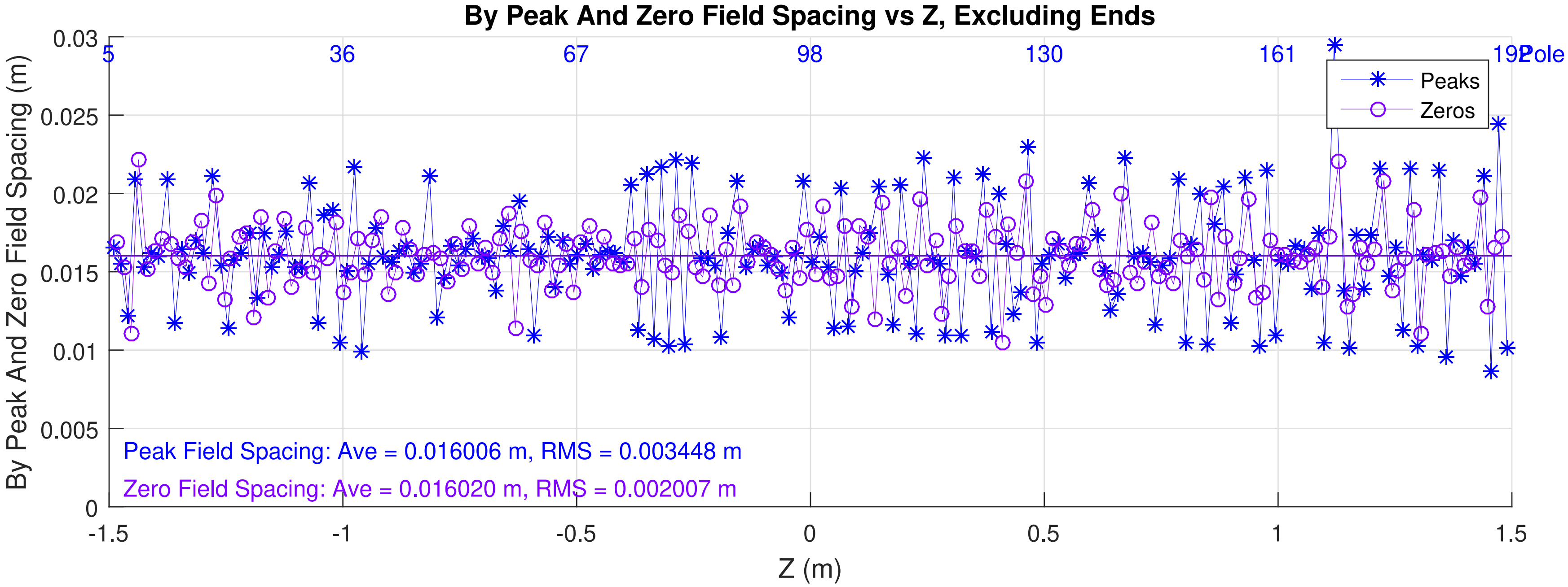
Abs(Fitted Peak By) vs Z, Excluding Ends



Bx Peak And Zero Field Spacing vs Z, Excluding Ends

Peak Field Spacing: Ave = 0.016002 m, RMS = 0.000581 m

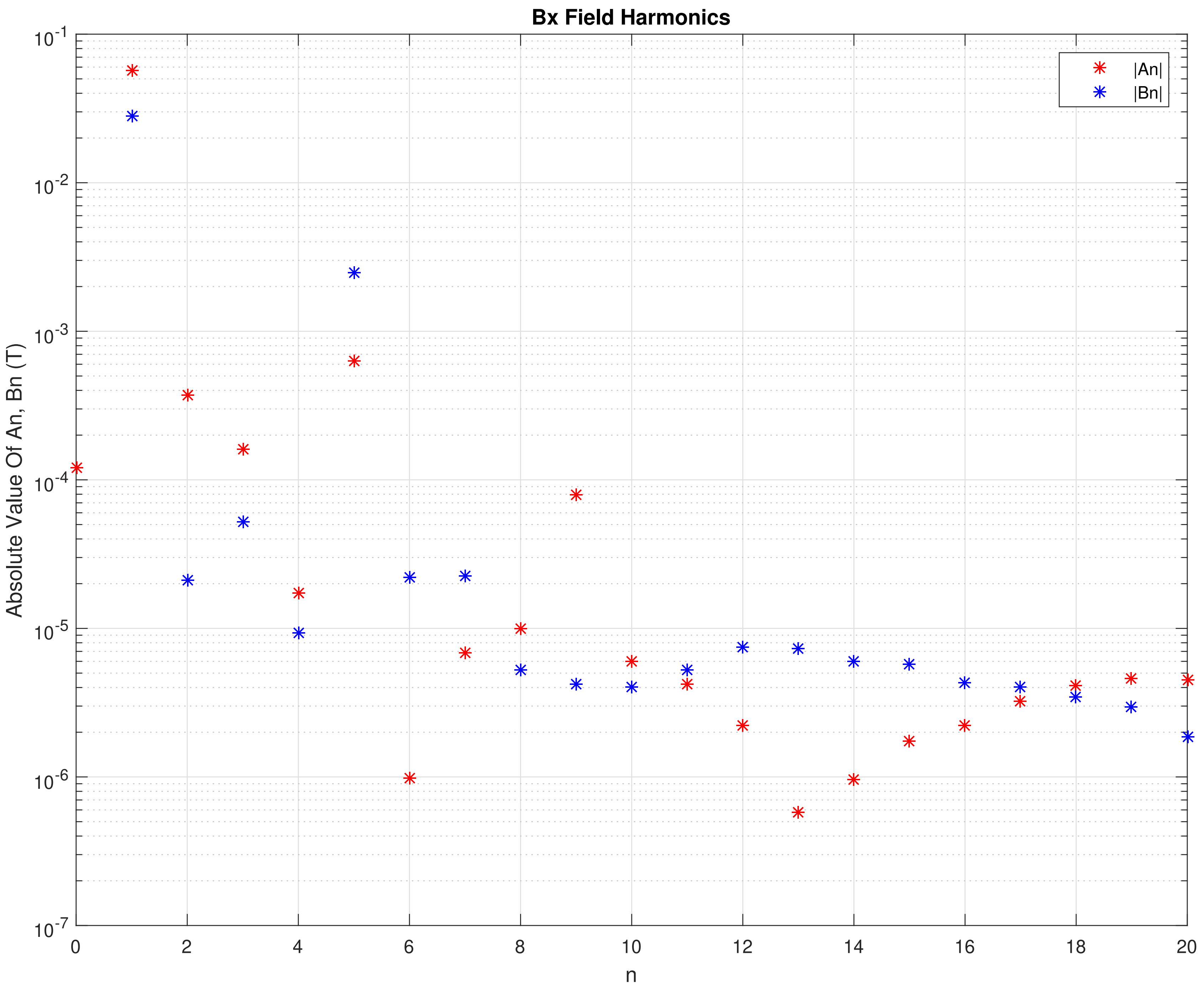
Zero Field Spacing: Ave = 0.016007 m, RMS = 0.000544 m

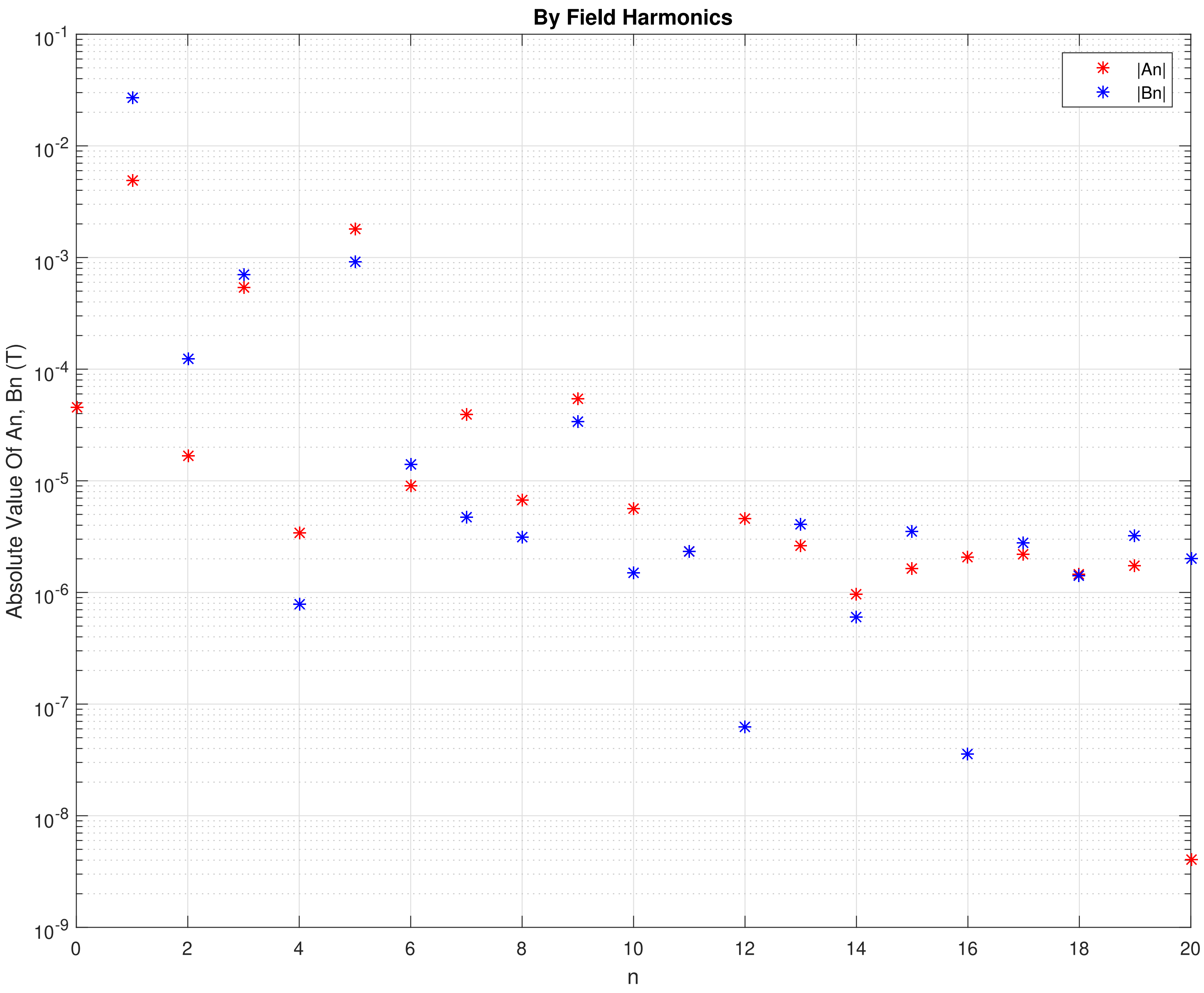


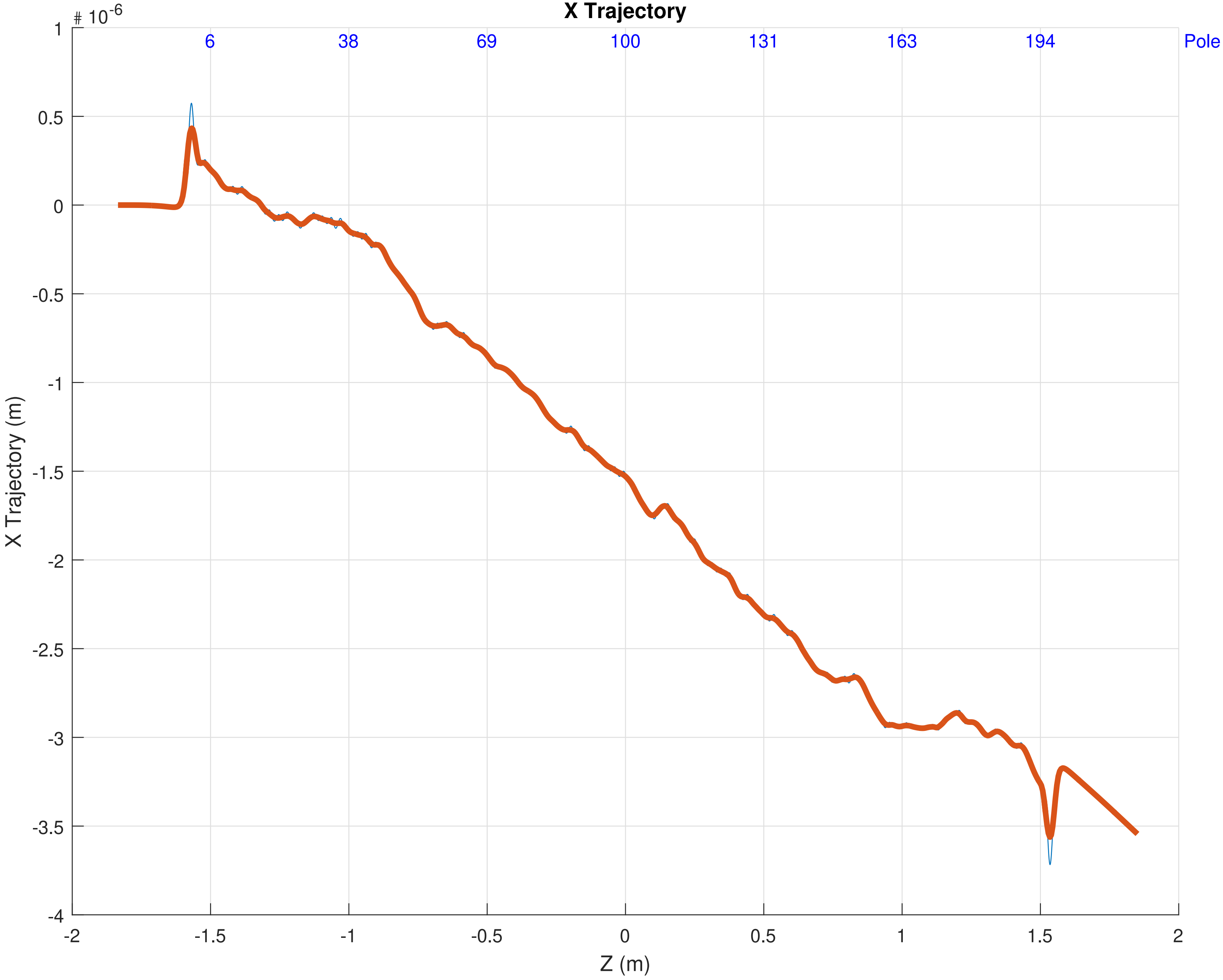
By Peak And Zero Field Spacing vs Z, Excluding Ends

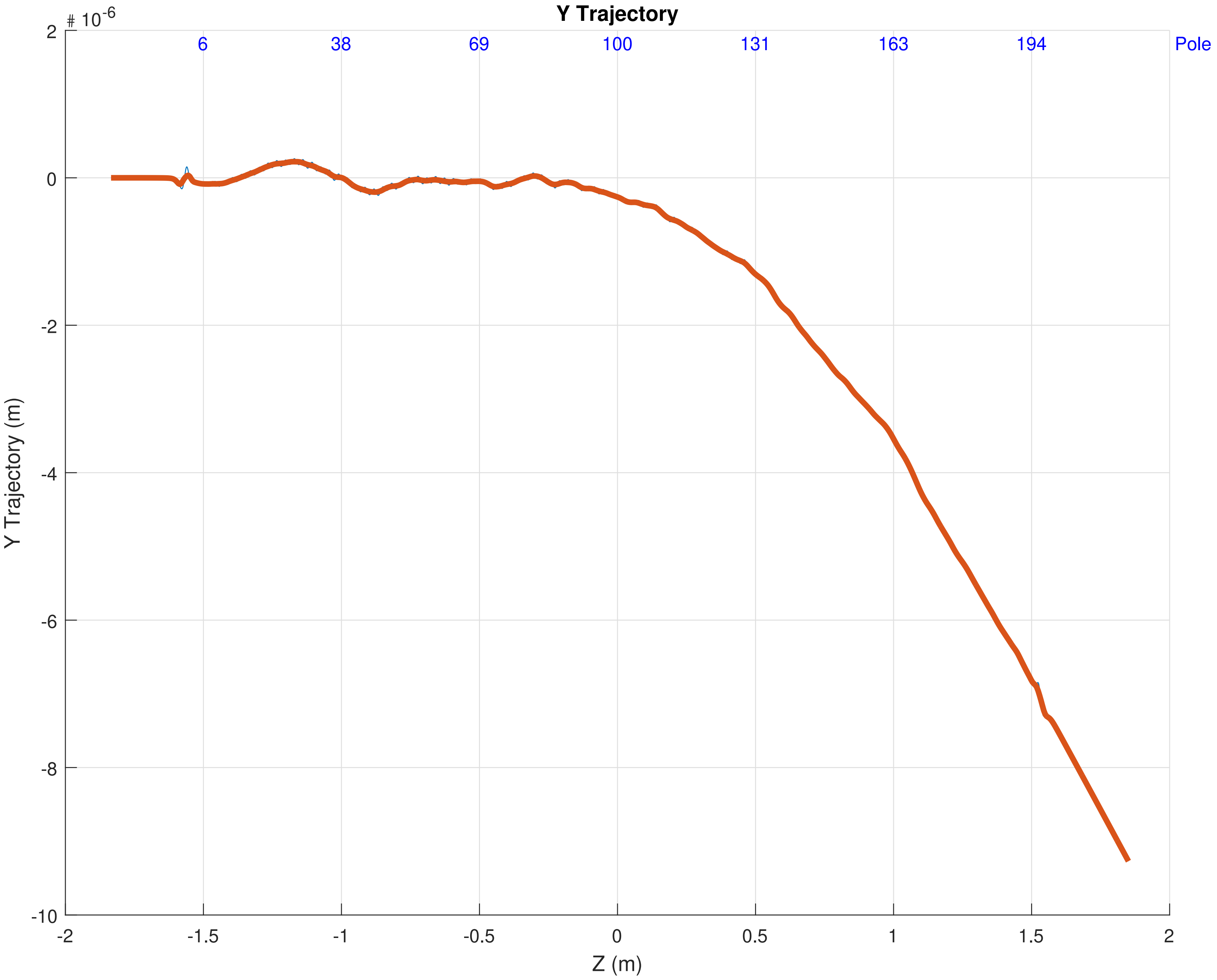
Peak Field Spacing: Ave = 0.016006 m, RMS = 0.003448 m

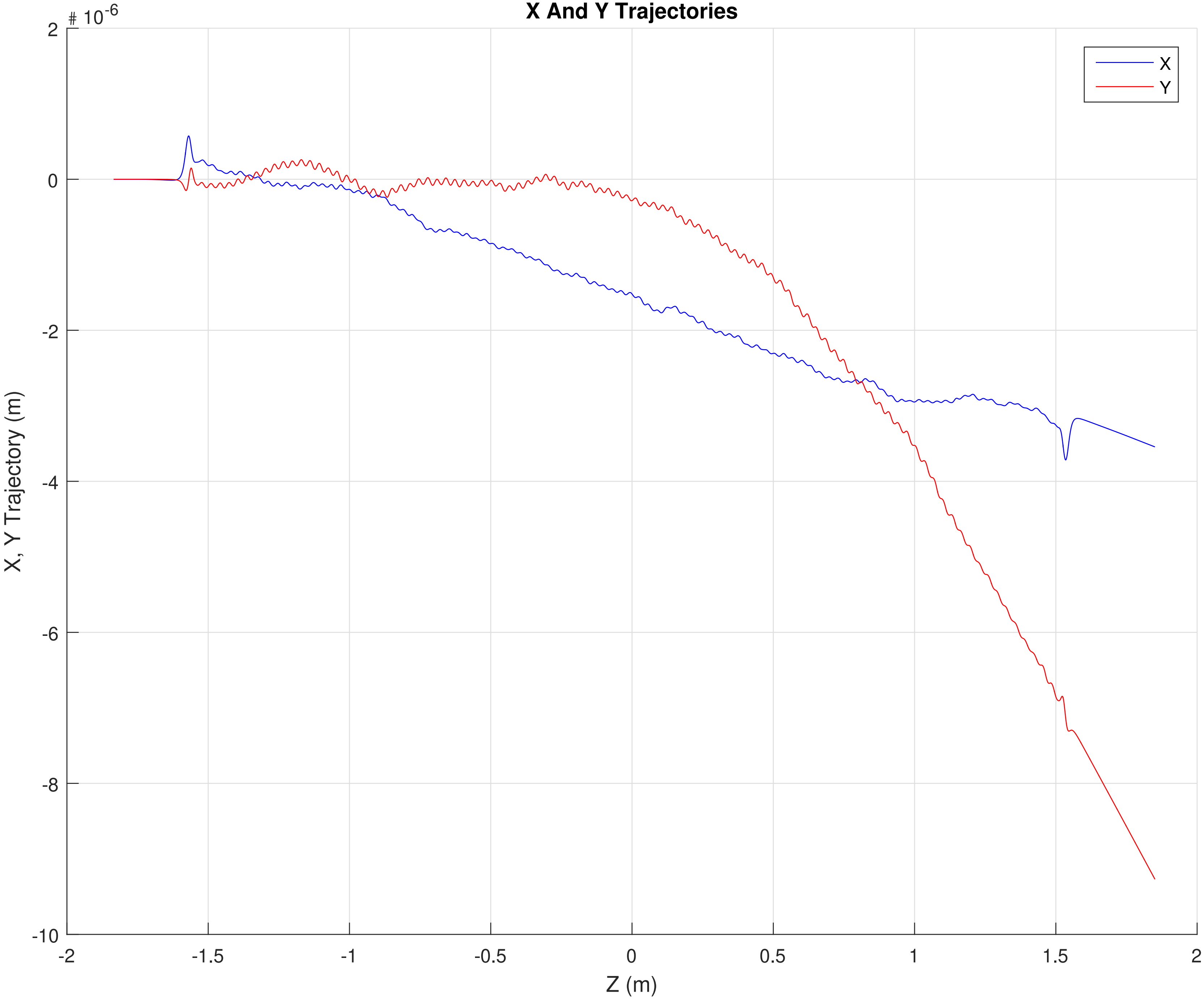
Zero Field Spacing: Ave = 0.016020 m, RMS = 0.002007 m

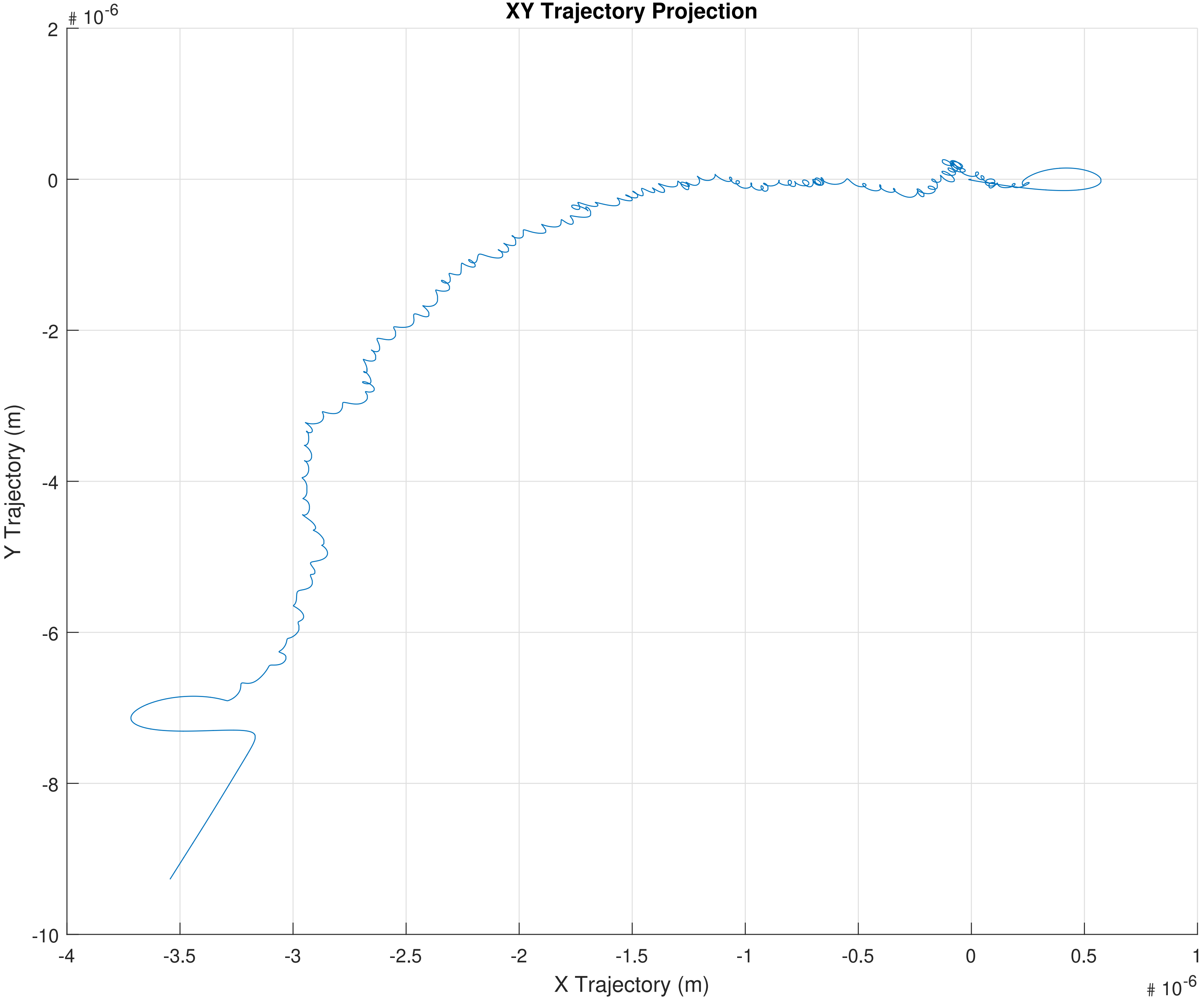

Bx Field Harmonics
|An|
|Bn|
Absolute Value Of An, Bn (T)
n
10-1
10-2
10-3
10-4
10-5
10-6
10-7
0
2
4
6
8
10
12
14
16
18
20

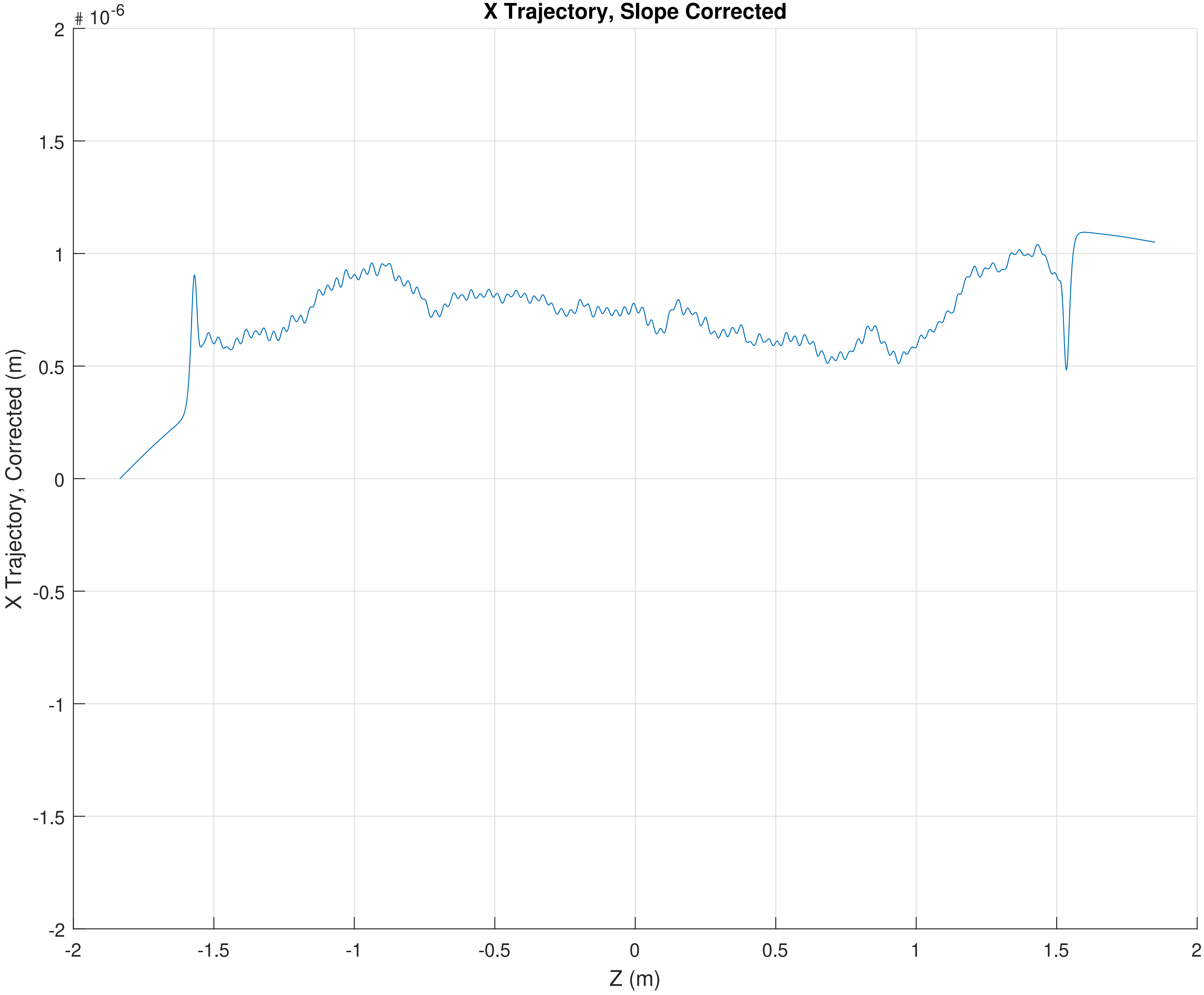

By Field Harmonics
Absolute Value Of An, Bn (T)
n
|An|
|Bn|
10^{-1}
10^{-2}
10^{-3}
10^{-4}
10^{-5}
10^{-6}
10^{-7}
10^{-8}
10^{-9}
0
2
4
6
8
10
12
14
16
18
20

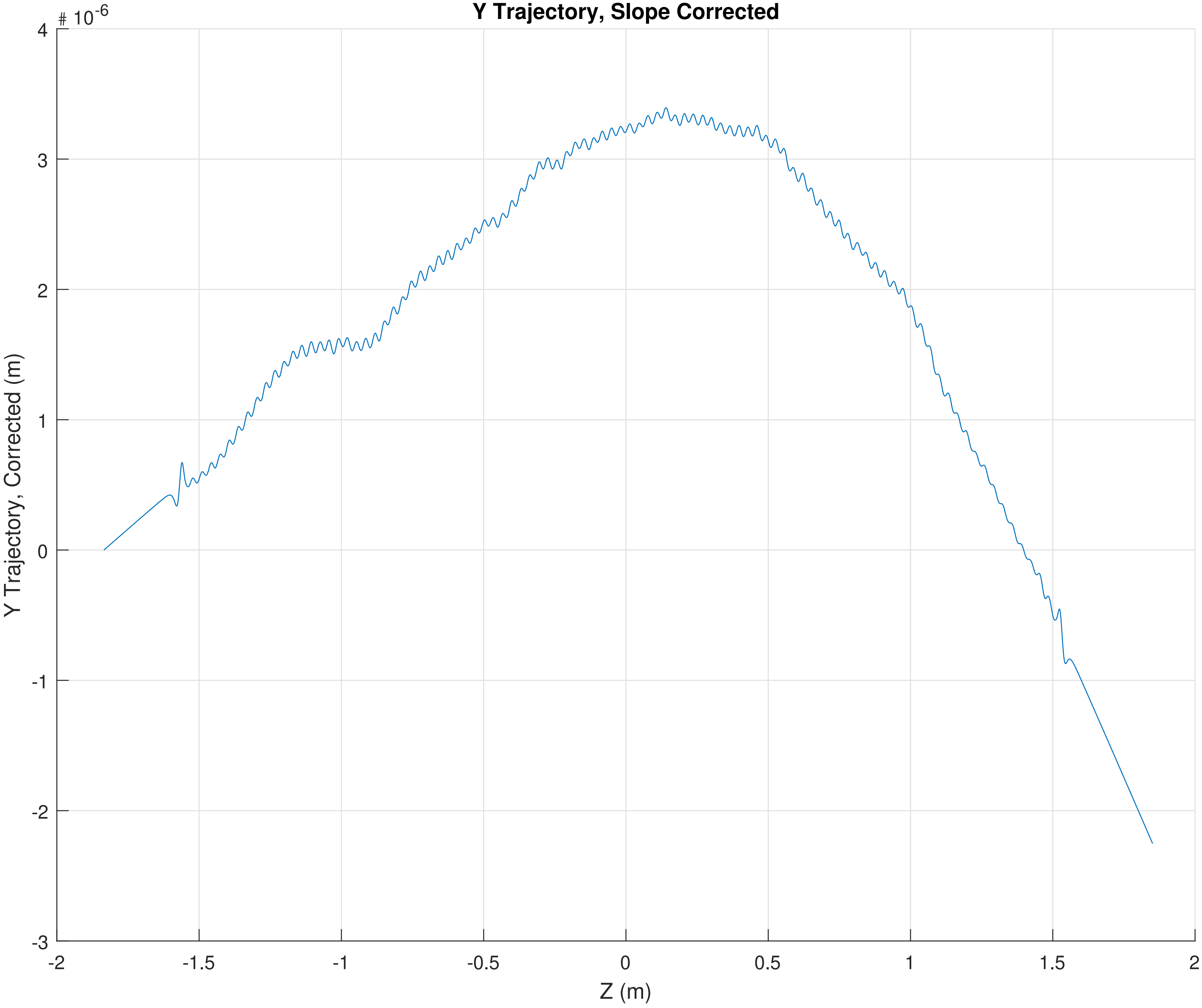

X Trajectory
10^-6
1
0.5
0
-0.5
-1
-1.5
-2
-2.5
-3
-3.5
-4
X Trajectory (m)
6
38
69
100
131
163
194
Pole
-2
-1.5
-1
-0.5
0
0.5
1
1.5
2
Z (m)


Y Trajectory
10^-6
2
0
-2
-4
-6
-8
-10
Y Trajectory (m)
6
38
69
100
131
163
194
Pole
-2
-1.5
-1
-0.5
0
0.5
1
1.5
2
Z (m)

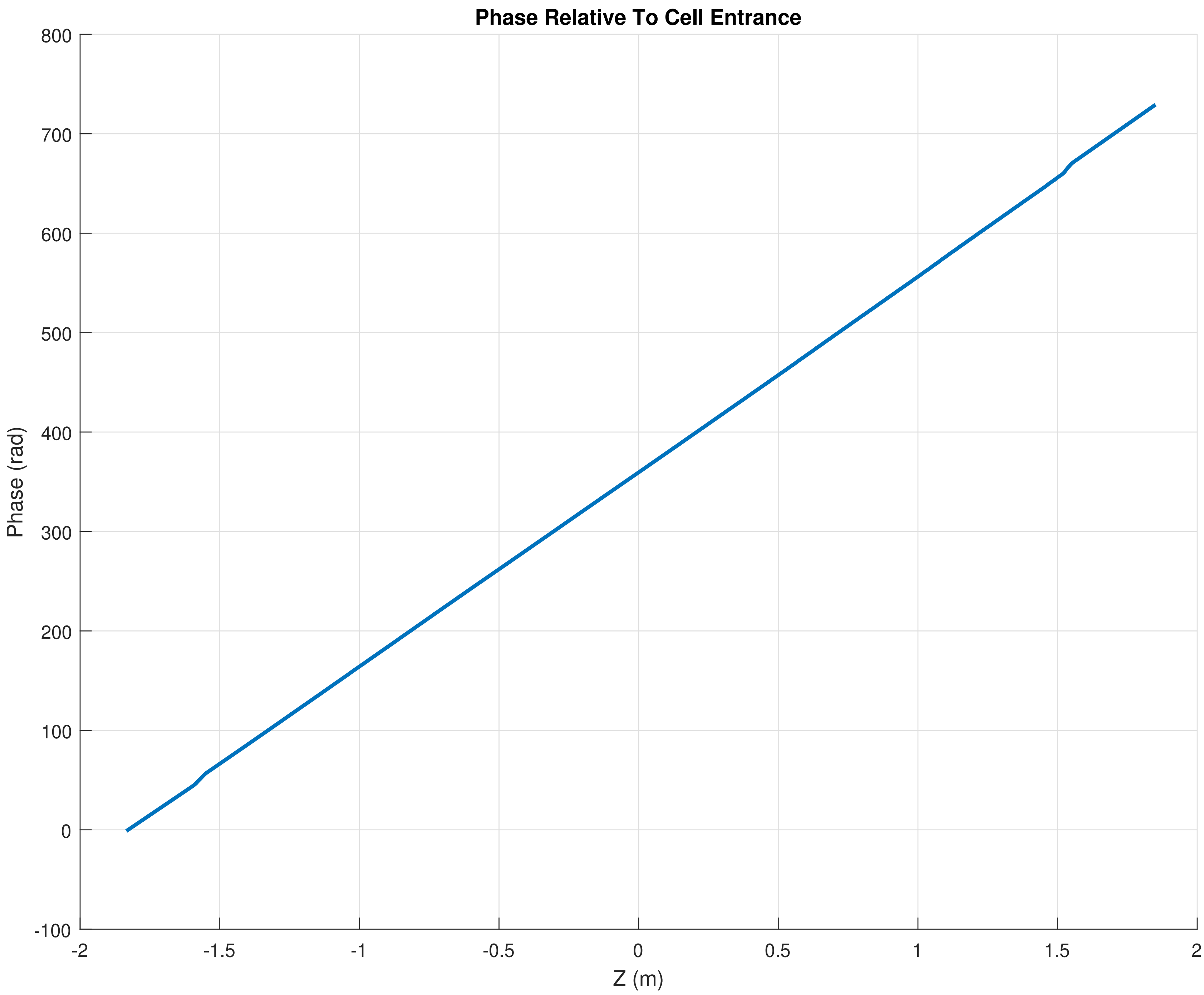

X And Y Trajectories
10^-6
2
0
-2
-4
-6
-8
-10
X, Y Trajectory (m)
-2
-1.5
-1
-0.5
0
0.5
1
1.5
2
Z (m)
X
Y

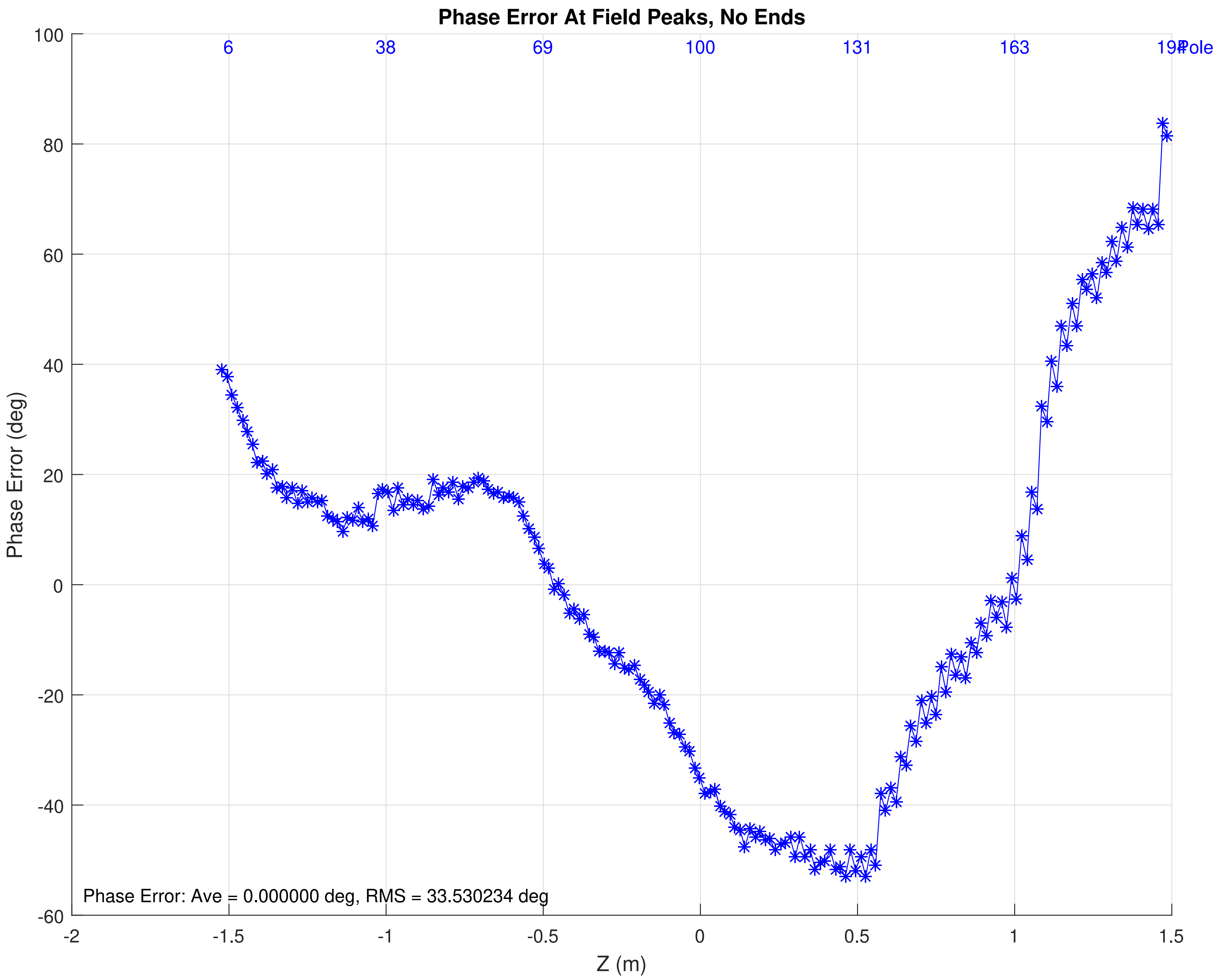

XY Trajectory Projection
10^-6
2
0
-2
-4
-6
-8
-10
Y Trajectory (m)
-4
-3.5
-3
-2.5
-2
-1.5
-1
-0.5
0
0.5
1
X Trajectory (m)
10^-6

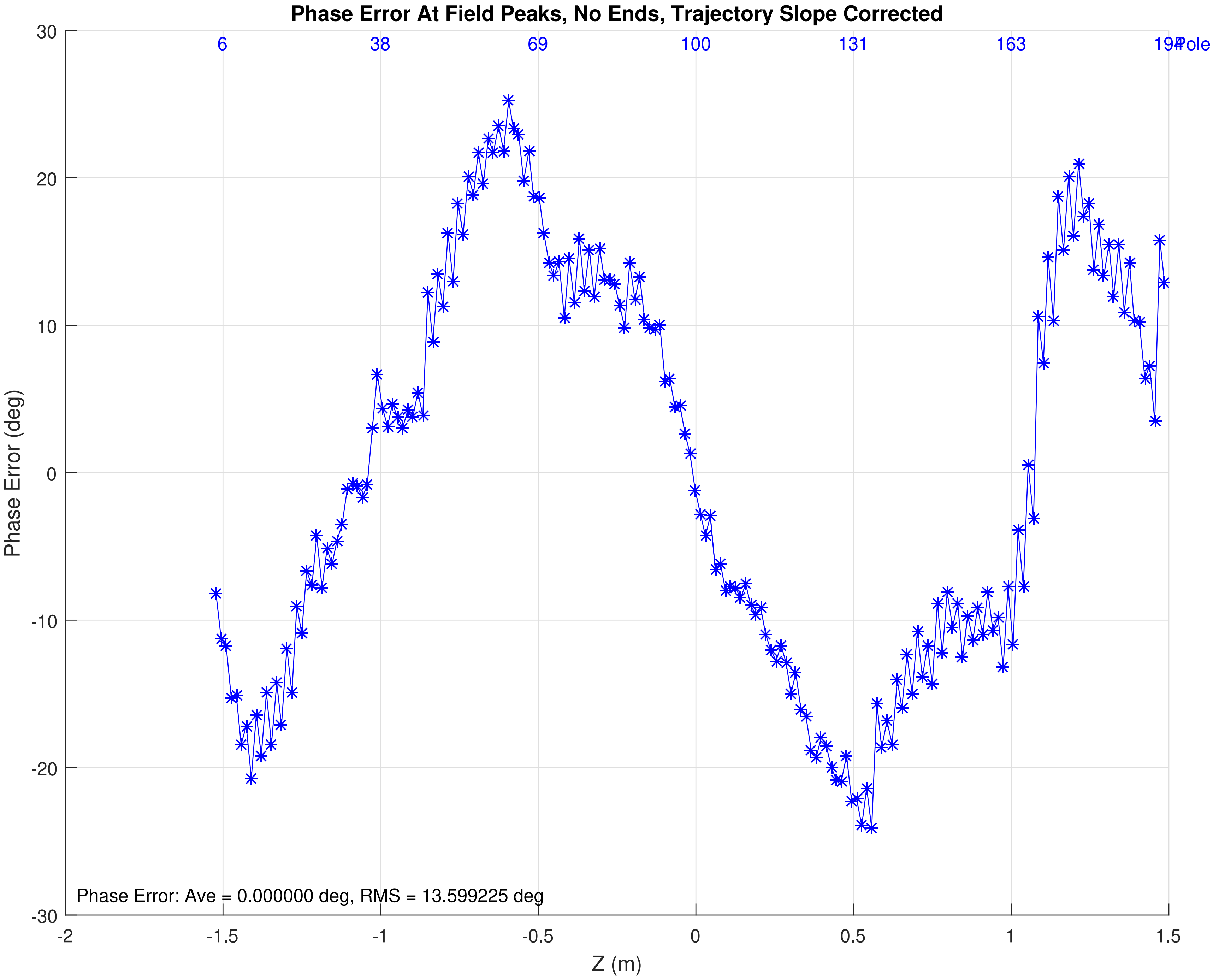

X Trajectory, Slope Corrected
10^-6
2
1.5
1
0.5
0
-0.5
-1
-1.5
-2
X Trajectory, Corrected (m)
-2
-1.5
-1
-0.5
0
0.5
1
1.5
2
Z (m)

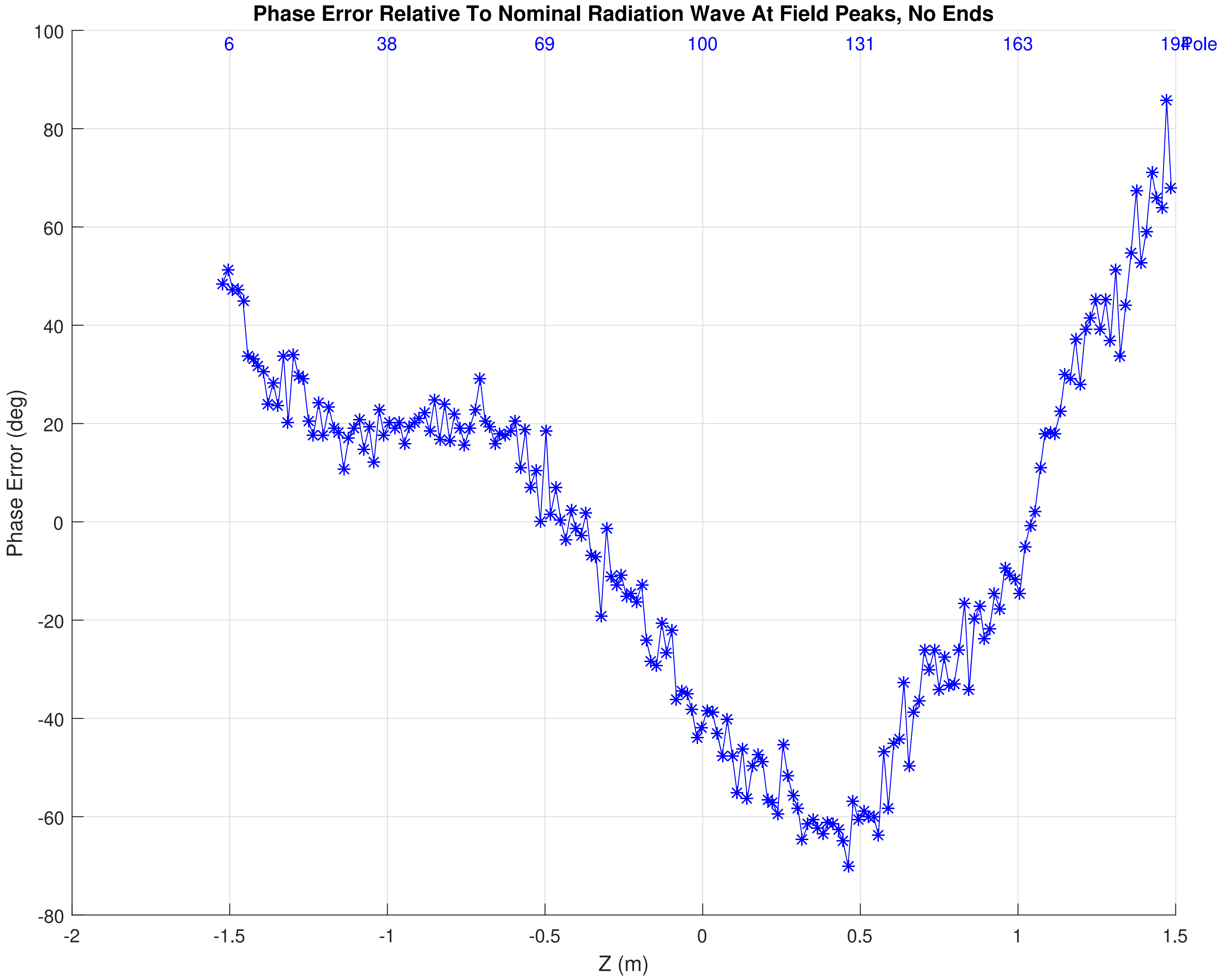


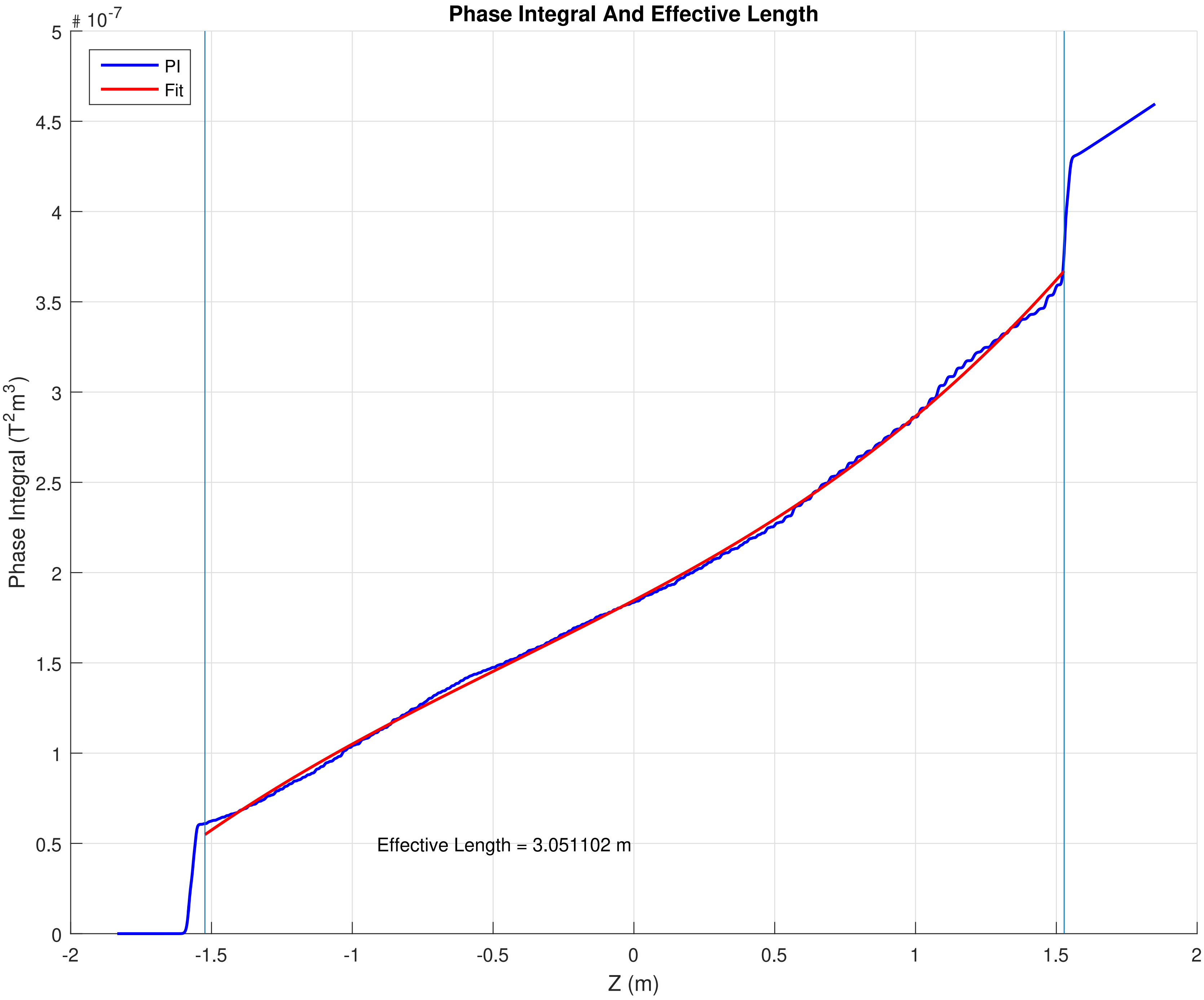
Y Trajectory, Slope Corrected
10-6
4
3
2
1
0
-1
-2
-3
Y Trajectory, Corrected (m)
-2
-1.5
-1
-0.5
0
0.5
1
1.5
2
Z (m)


Phase Relative To Cell Entrance
Phase (rad)
800
700
600
500
400
300
200
100
0
-100
-2
-1.5
-1
-0.5
0
0.5
1
1.5
2
Z (m)

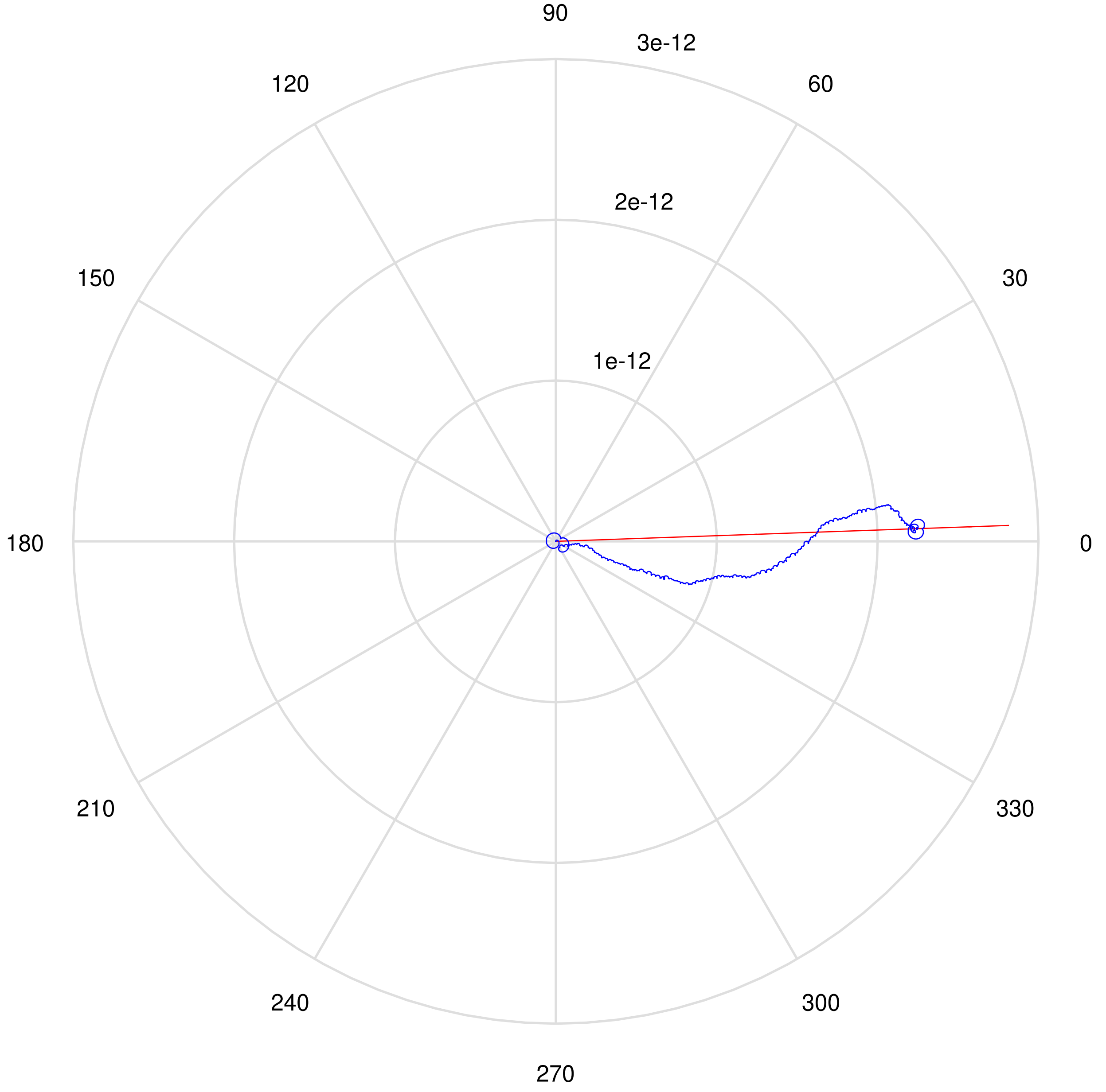

Phase Error At Field Peaks, No Ends
6
38
69
100
131
163
194
Pole
100
80
60
40
20
0
-20
-40
-60
Phase Error (deg)
-2
-1.5
-1
-0.5
0
0.5
1
1.5
Z (m)
Phase Error: Ave = 0.000000 deg, RMS = 33.530234 deg


Phase Error At Field Peaks, No Ends, Trajectory Slope Corrected
6
38
69
100
131
163
194
Pole
30
20
10
0
-10
-20
-30
Phase Error (deg)
-2
-1.5
-1
-0.5
0
0.5
1
1.5
Z (m)
Phase Error: Ave = 0.000000 deg, RMS = 13.599225 deg


Phase Error Relative To Nominal Radiation Wave At Field Peaks, No Ends

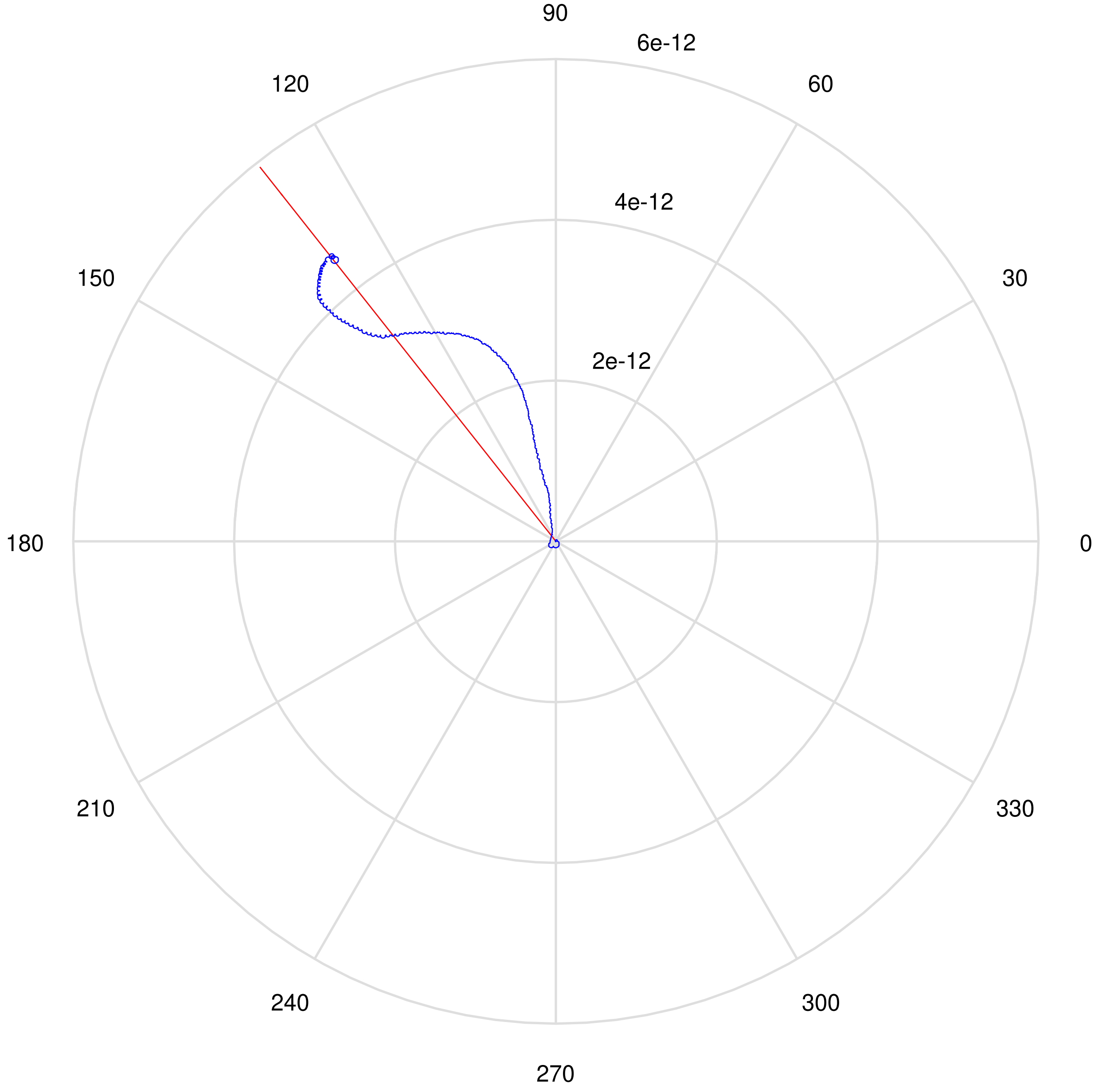


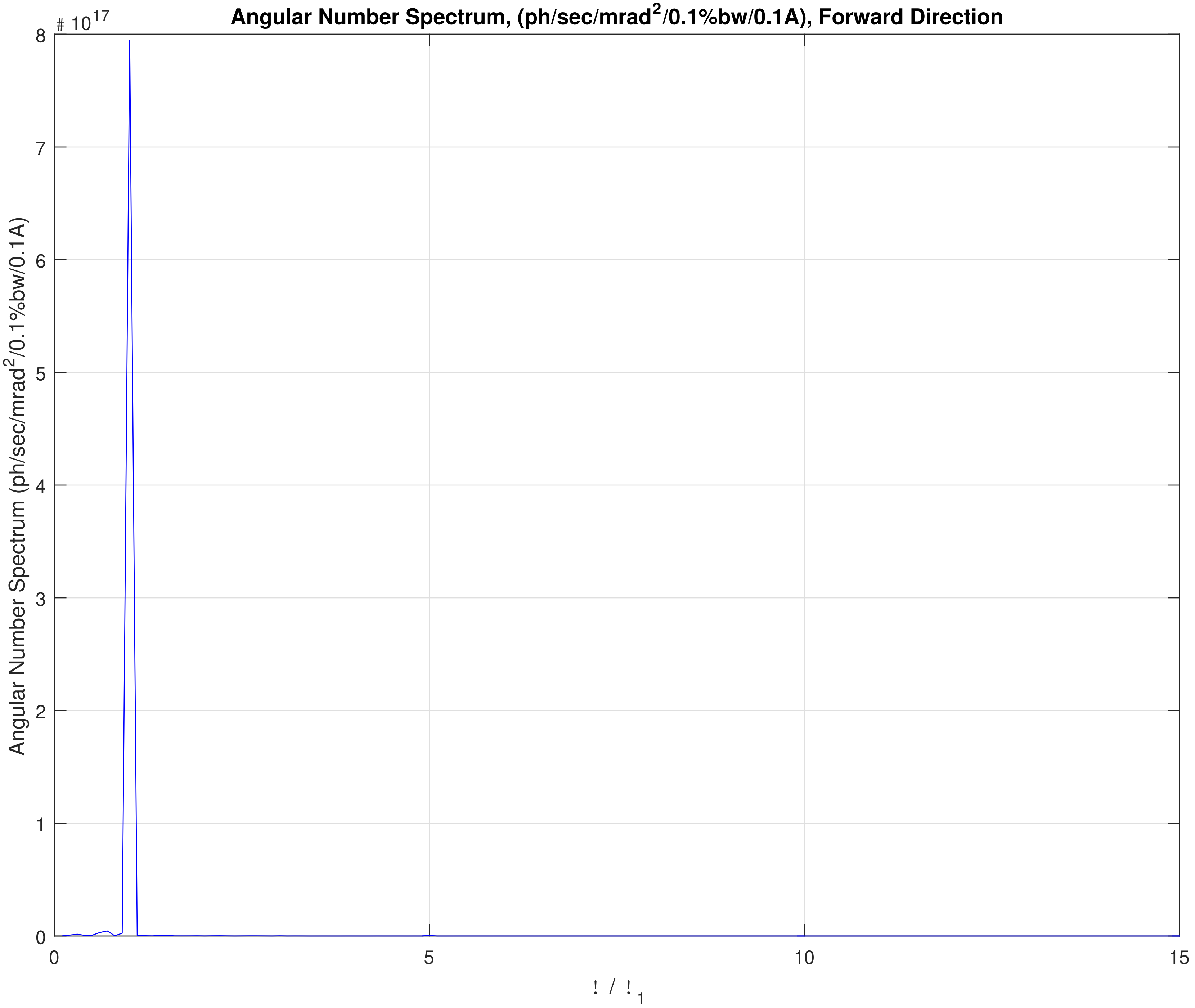
Phase Integral And Effective Length
10^-7
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
Phase Integral (T^2m^3)
PI
Fit
Effective Length = 3.051102 m
-2
-1.5
-1
-0.5
0
0.5
1
1.5
2
Z (m)

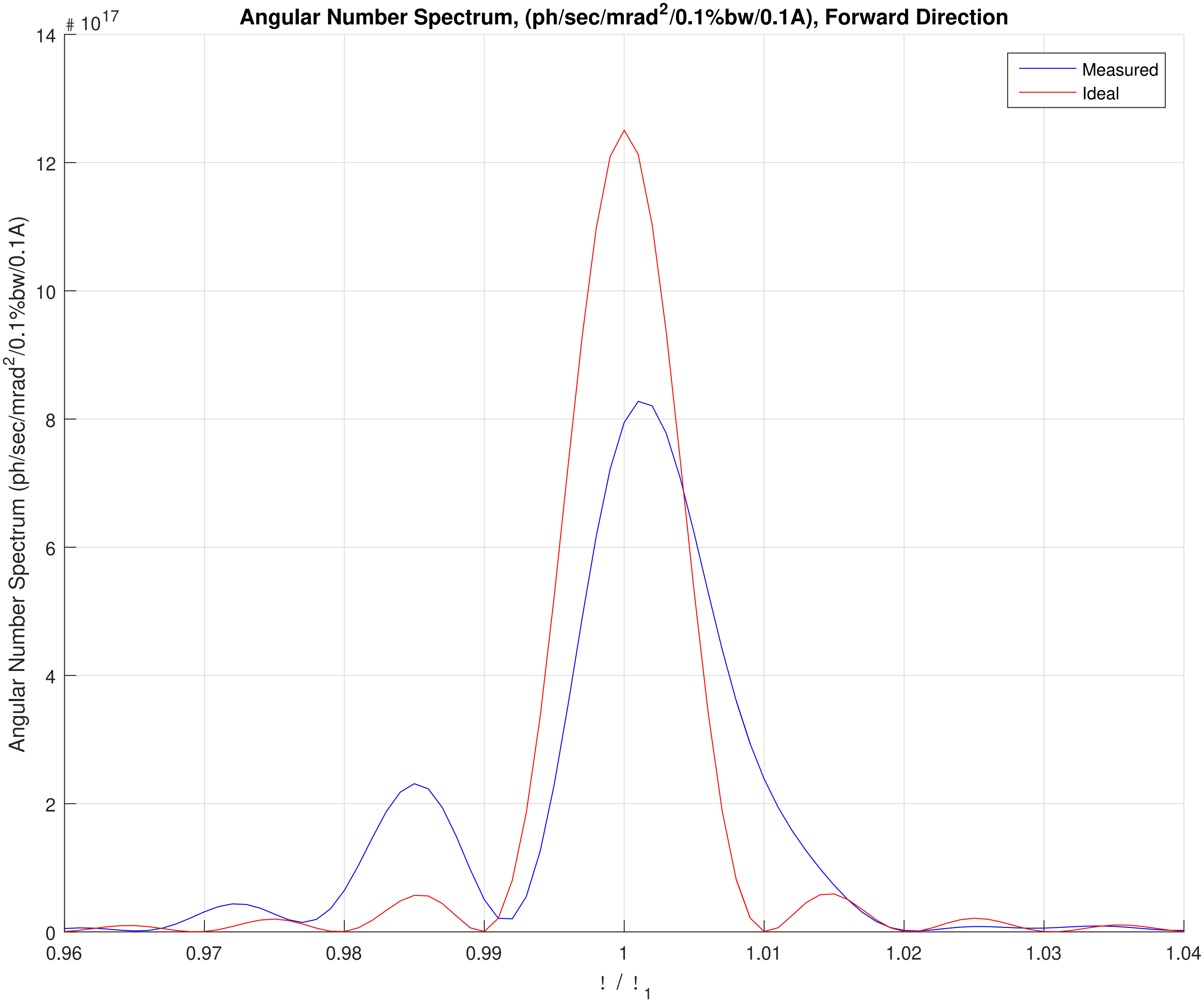


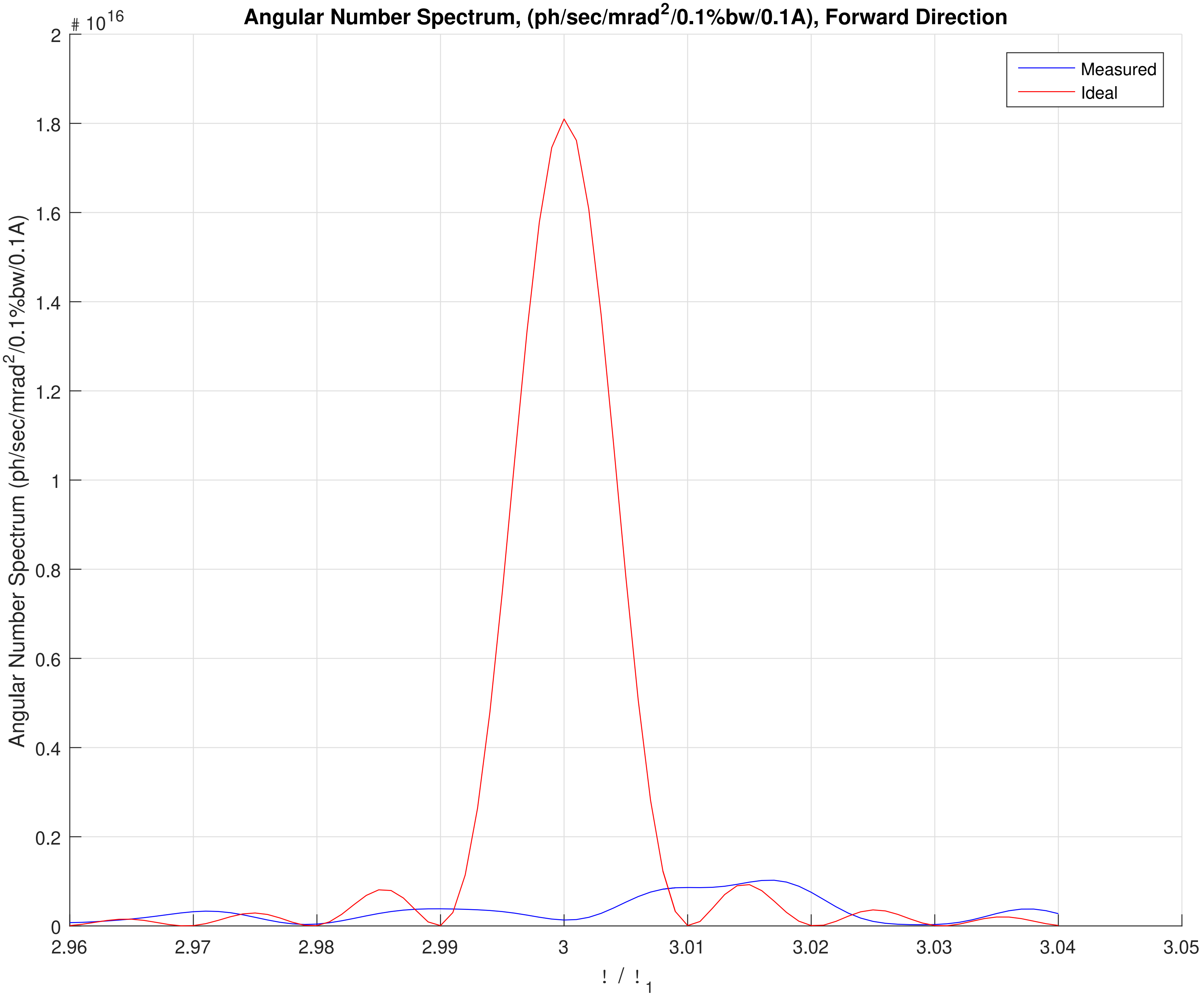
Re and Im Parts Of Ex(!), Forward Direction, ! = !$_1$

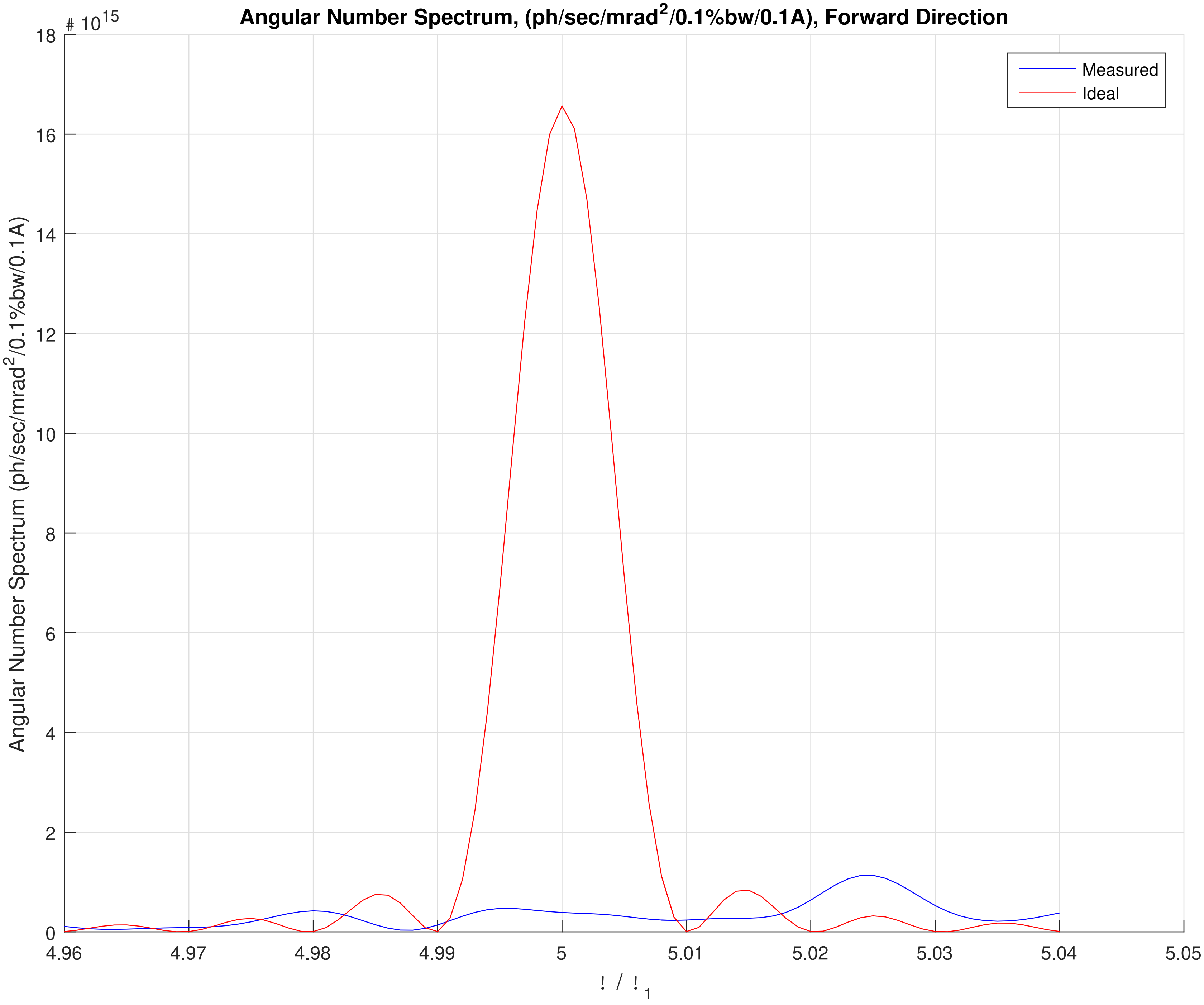
Re and Im Parts Of Ey(!), Forward Direction, ! = !$_1$




Angular Number Spectrum, (ph/sec/mrad^2/0.1%bw/0.1A), Forward Direction
10^{17}
8
7
6
5
4
3
2
1
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^{17}
14
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
! / !$_1$
Measured
Ideal


Angular Number Spectrum, (ph/sec/mrad2/0.1%bw/0.1A), Forward Direction
10^16
2
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
Angular Number Spectrum (ph/sec/mrad2/0.1%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
10^{15}
18
16
14
12
10
8
6
4
2
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
! / ! $_1$