SLAC Magnetic Measurements

EPU Analysis
−−−−−−−−−−−

Parameters:
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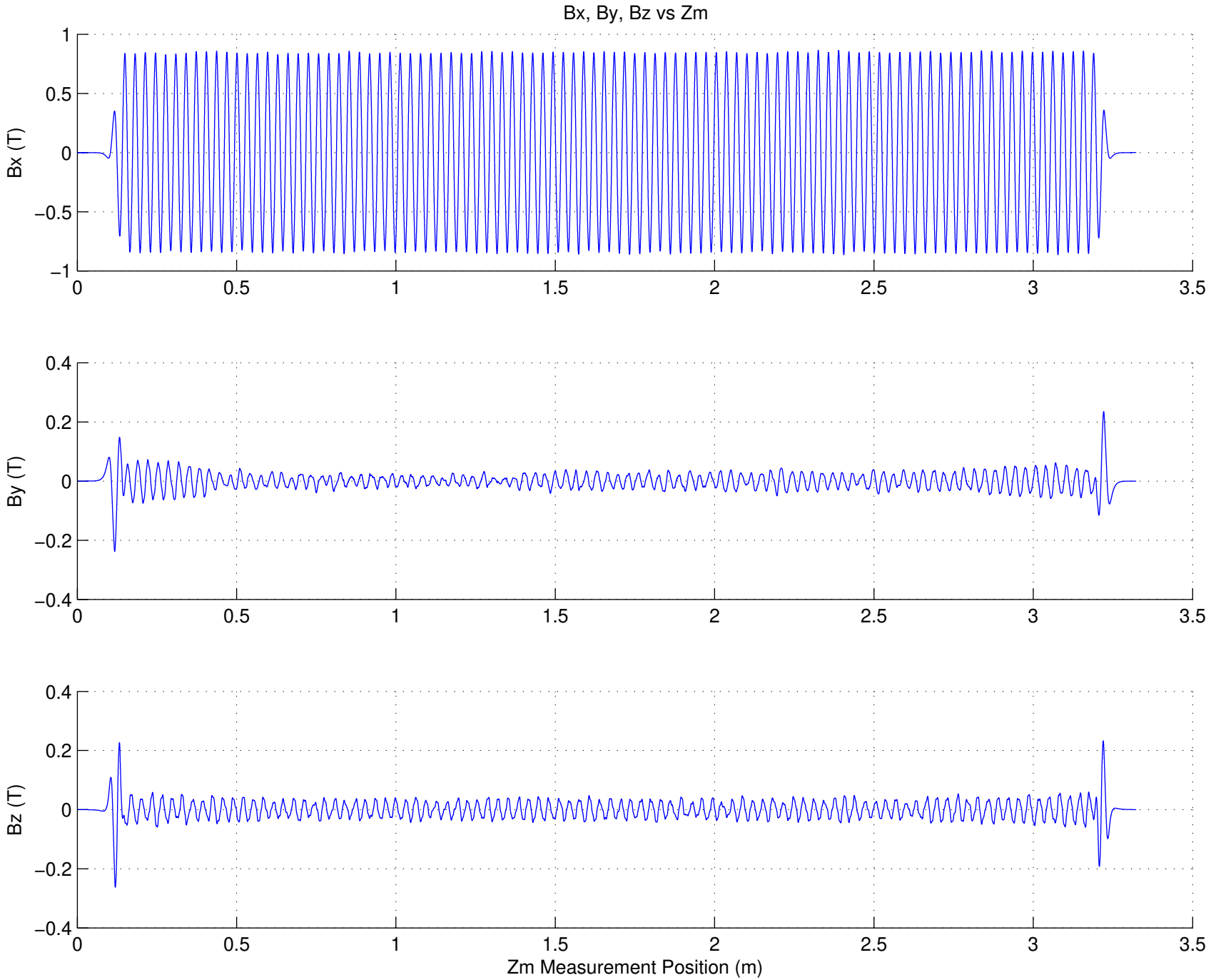
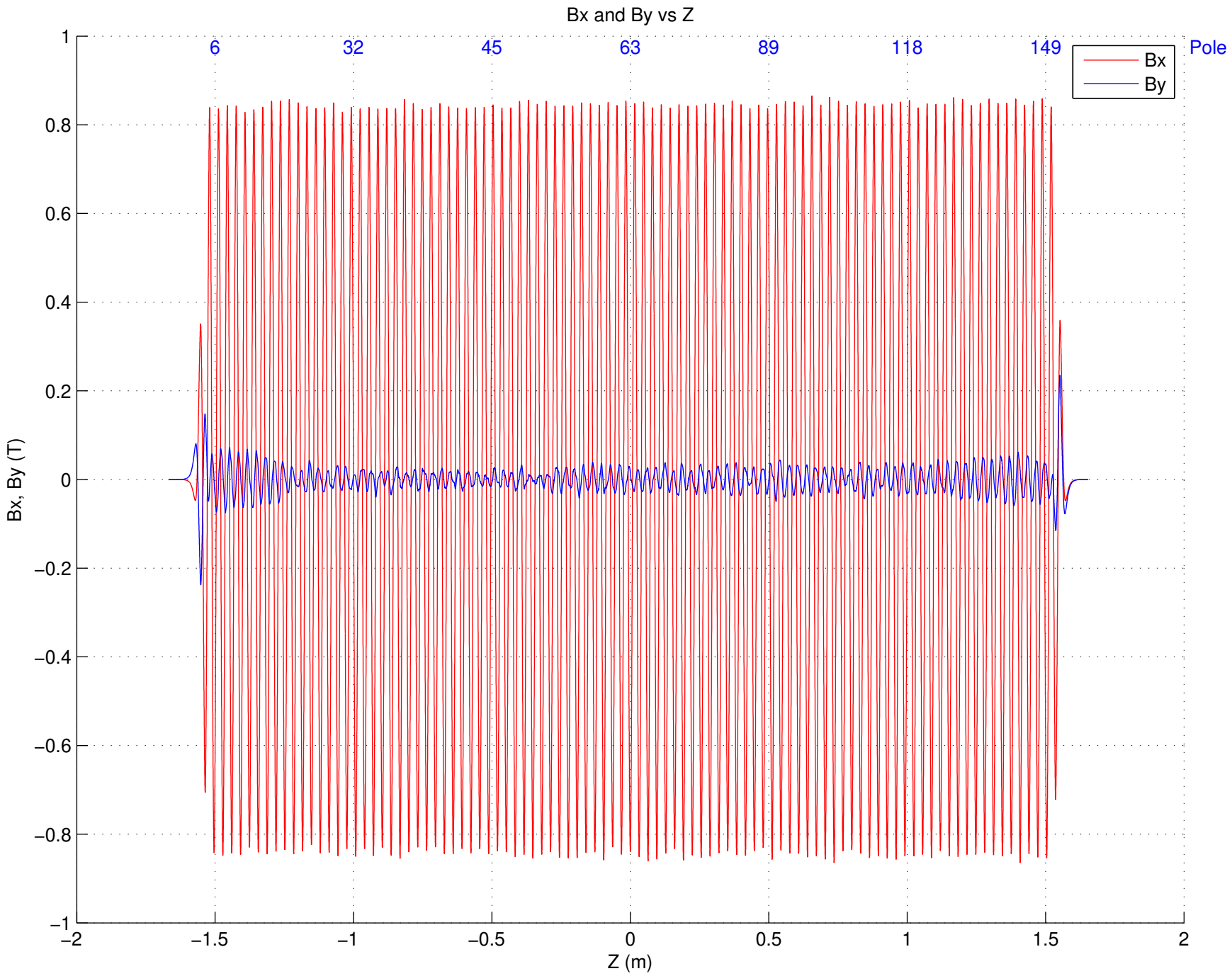
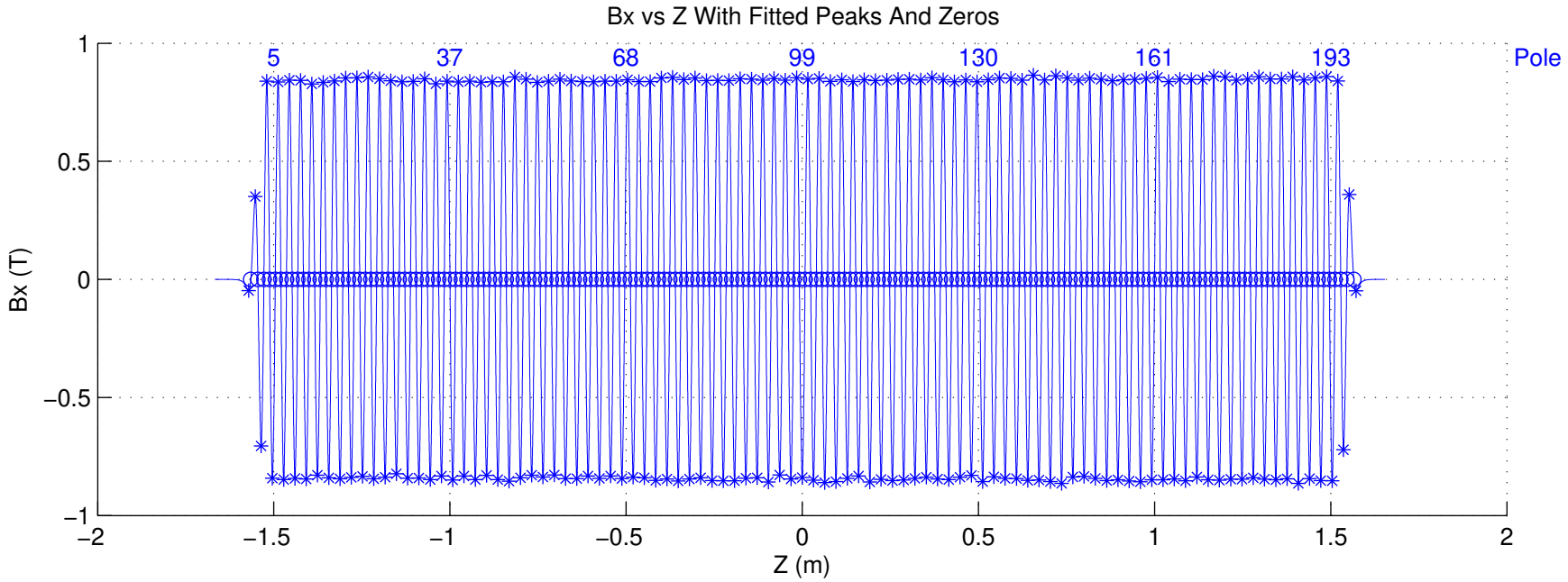
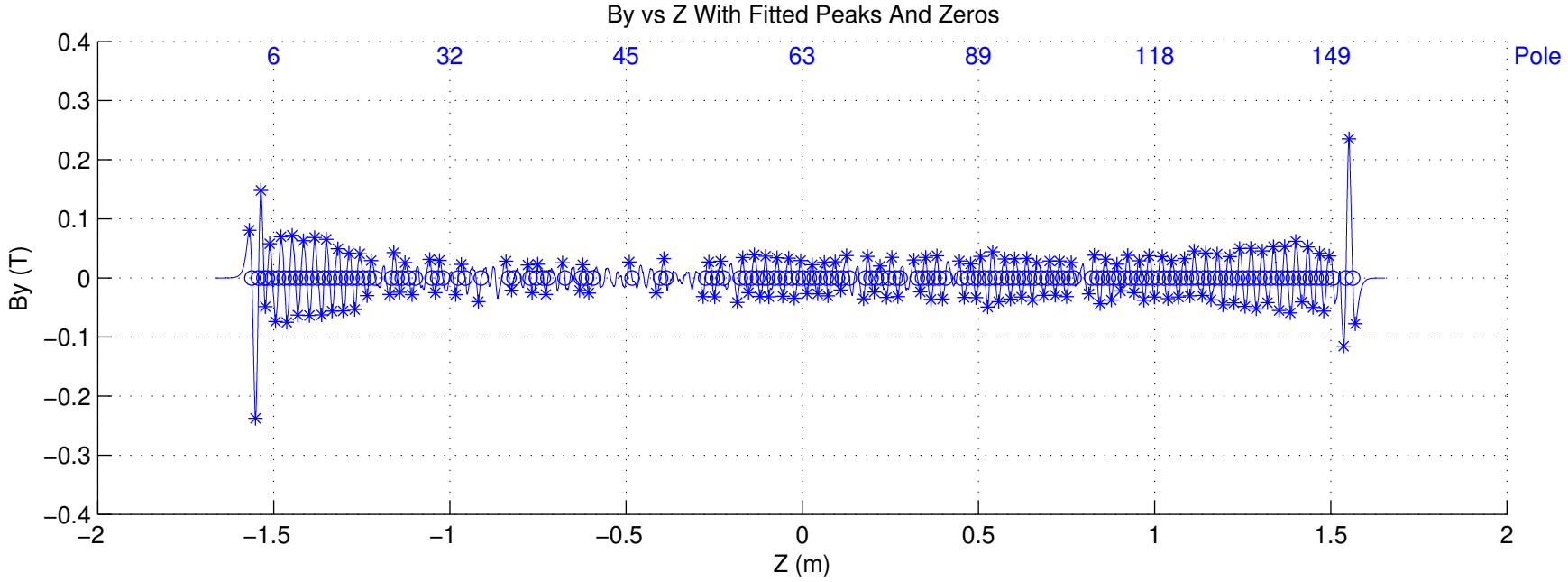
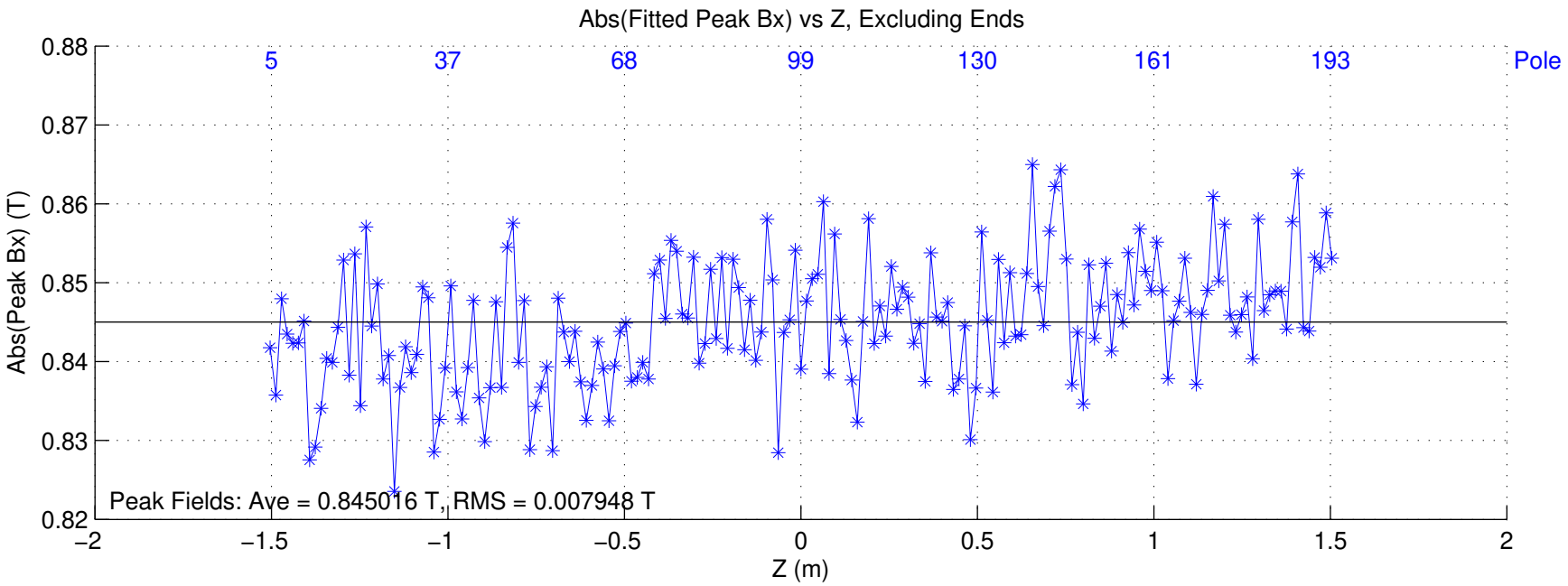
INPUT−FILE−NAME =hall2−anal−meas−field.dat
INPUT−FILE−TYPE =ZBXYZH
CORR−REQUIRED =0
GAMMA =26627.1
NOM−LAMBDA−U =0
NOM−K−VALUE =0
NOM−LAMBDA−R =0
NUM−POLES =196
NUM−END−POLES =4
CELL−LENGTH =3.126

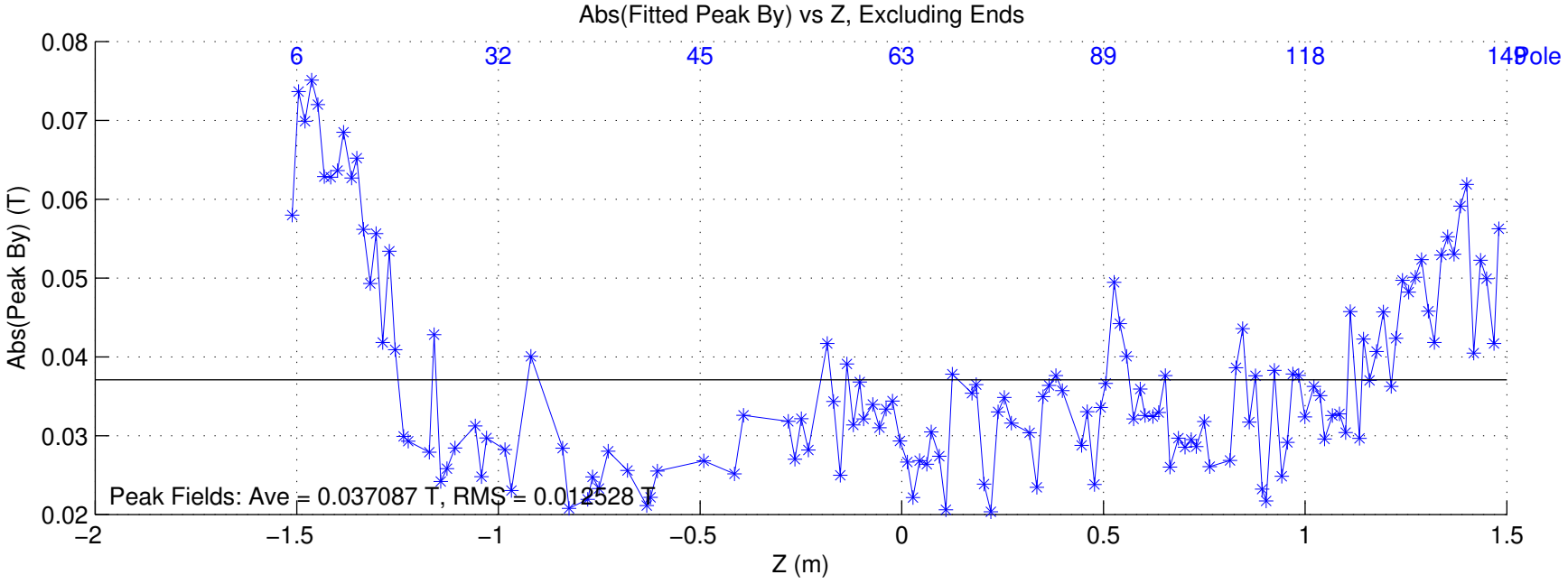

Bx, By, Bz vs Zm
Bx (T)
By (T)
Bz (T)
Zm Measurement Position (m)
1
0.5
0
−0.5
−1
0.4
0.2
−0.2
−0.4
0
0.5
1
1.5
2
2.5
3
3.5

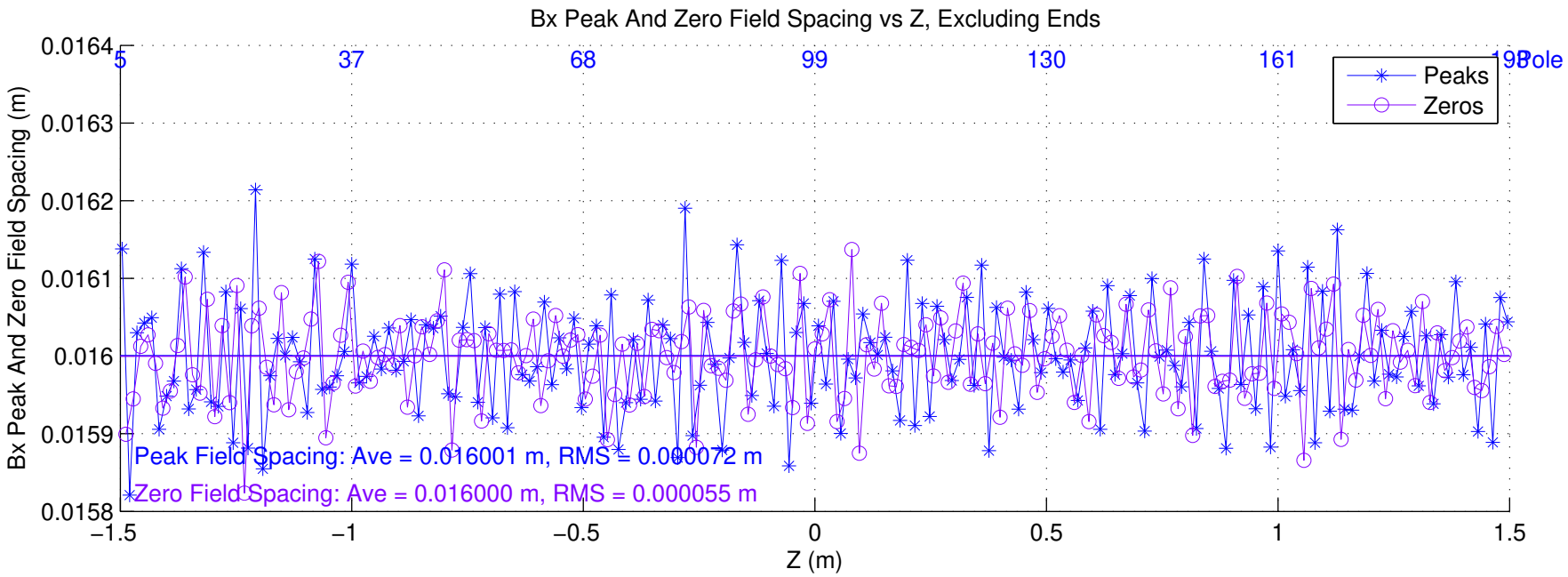

Bx and By vs Z
6
32
45
63
89
118
149
Pole
Bx
By
Bx, By (T)
Z (m)
1
0.8
0.6
0.4
0.2
0
−0.2
−0.4
−0.6
−0.8
−1
−2
−1.5
−1
−0.5
0
0.5
1
1.5
2

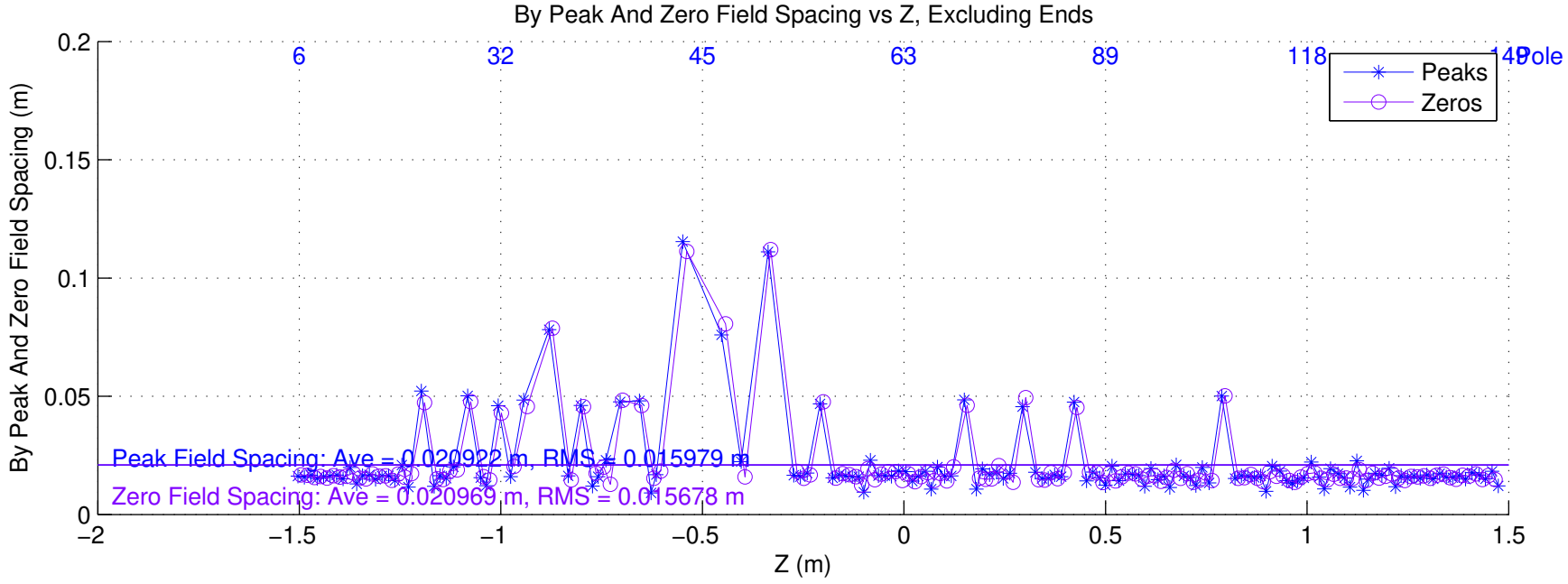

Bx vs Z With Fitted Peaks And Zeros
5
37
68
99
130
161
193
Pole
1
0.5
0
−0.5
−1
Bx (T)
−2
−1.5
−1
−0.5
0
0.5
1
1.5
2
Z (m)

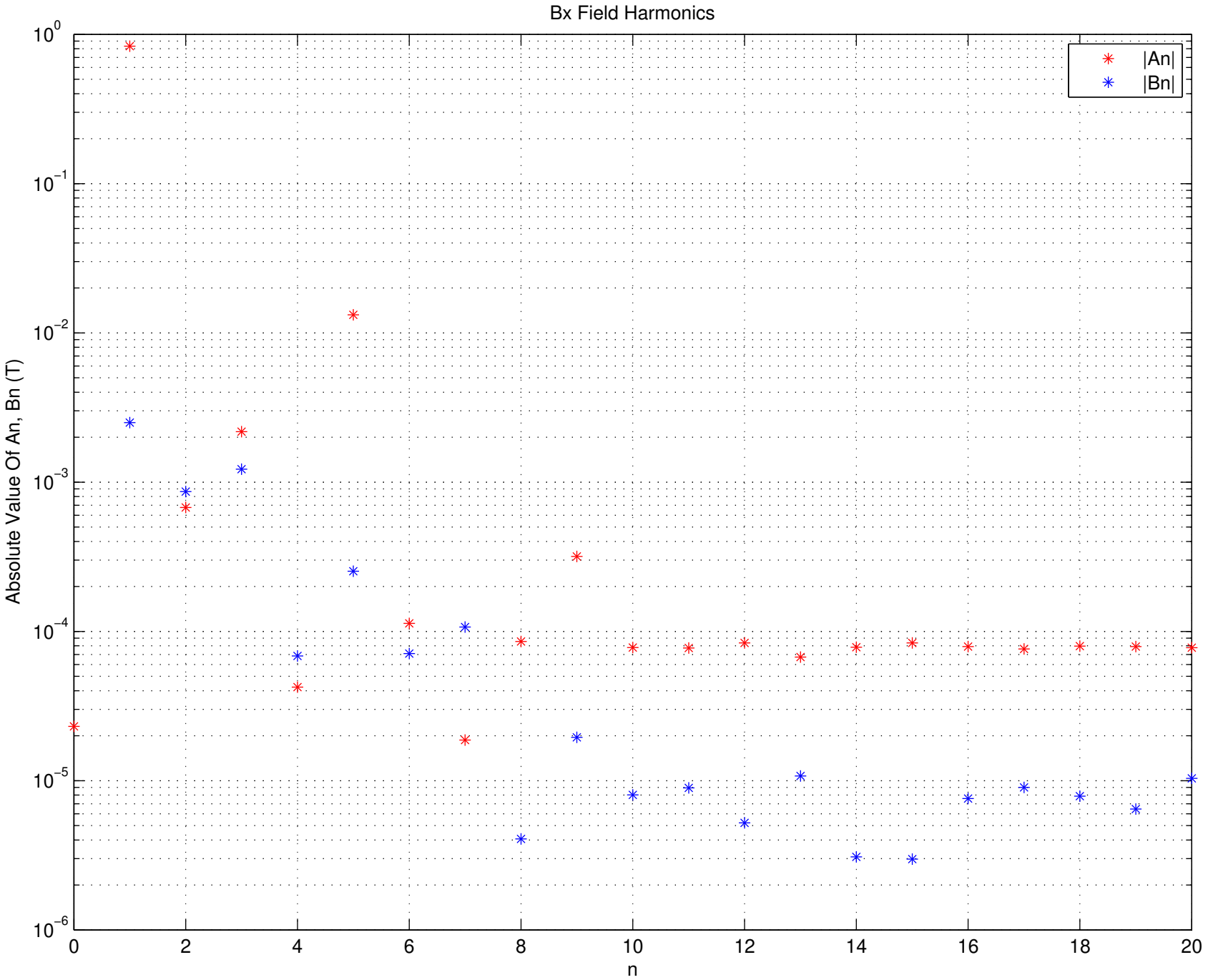

By vs Z With Fitted Peaks And Zeros
6
32
45
63
89
118
149
Pole
0.4
0.3
0.2
0.1
0
−0.1
−0.2
−0.3
−0.4
By (T)
−2
−1.5
−1
−0.5
0
0.5
1
1.5
2
Z (m)

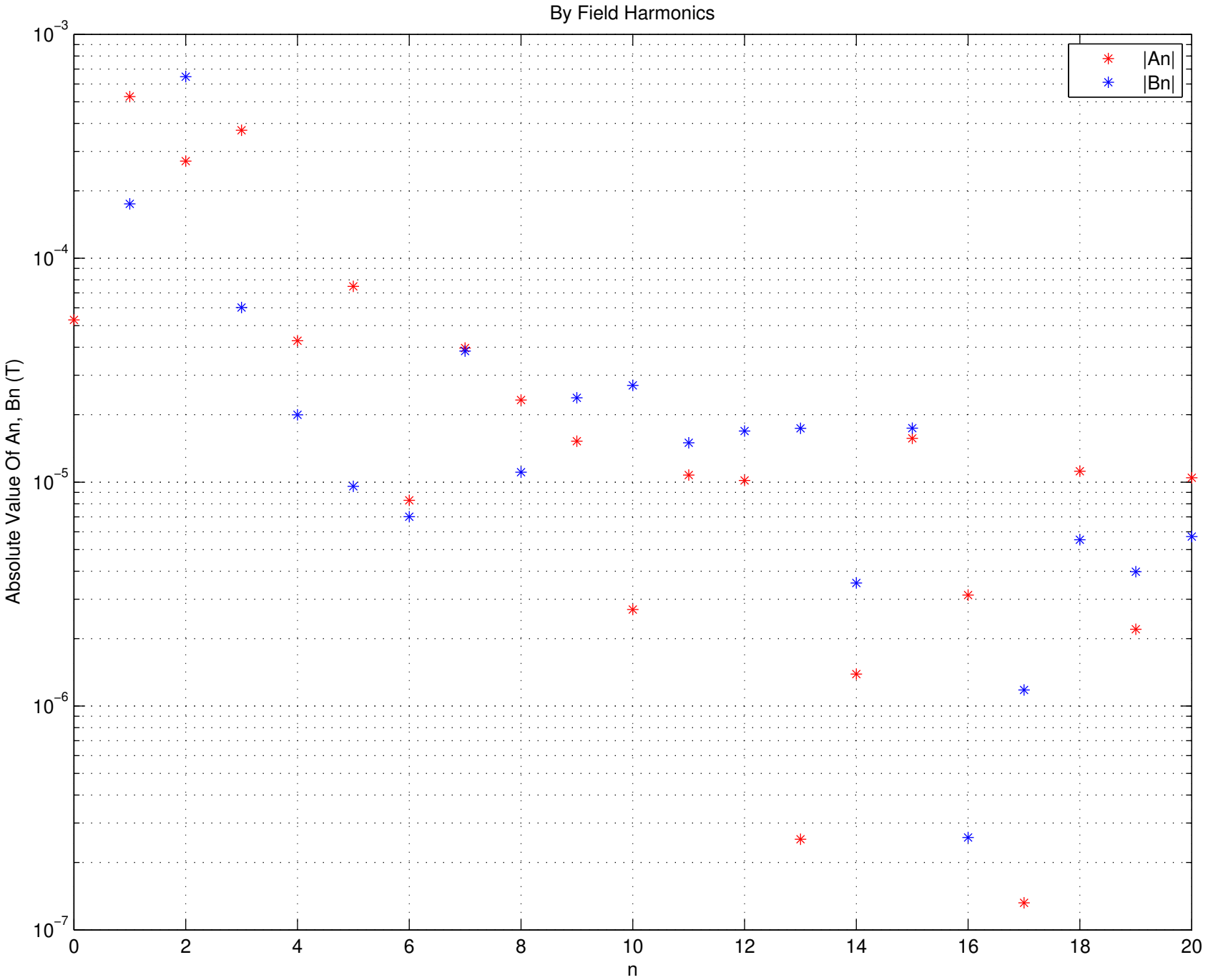

Abs(Fitted Peak Bx) vs Z, Excluding Ends
5
37
68
99
130
161
193
Pole
0.88
0.87
0.86
0.85
0.84
0.83
0.82
Abs(Peak Bx) (T)
Peak Fields: Ave = 0.845016 T, RMS = 0.007948 T
−2
−1.5
−1
−0.5
0
0.5
1
1.5
2
Z (m)

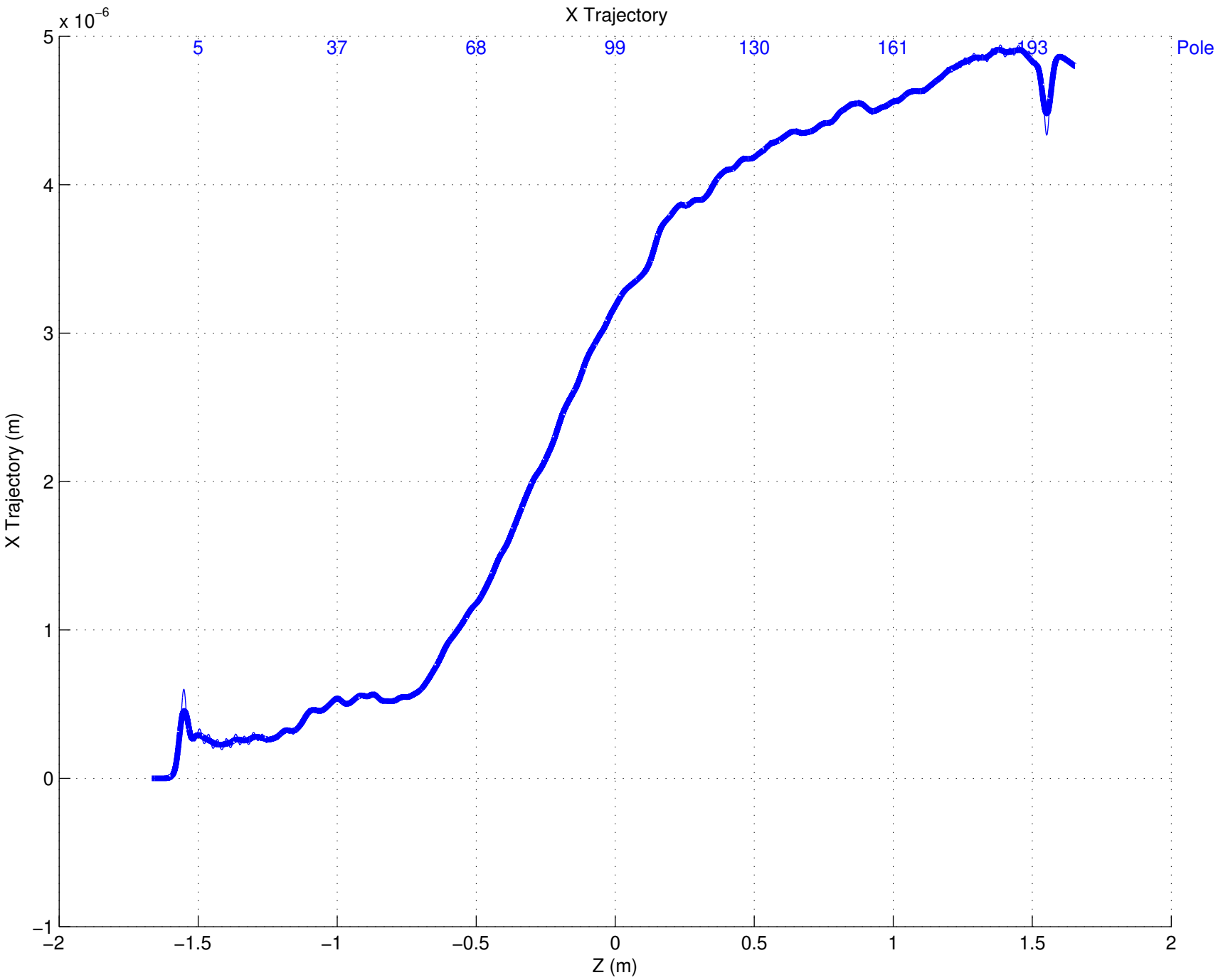

Abs(Fitted Peak By) vs Z, Excluding Ends
6
32
45
63
89
118
149
Pole
0.08
0.07
0.06
0.05
0.04
0.03
0.02
Abs(Peak By) (T)
Peak Fields: Ave = 0.037087 T, RMS = 0.012528 T
−2
−1.5
−1
−0.5
0
0.5
1
1.5
Z (m)

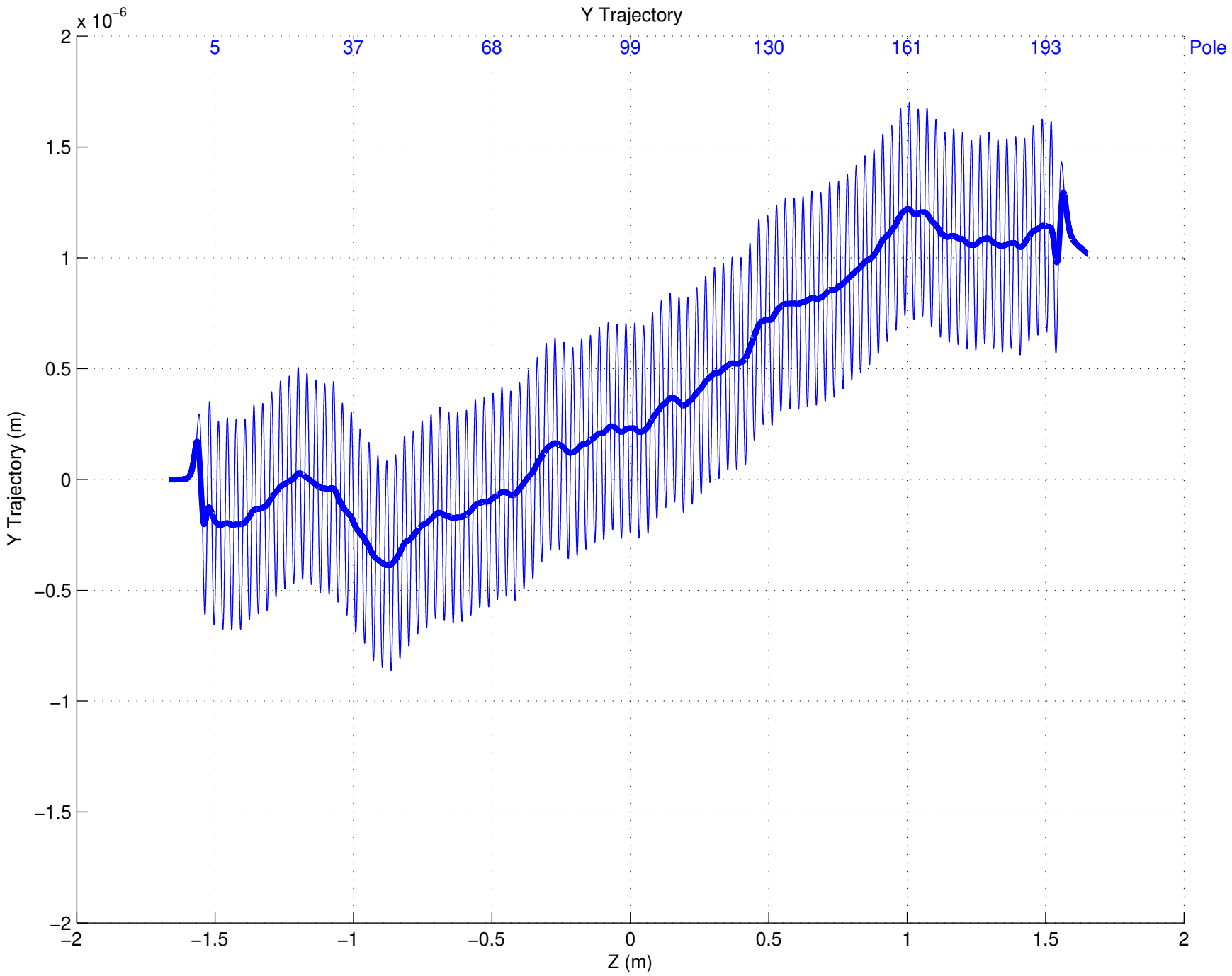

Bx Peak And Zero Field Spacing vs Z, Excluding Ends
Bx Peak And Zero Field Spacing (m)
Z (m)
Pole
Peaks
Zeros
Peak Field Spacing: Ave = 0.016001 m, RMS = 0.000072 m
Zero Field Spacing: Ave = 0.016000 m, RMS = 0.000055 m

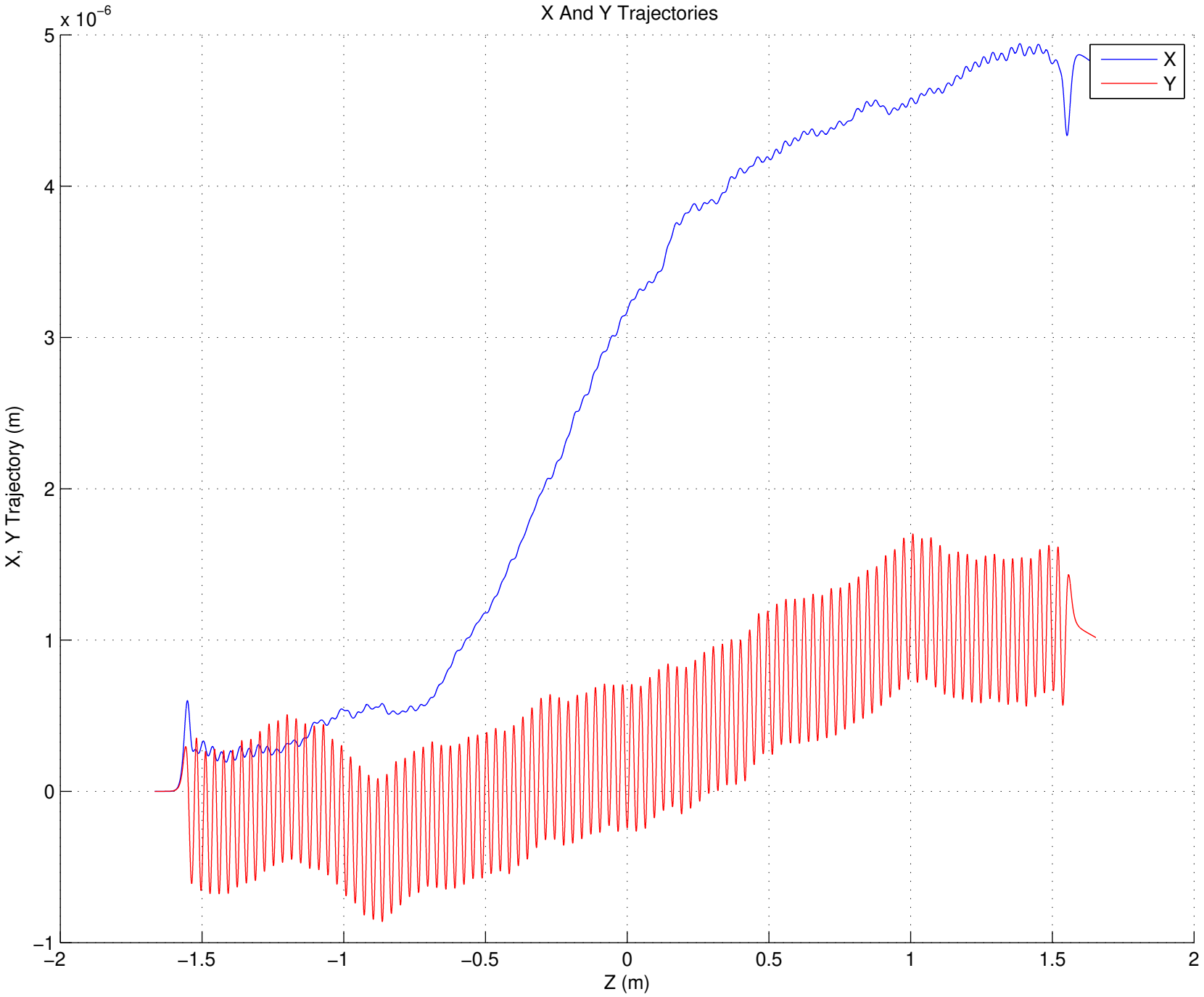

By Peak And Zero Field Spacing vs Z, Excluding Ends
By Peak And Zero Field Spacing (m)
Z (m)
Pole
Peaks
Zeros
Peak Field Spacing: Ave = 0.020922 m, RMS = 0.015979 m
Zero Field Spacing: Ave = 0.020969 m, RMS = 0.015678 m

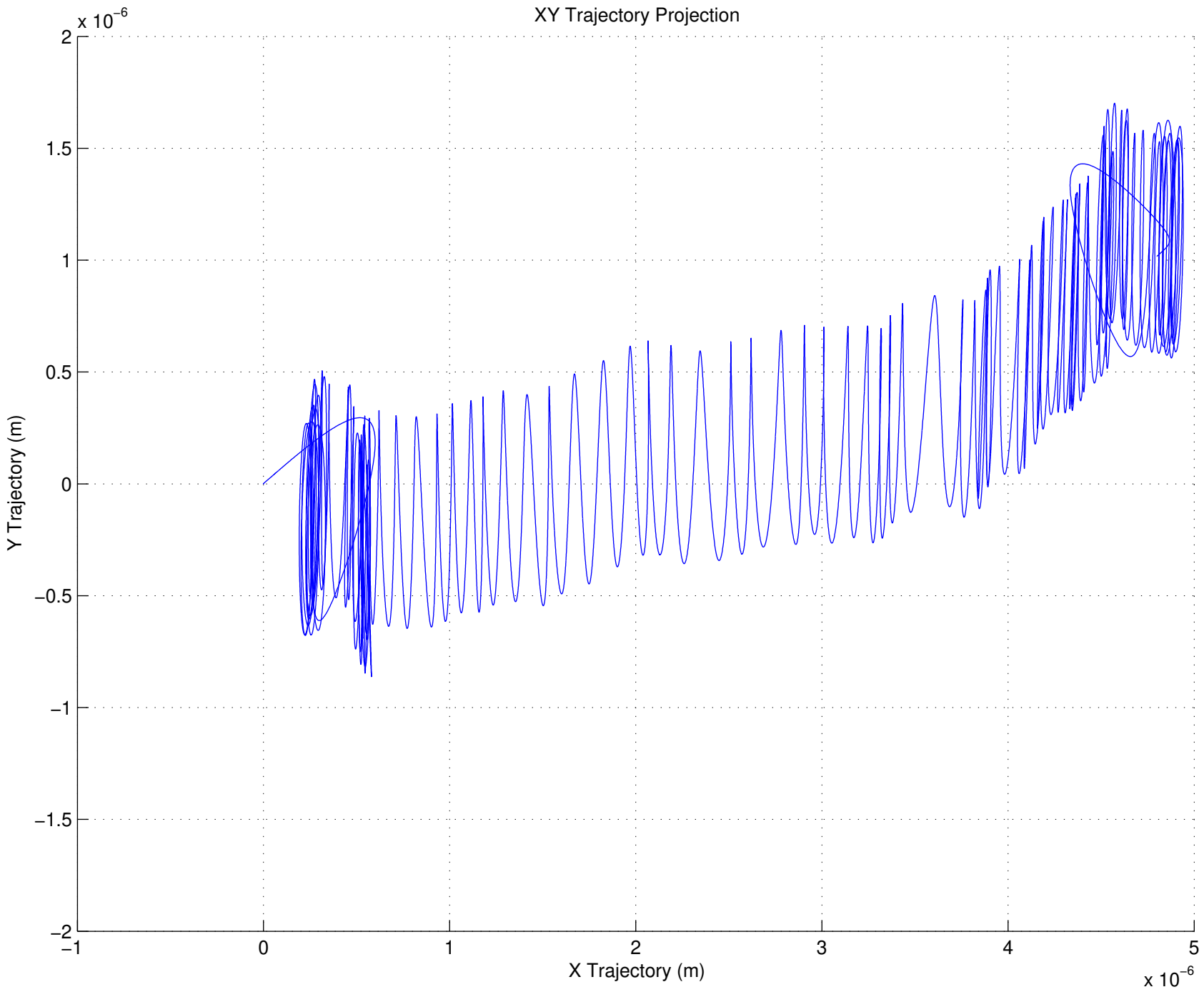

Bx Field Harmonics
|An|
|Bn|
Absolute Value Of An, Bn (T)
n
10^{0}
10^{-1}
10^{-2}
10^{-3}
10^{-4}
10^{-5}
10^{-6}
0
2
4
6
8
10
12
14
16
18
20

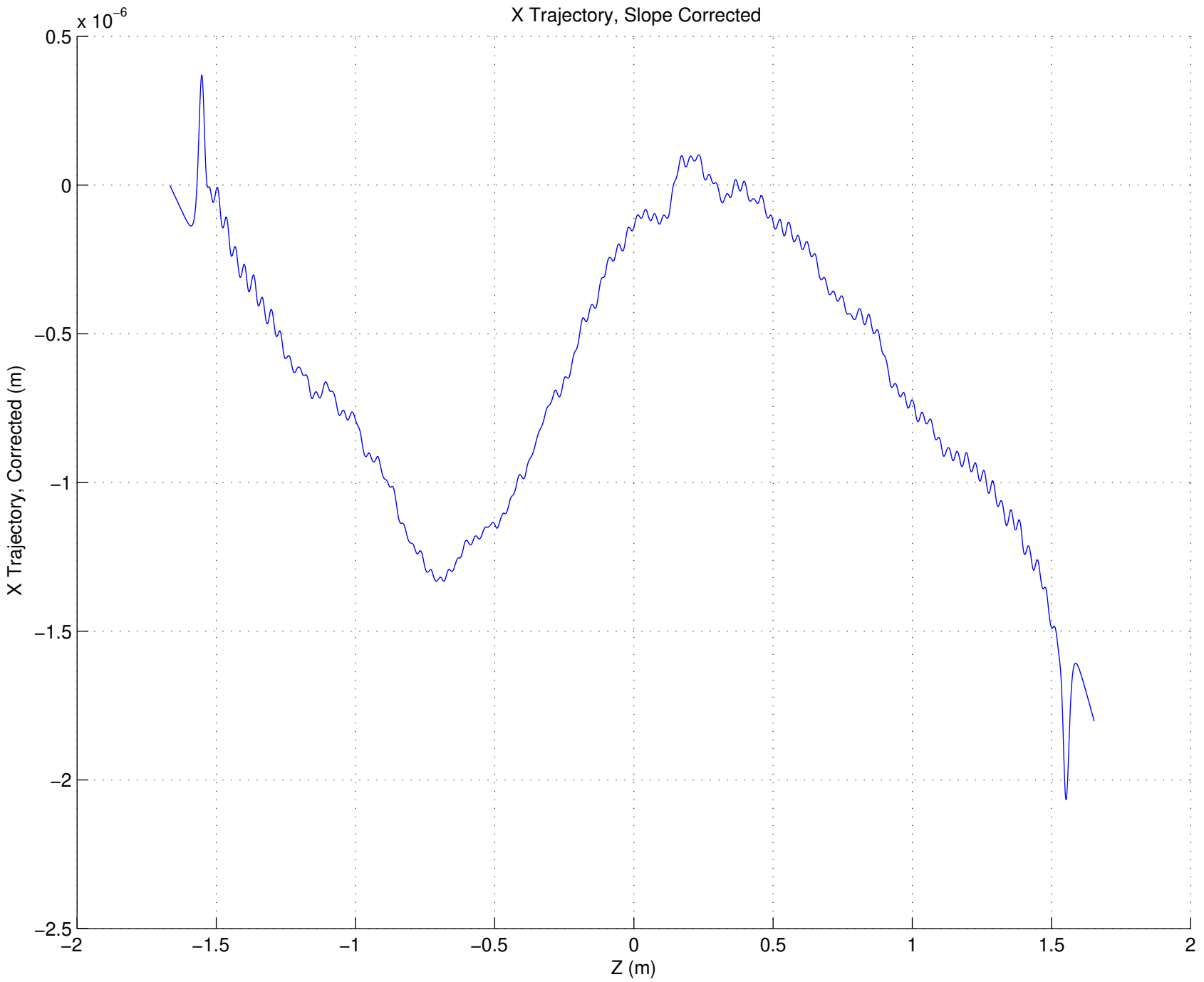

By Field Harmonics
|An|
|Bn|
Absolute Value Of An, Bn (T)
n
10^{-3}
10^{-4}
10^{-5}
10^{-6}
10^{-7}
0
2
4
6
8
10
12
14
16
18
20

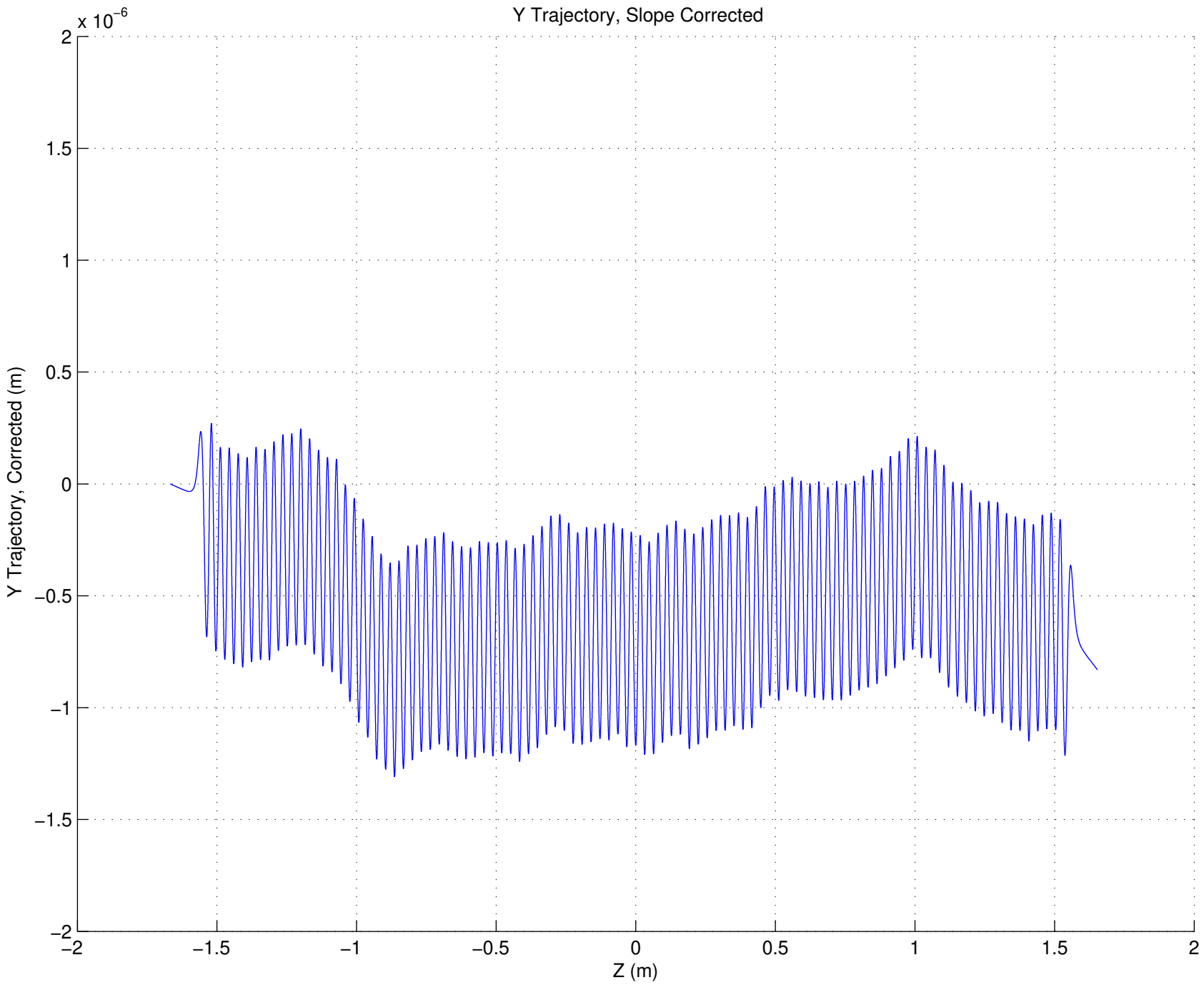

X Trajectory
x 10^-6
5
37
68
99
130
161
193
Pole
X Trajectory (m)
Z (m)
5
4
3
2
1
0
−1
−2
−1.5
−1
−0.5
0
0.5
1
1.5
2

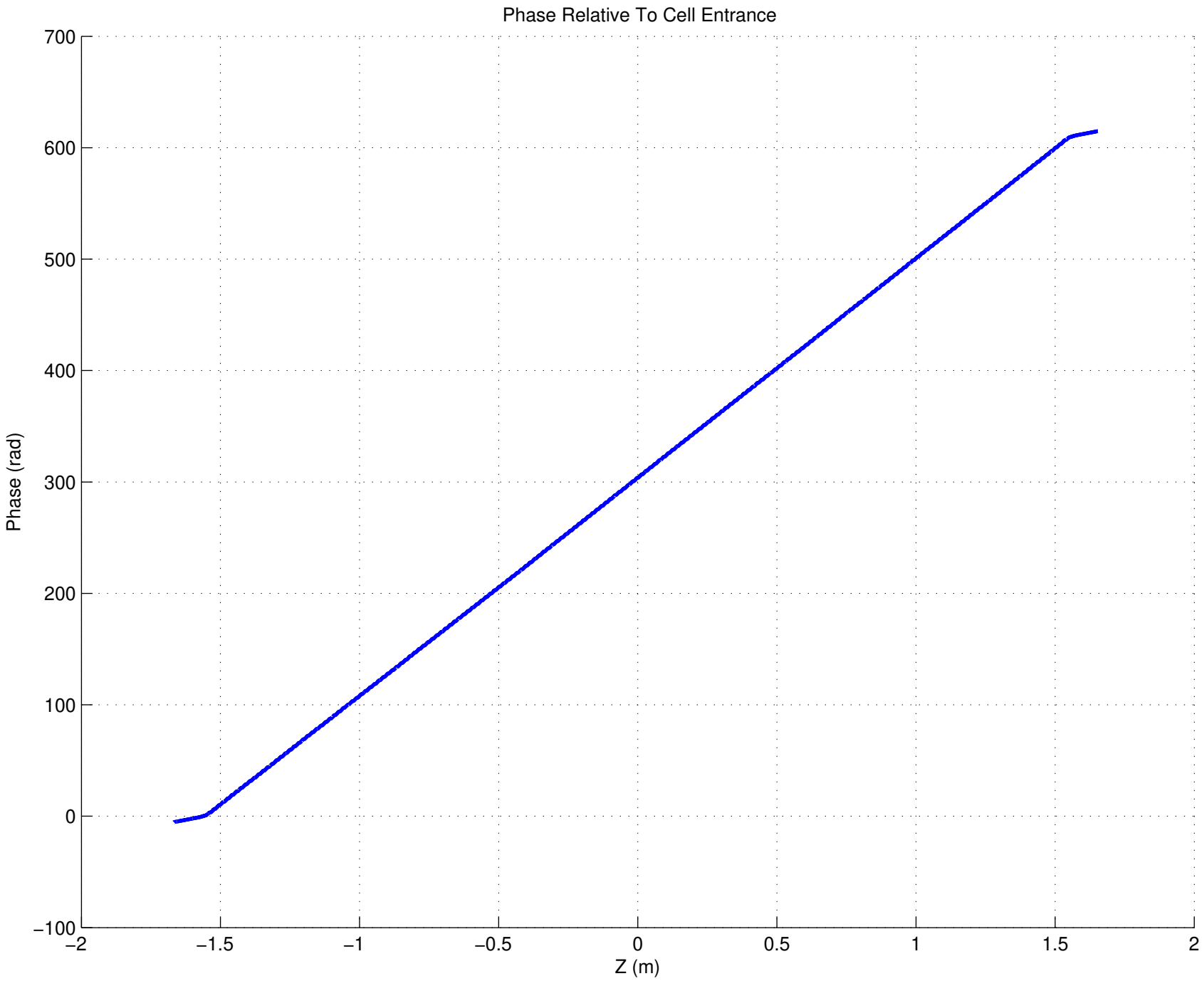

Y Trajectory
x 10^-6
5
37
68
99
130
161
193
Pole
2
1.5
1
0.5
0
−0.5
−1
−1.5
−2
Y Trajectory (m)
−2
−1.5
−1
−0.5
0
0.5
1
1.5
2
Z (m)

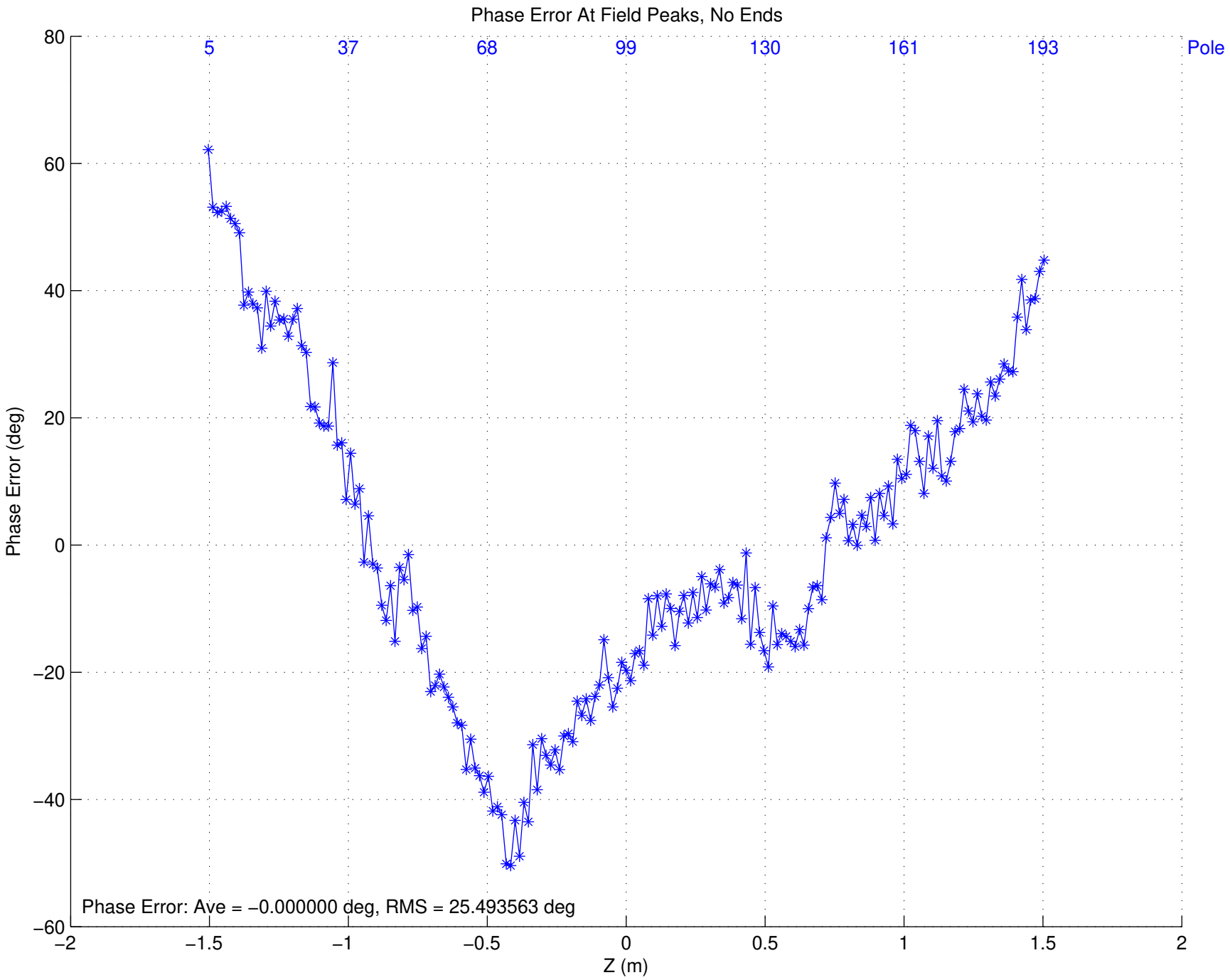

X And Y Trajectories
x 10^-6
X, Y Trajectory (m)
Z (m)
X
Y
5
4
3
2
1
0
−1
−2
−1.5
−1
−0.5
0
0.5
1
1.5
2

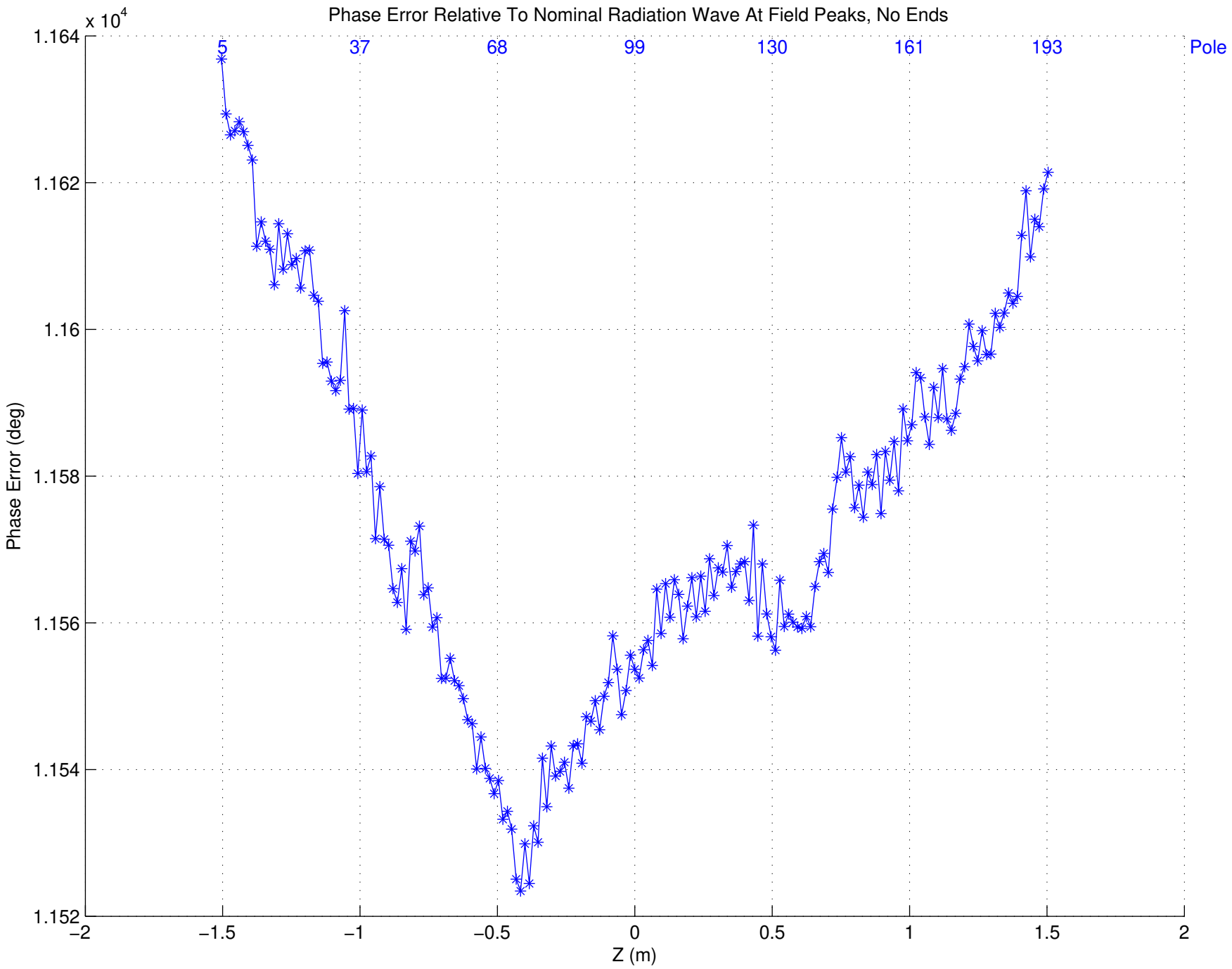

XY Trajectory Projection
x 10^-6
2
1.5
1
0.5
0
−0.5
−1
−1.5
−2
Y Trajectory (m)
−1
0
1
2
3
4
5
X Trajectory (m)
x 10^-6

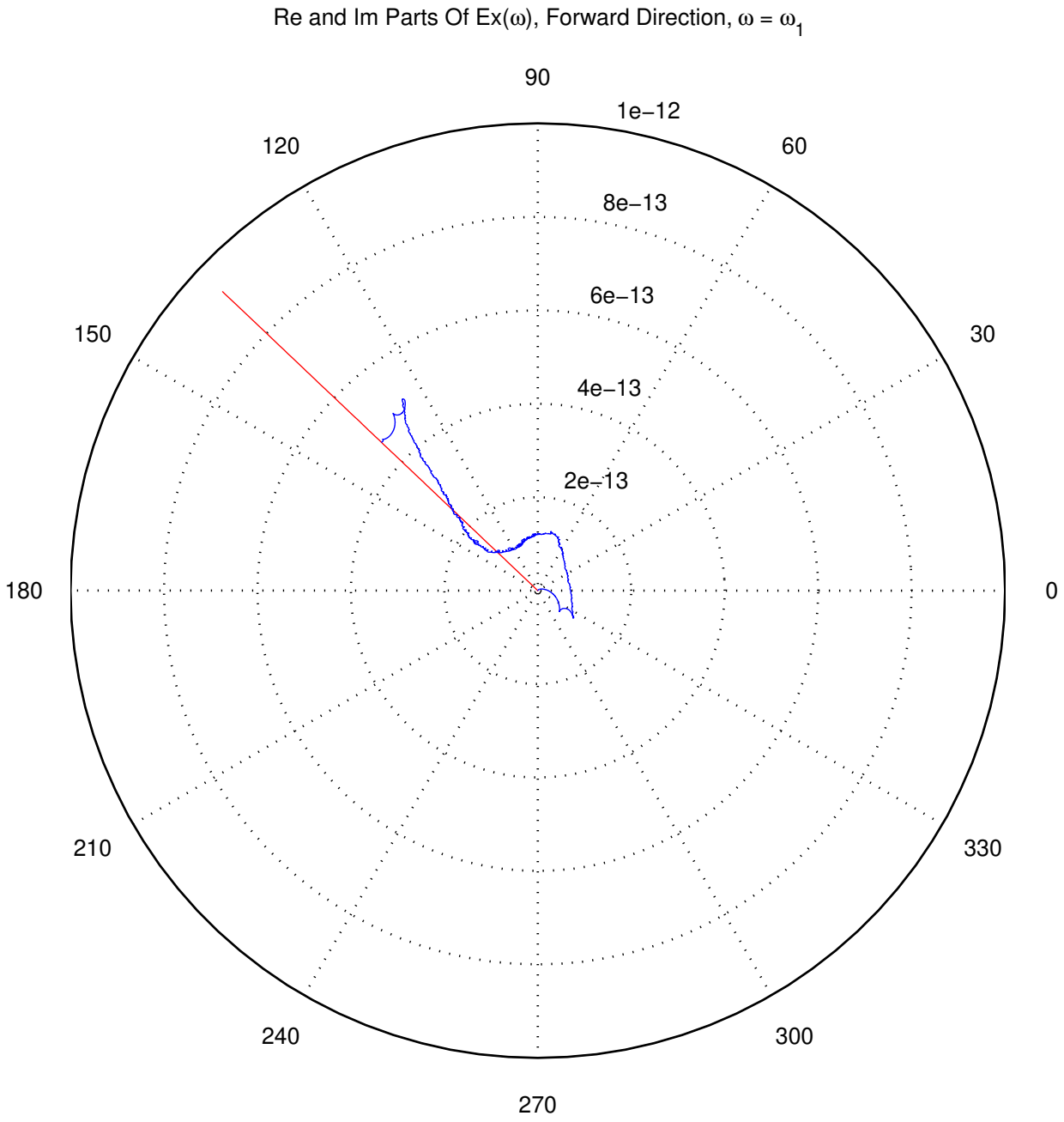

X Trajectory, Slope Corrected
x 10^-6
0.5
0
−0.5
−1
−1.5
−2
−2.5
X Trajectory, Corrected (m)
−2
−1.5
−1
−0.5
0
0.5
1
1.5
2
Z (m)

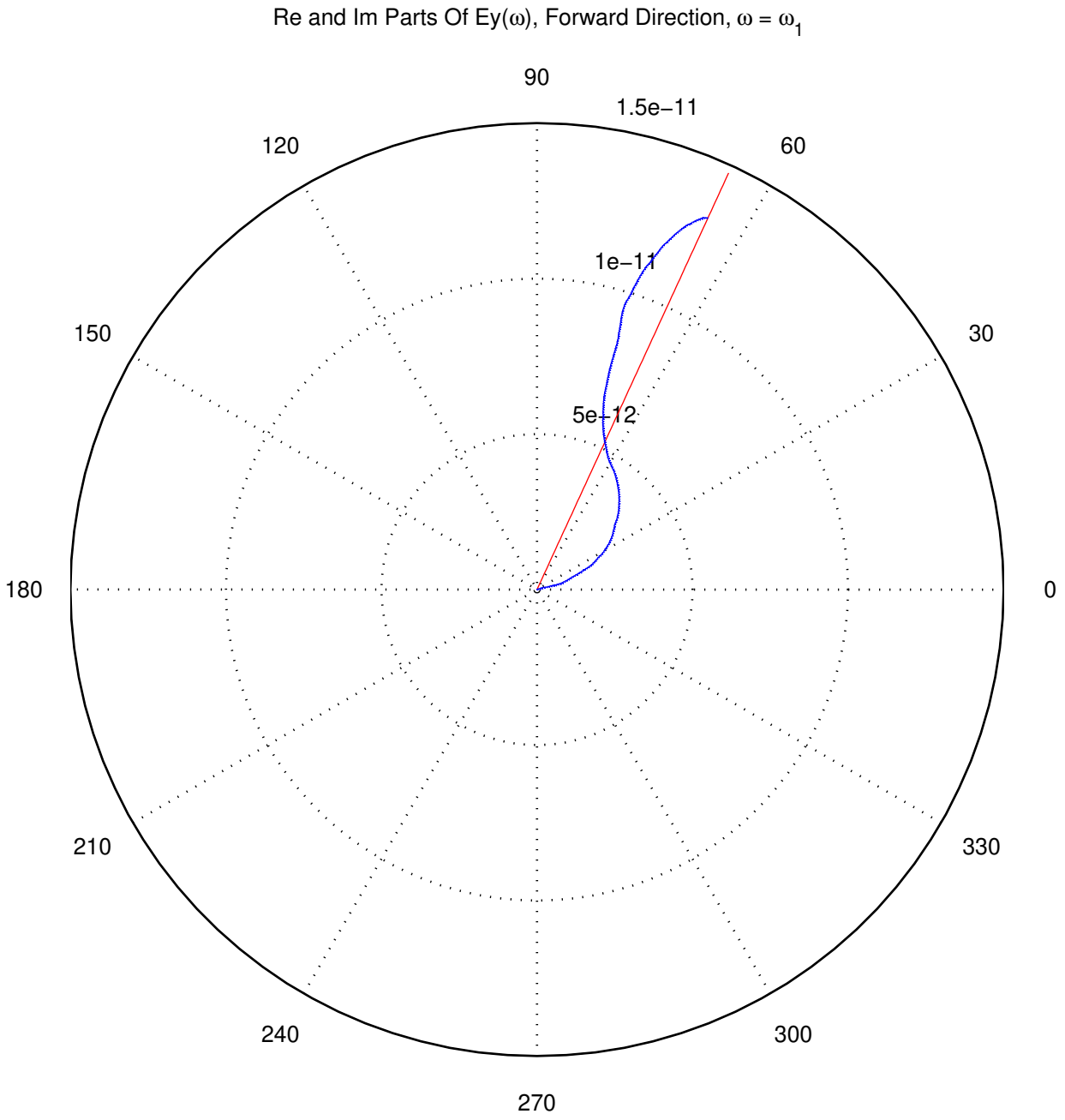

Y Trajectory, Slope Corrected
x 10^-6
2
1.5
1
0.5
0
−0.5
−1
−1.5
−2
Y Trajectory, Corrected (m)
−2
−1.5
−1
−0.5
0
0.5
1
1.5
2
Z (m)

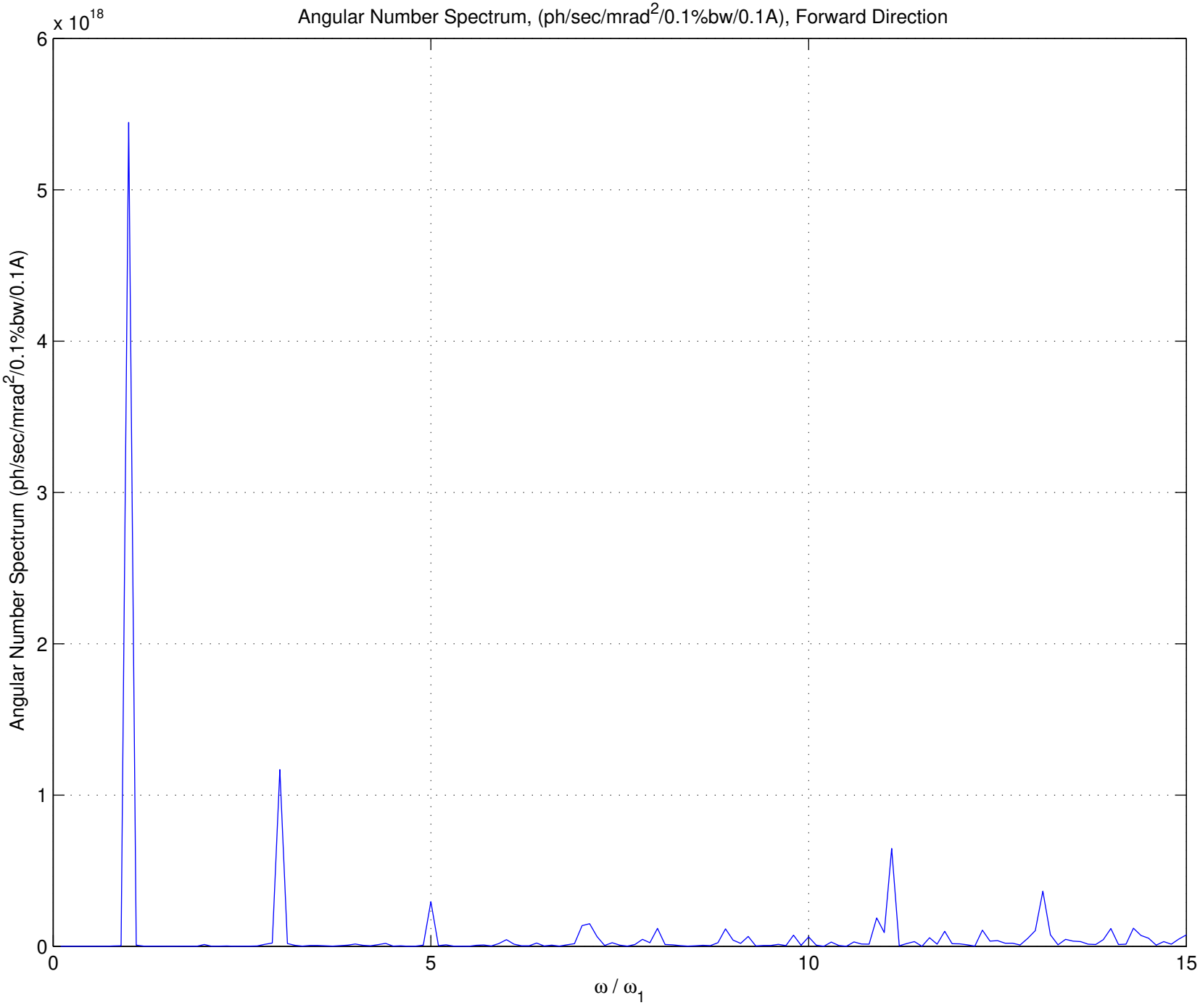

Phase Relative To Cell Entrance
700
600
500
400
300
200
100
0
−100
Phase (rad)
−2
−1.5
−1
−0.5
0
0.5
1
1.5
2
Z (m)

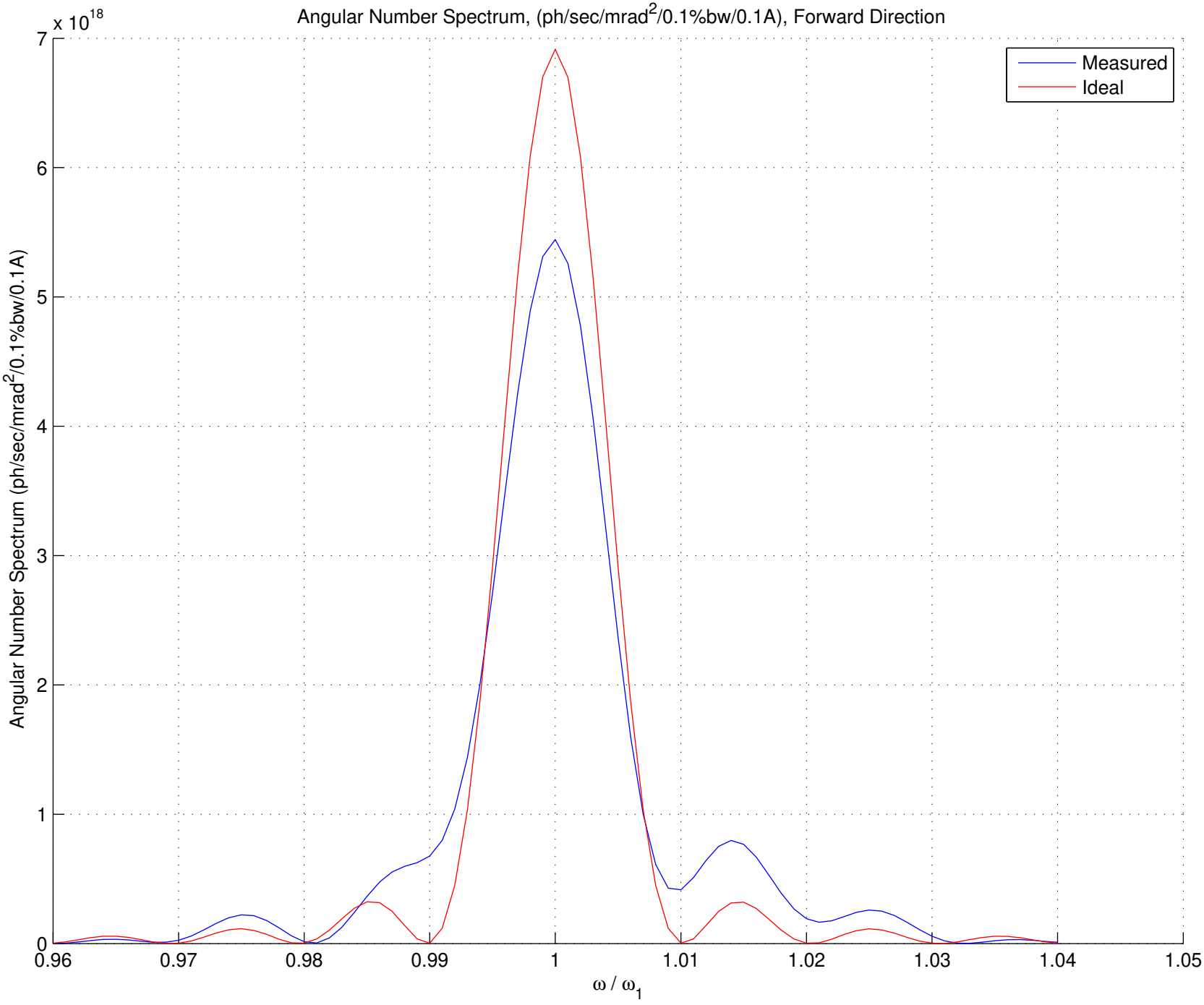

Phase Error At Field Peaks, No Ends
5
37
68
99
130
161
193
Pole
80
60
40
20
0
−20
−40
−60
Phase Error (deg)
−2
−1.5
−1
−0.5
0
0.5
1
1.5
2
Z (m)
Phase Error: Ave = −0.000000 deg, RMS = 25.493563 deg

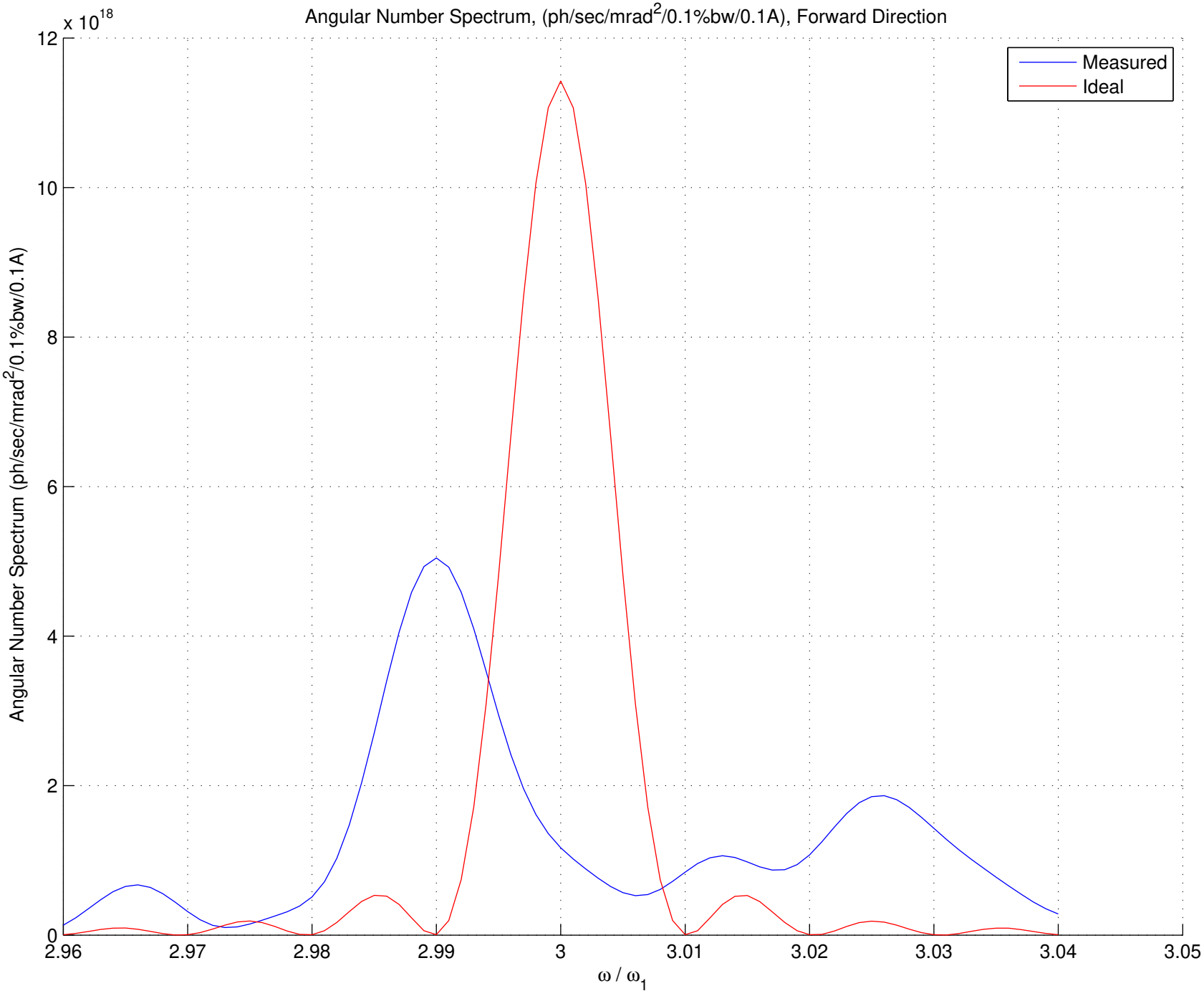

Phase Error Relative To Nominal Radiation Wave At Field Peaks, No Ends
x 10^4
1.164
1.162
1.16
1.158
1.156
1.154
1.152
Phase Error (deg)
5
37
68
99
130
161
193
Pole
−2
−1.5
−1
−0.5
0
0.5
1
1.5
2
Z (m)

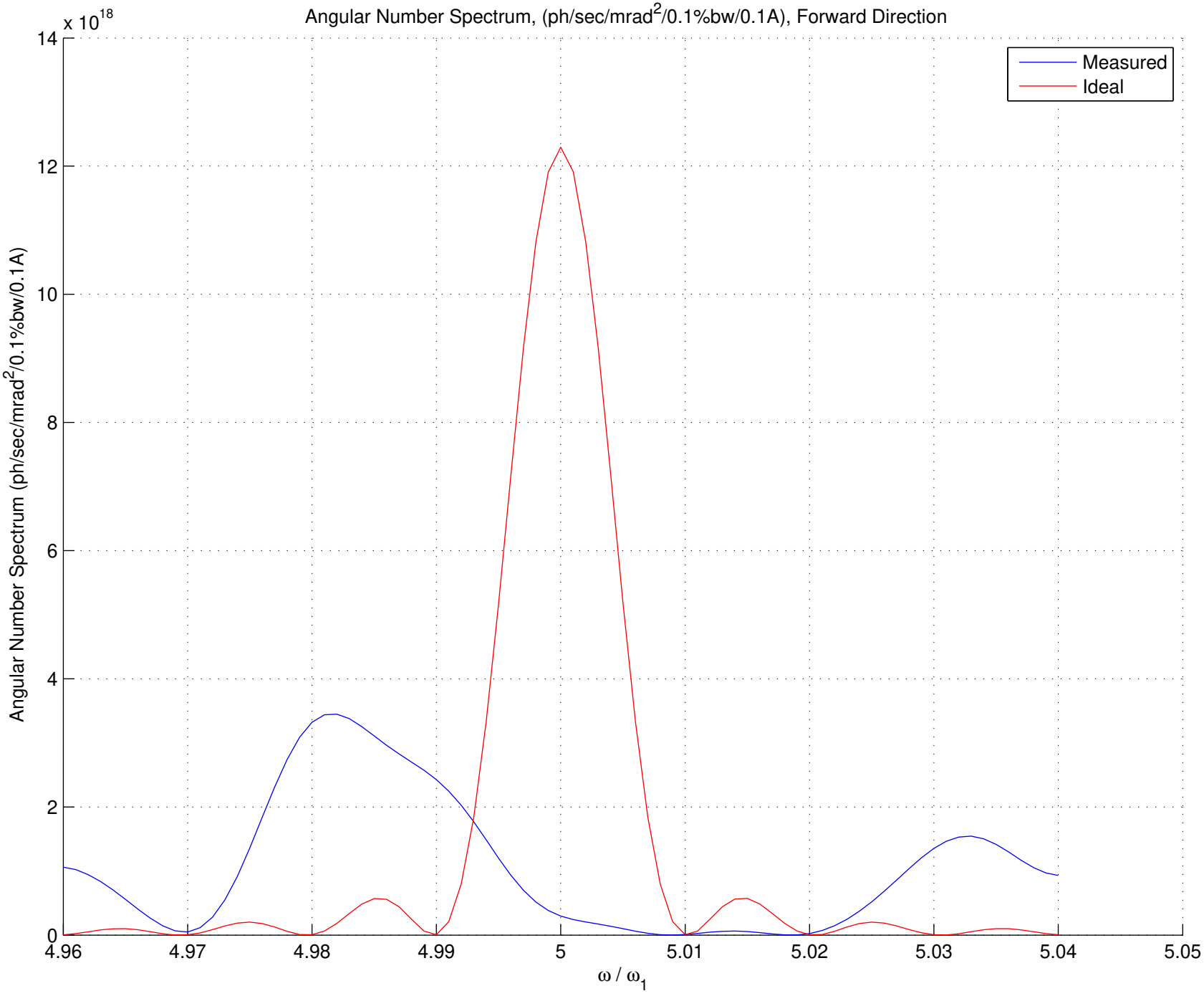

Re and Im Parts Of Ex(ω), Forward Direction, ω = ω1
90
1e−12
120
60
8e−13
6e−13
150
30
4e−13
2e−13
180
0
210
330
240
300
270


Re and Im Parts Of Ey(ω), Forward Direction, ω = ω1
90
1.5e−11
60
120
1e−11
30
150
5e−12
180
0
210
330
240
300
270


Angular Number Spectrum, (ph/sec/mrad2/0.1%bw/0.1A), Forward Direction
x 10^18
6
5
4
3
2
1
0
Angular Number Spectrum (ph/sec/mrad2/0.1%bw/0.1A)
0
5
10
15
ω / ω1


Angular Number Spectrum, (ph/sec/mrad^2/0.1%bw/0.1A), Forward Direction
x 10^{18}
Angular Number Spectrum (ph/sec/mrad^2/0.1%bw/0.1A)
ω / $ω_1$
Measured
Ideal
0
1
2
3
4
5
6
7
0.96
0.97
0.98
0.99
1
1.01
1.02
1.03
1.04
1.05


Angular Number Spectrum, (ph/sec/mrad^2/0.1%bw/0.1A), Forward Direction
x 10^{18}
Angular Number Spectrum (ph/sec/mrad^2/0.1%bw/0.1A)
ω / $ω_1$
Measured
Ideal
0
2
4
6
8
10
12
2.96
2.97
2.98
2.99
3
3.01
3.02
3.03
3.04
3.05


Angular Number Spectrum, (ph/sec/mrad^2/0.1%bw/0.1A), Forward Direction
x 10^{18}
Measured
Ideal
Angular Number Spectrum (ph/sec/mrad^2/0.1%bw/0.1A)
0
2
4
6
8
10
12
14
4.96
4.97
4.98
4.99
5
5.01
5.02
5.03
5.04
5.05
ω / $ω_1$