SLAC Magnetic Measurements

EPU Analysis
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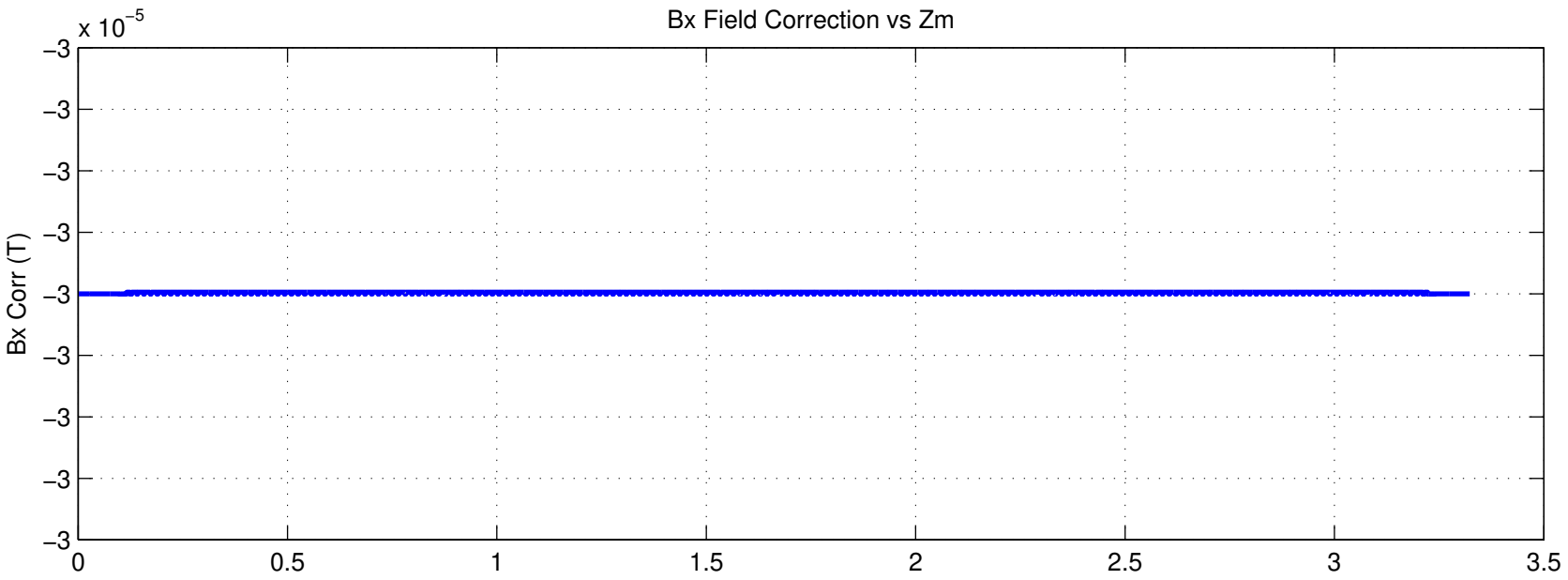
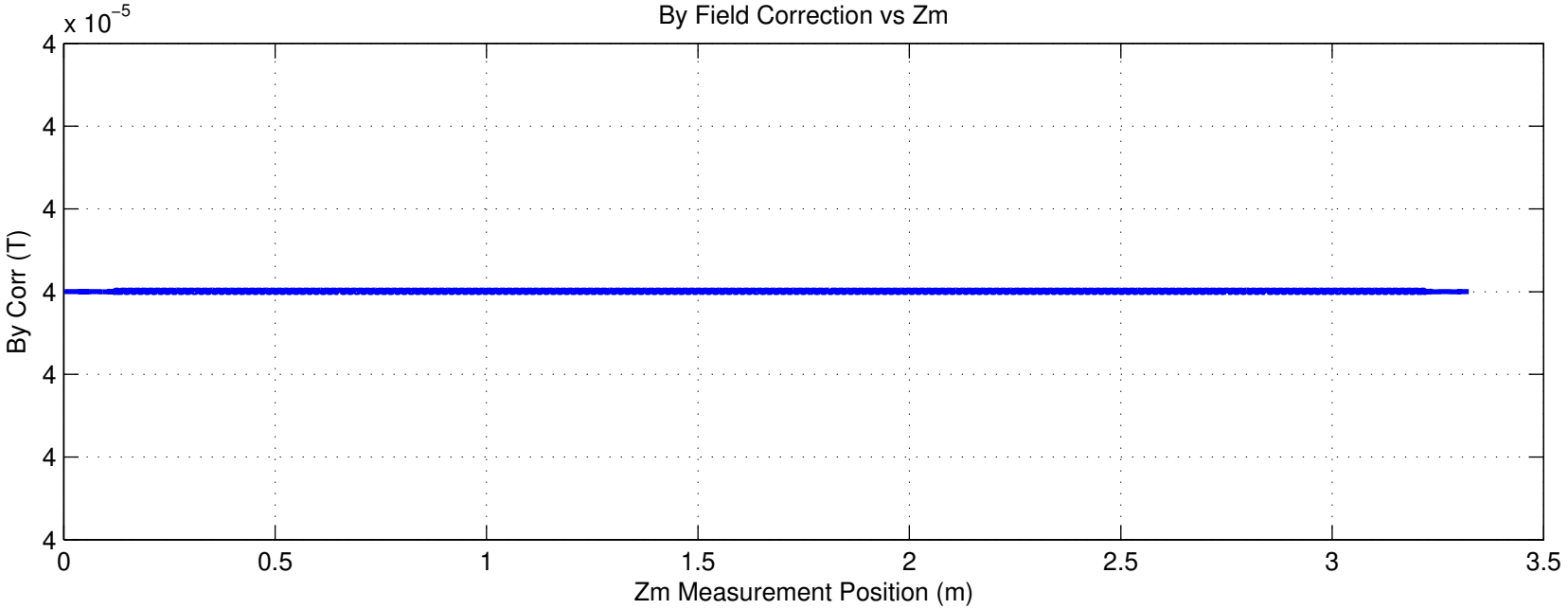
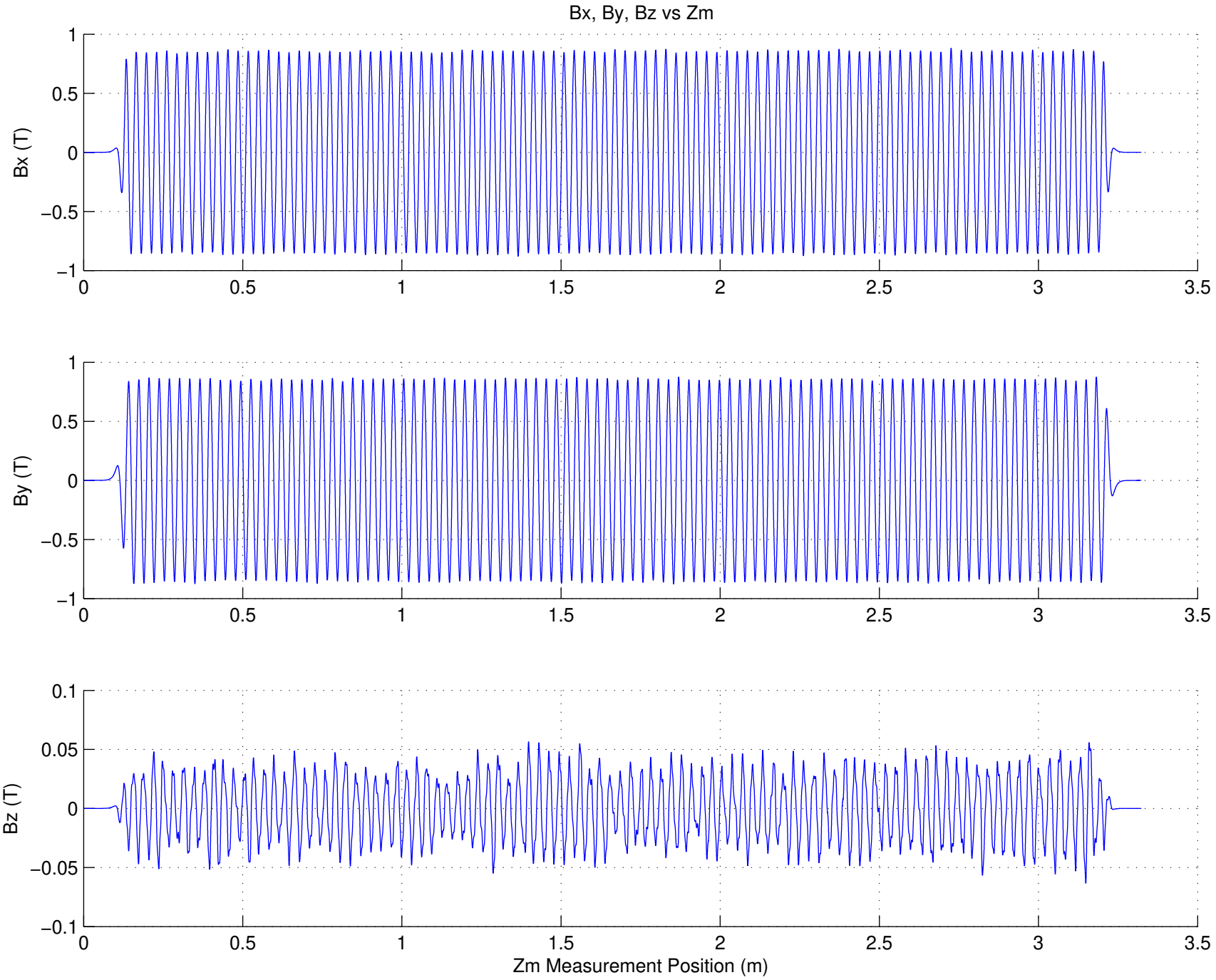
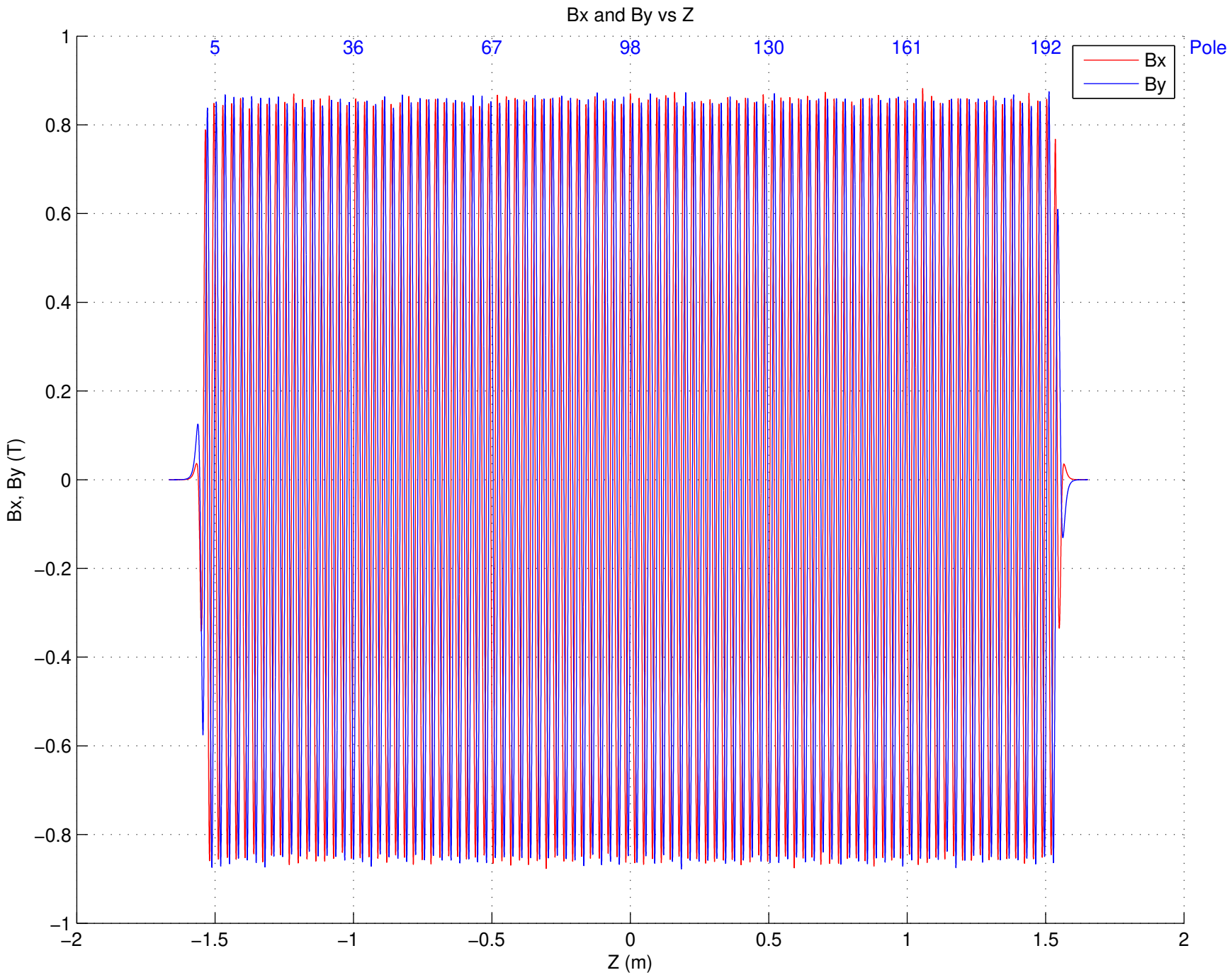
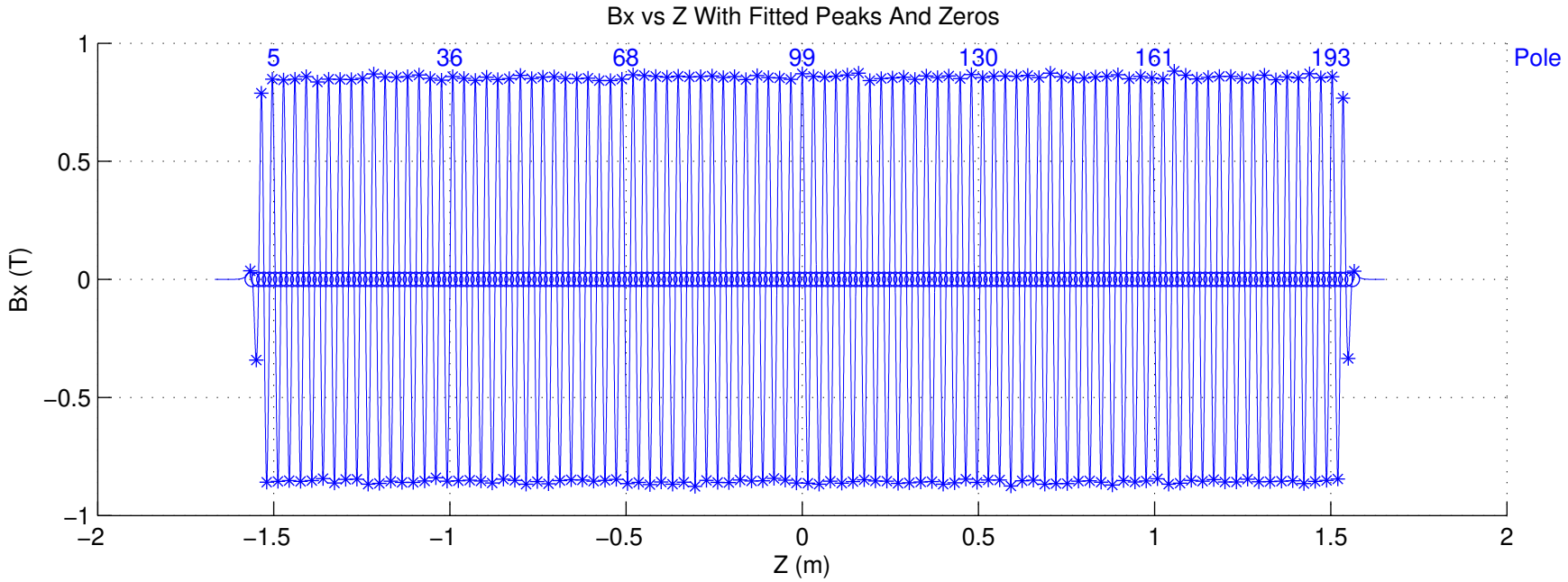
Parameters:
INPUT–FILE–DIR =s:\MagData\LCLS\Undulator\DELTA\Data\Assembled Measurements\Run 015\CPRMF\KR1000\
INPUT–FILE–NAME =hall2–anal–meas–field.dat
INPUT–FILE–TYPE =ZBXYZH
CORR–REQUIRED =1
GAMMA =26627.1
NOM–LAMBDA–U =0
NOM–K–VALUE =3.48
NOM–LAMBDA–R =0
NUM–POLES =196
NUM–END–POLES =4
CELL–LENGTH =3.126

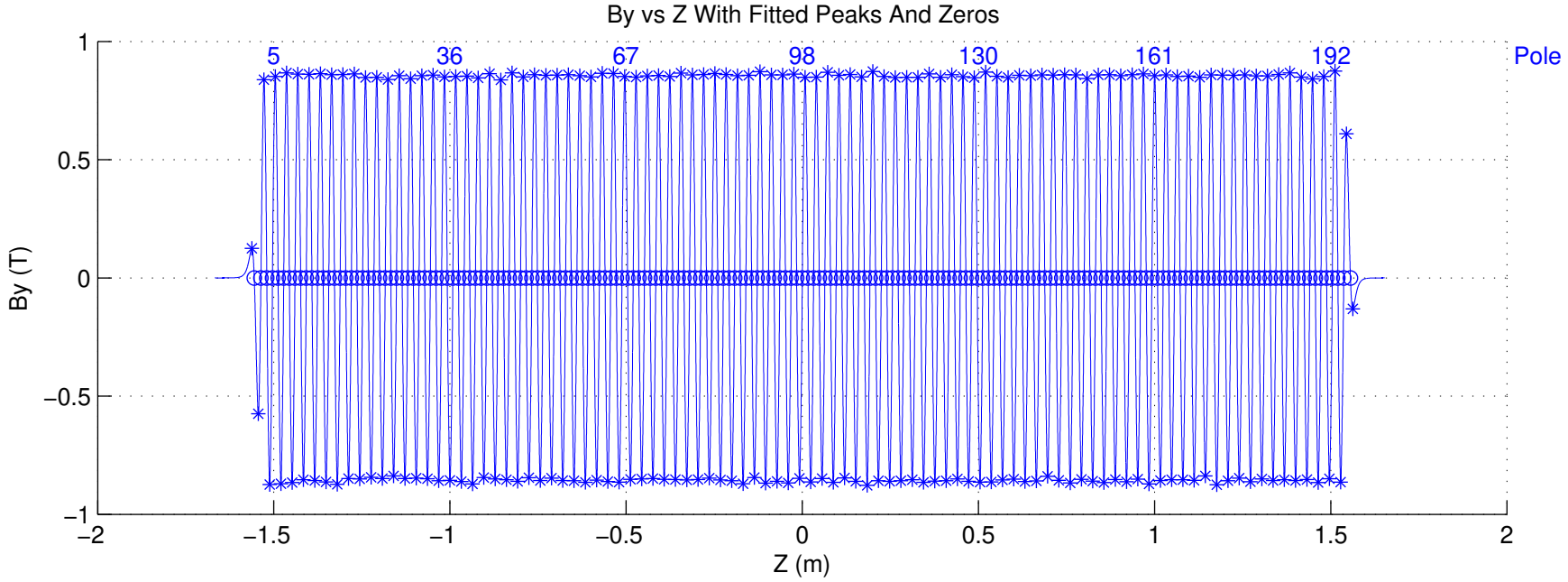

Bx Field Correction vs Zm
x 10^-5
Bx Corr (T)
−3
−3
−3
−3
−3
−3
−3
−3
0
0.5
1
1.5
2
2.5
3
3.5

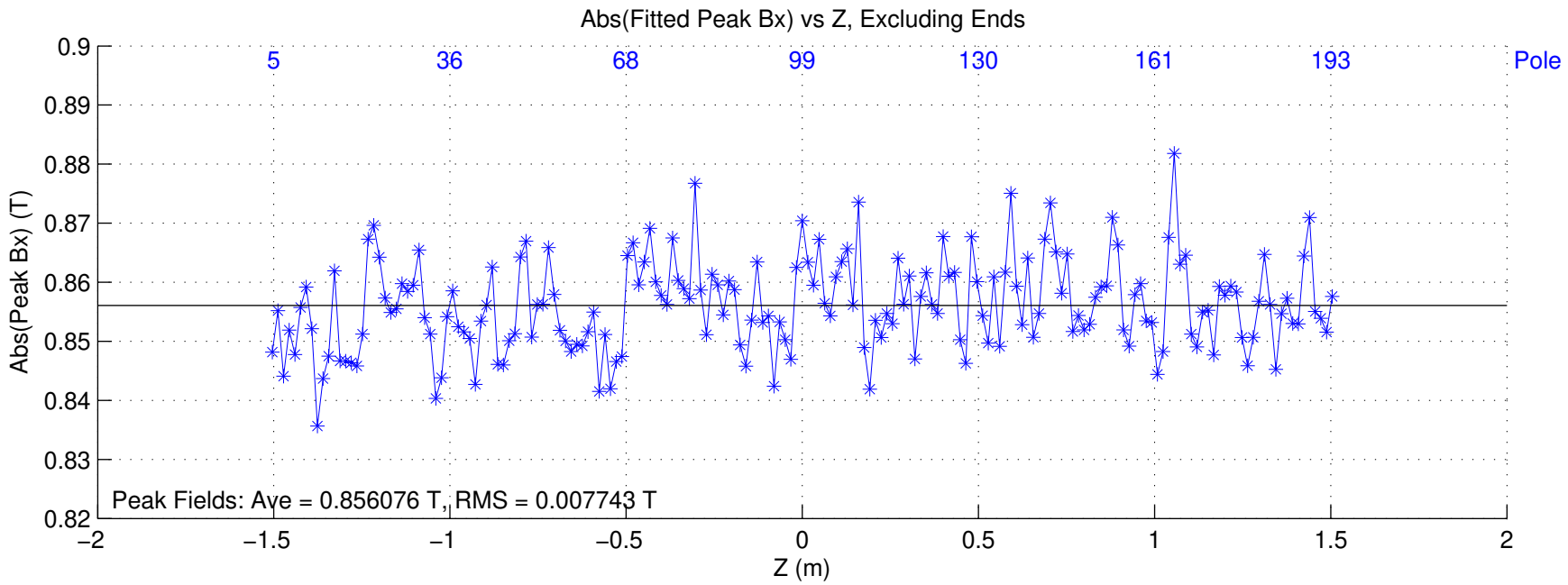

By Field Correction vs Zm
x 10^-5
By Corr (T)
4
4
4
4
4
4
4
4
0
0.5
1
1.5
2
2.5
3
3.5
Zm Measurement Position (m)

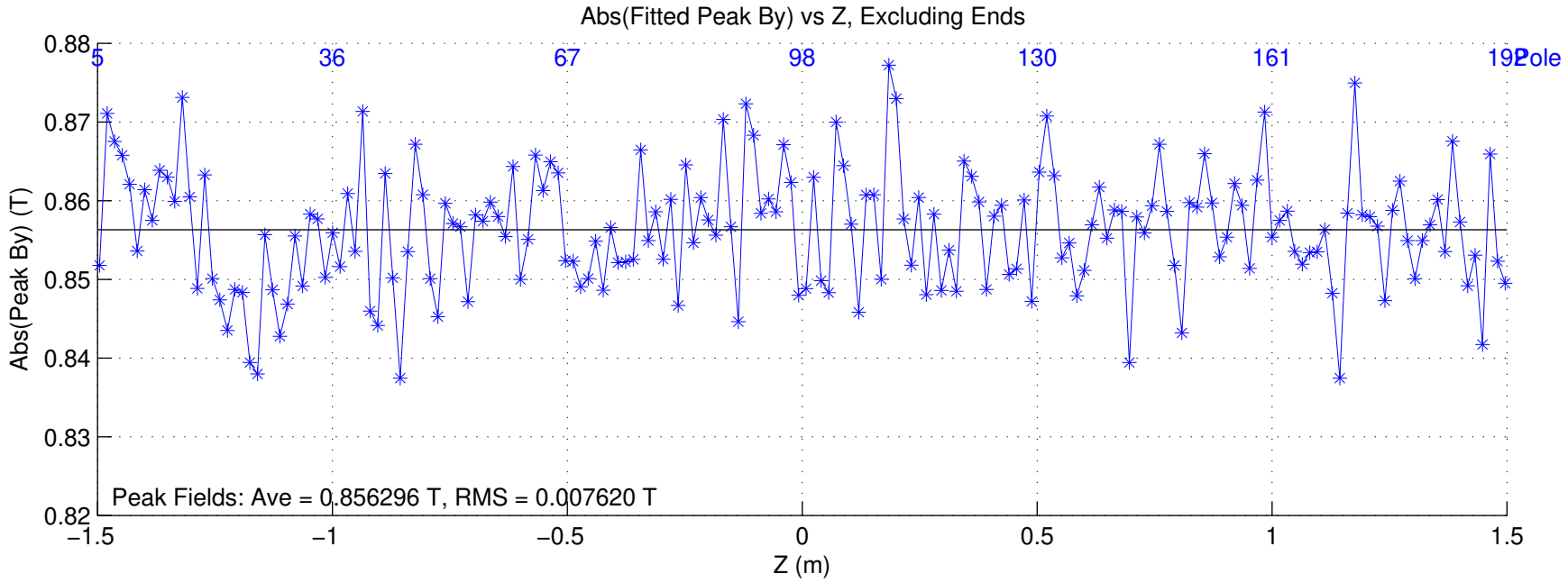

Bx, By, Bz vs Zm
Bx (T)
By (T)
Bz (T)
Zm Measurement Position (m)
1
0.5
0
−0.5
−1
0.1
0.05
−0.05
−0.1
0
0.5
1
1.5
2
2.5
3
3.5

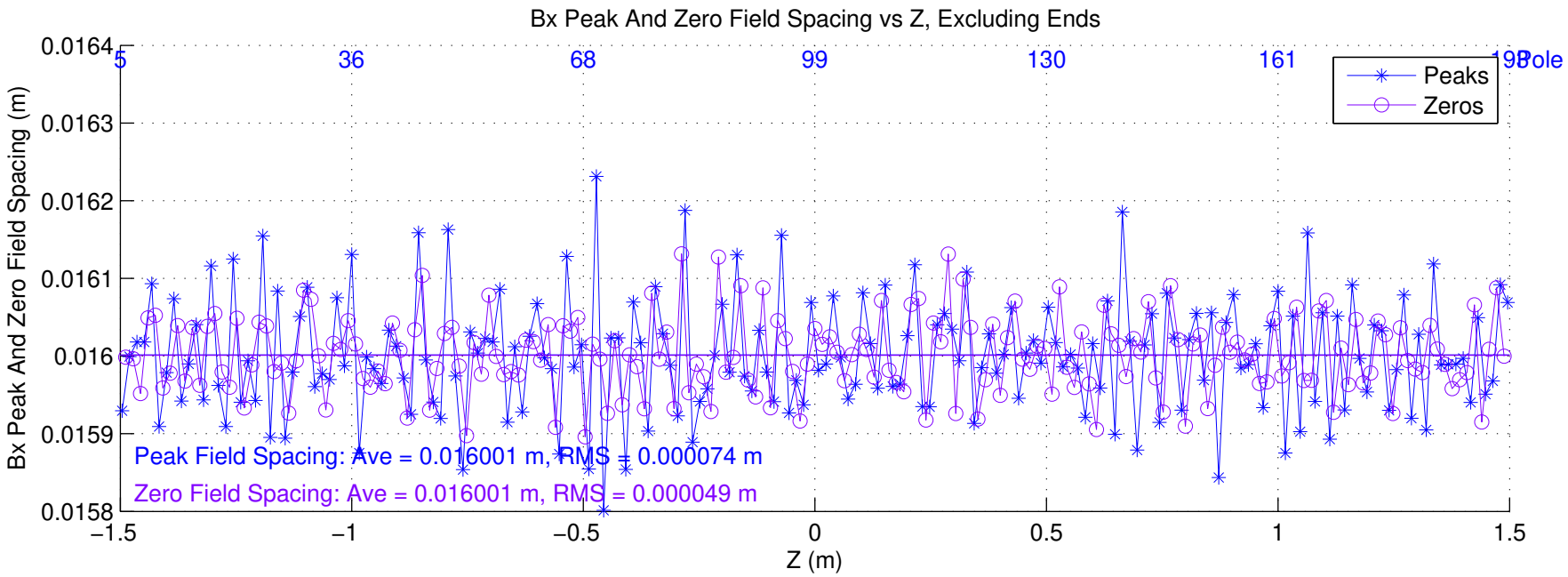

Bx and By vs Z
5
36
67
98
130
161
192
Pole
Bx
By
1
0.8
0.6
0.4
0.2
0
−0.2
−0.4
−0.6
−0.8
−1
Bx, By (T)
−2
−1.5
−1
−0.5
0
0.5
1
1.5
2
Z (m)

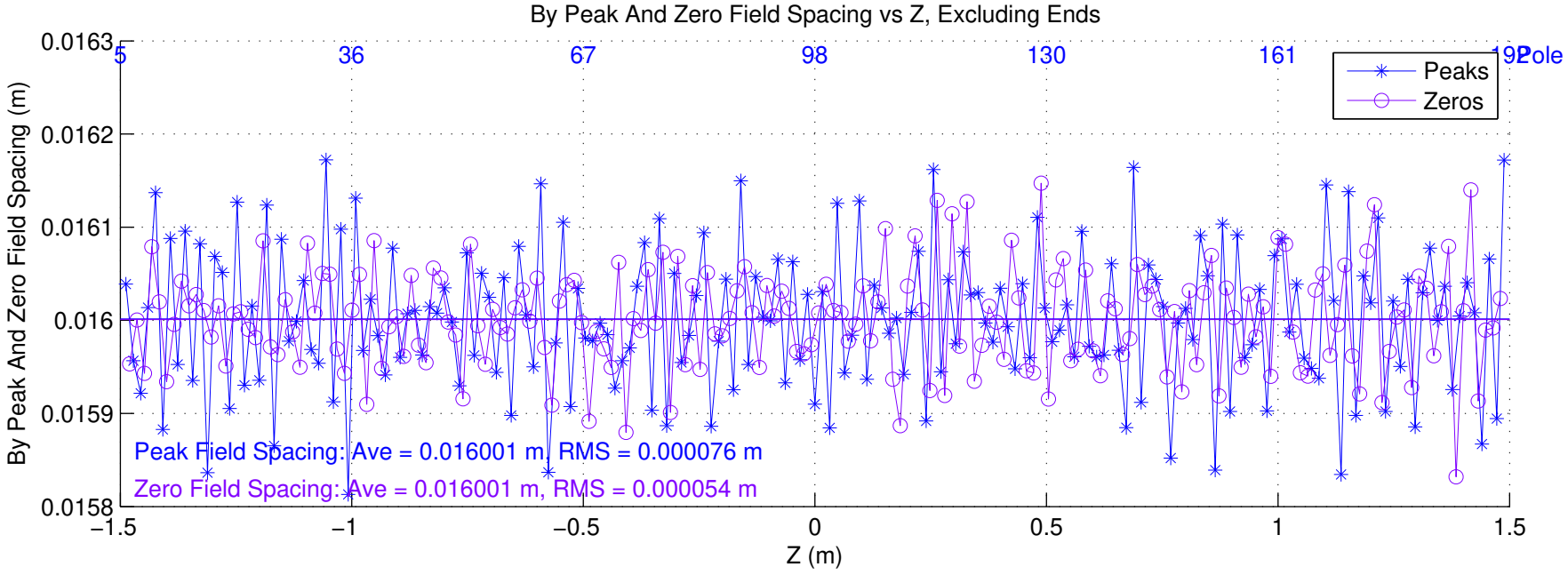

Bx vs Z With Fitted Peaks And Zeros
5
36
68
99
130
161
193
Pole
1
0.5
0
−0.5
−1
Bx (T)
−2
−1.5
−1
−0.5
0
0.5
1
1.5
2
Z (m)

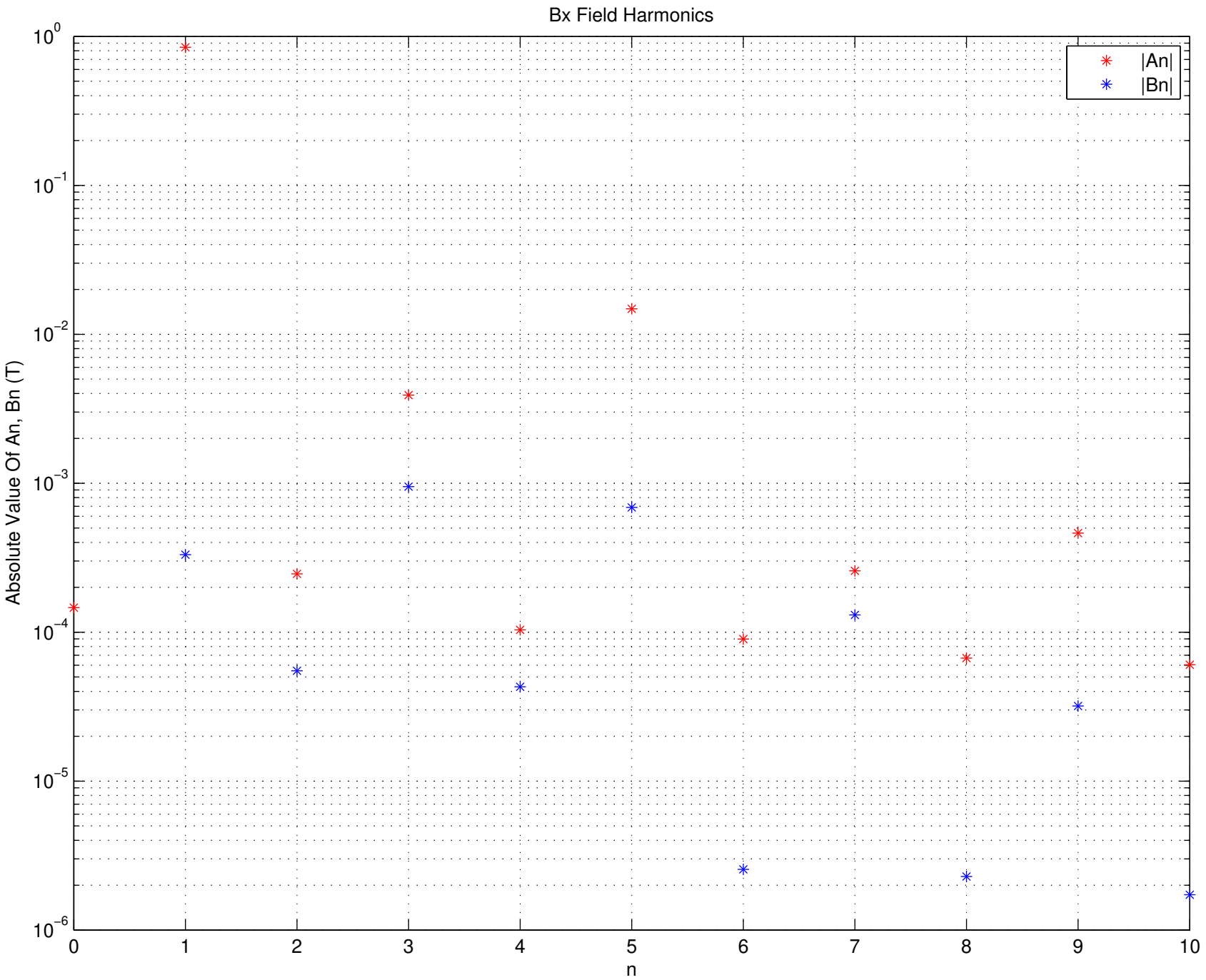

By vs Z With Fitted Peaks And Zeros
5
36
67
98
130
161
192
Pole
1
0.5
0
−0.5
−1
By (T)
−2
−1.5
−1
−0.5
0
0.5
1
1.5
2
Z (m)

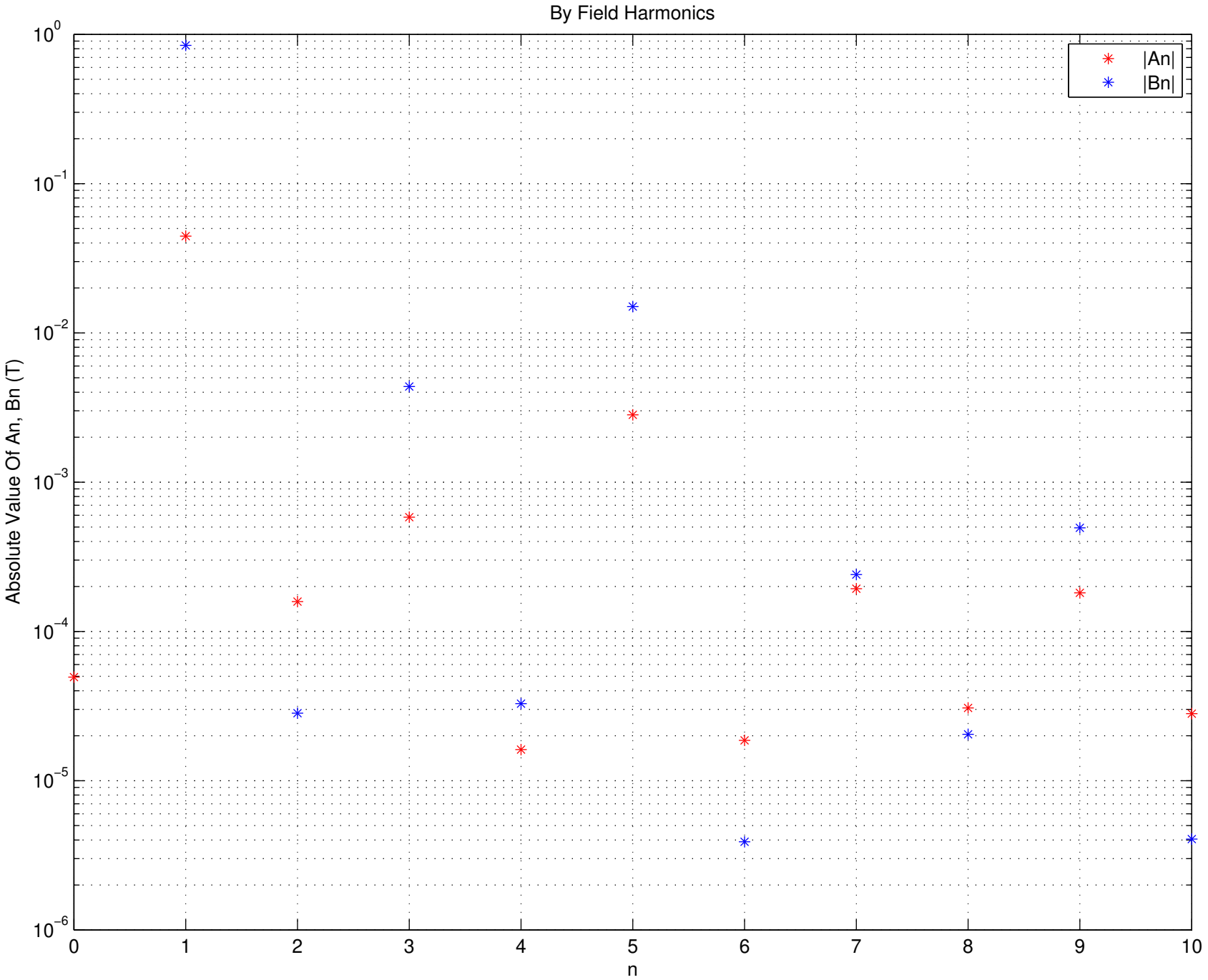

Abs(Fitted Peak Bx) vs Z, Excluding Ends
5
36
68
99
130
161
193
Pole
0.9
0.89
0.88
0.87
0.86
0.85
0.84
0.83
0.82
Abs(Peak Bx) (T)
Peak Fields: Ave = 0.856076 T, RMS = 0.007743 T
−2
−1.5
−1
−0.5
0
0.5
1
1.5
2
Z (m)

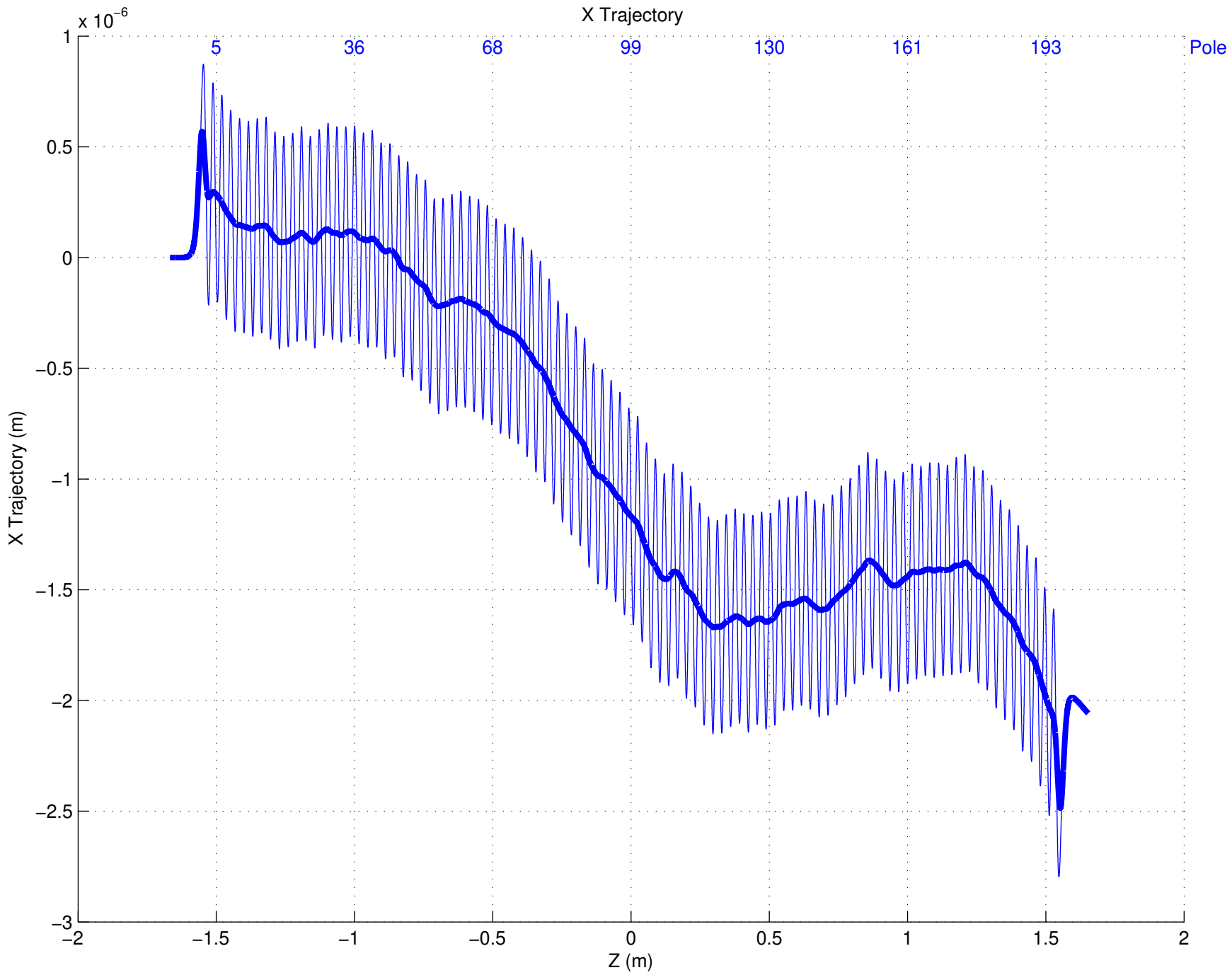

Abs(Fitted Peak By) vs Z, Excluding Ends
5
36
67
98
130
161
192
Pole
0.88
0.87
0.86
0.85
0.84
0.83
0.82
Abs(Peak By) (T)
Peak Fields: Ave = 0.856296 T, RMS = 0.007620 T
−1.5
−1
−0.5
0
0.5
1
1.5
Z (m)

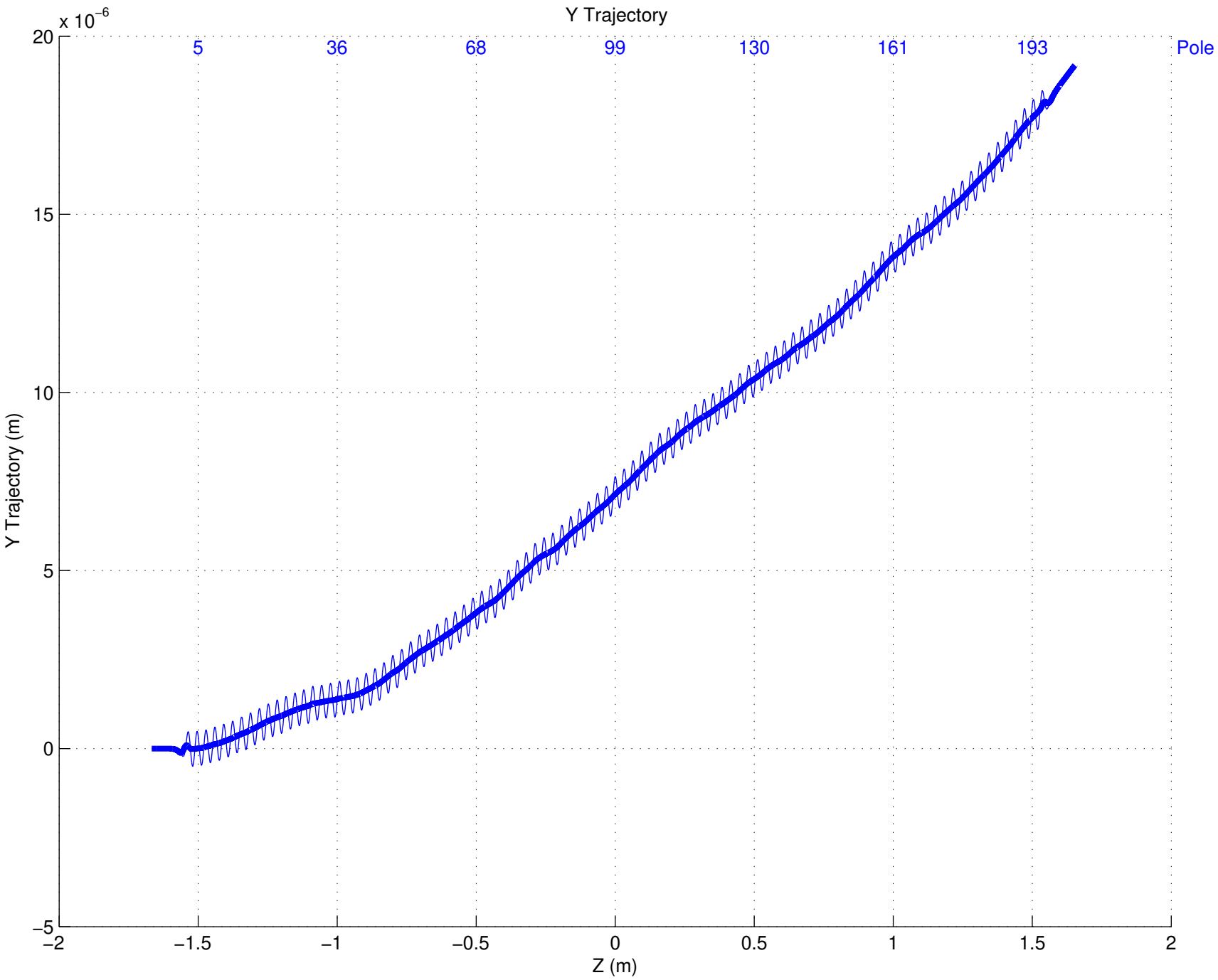

Bx Peak And Zero Field Spacing vs Z, Excluding Ends
Bx Peak And Zero Field Spacing (m)
Z (m)
Pole
Peaks
Zeros
Peak Field Spacing: Ave = 0.016001 m, RMS = 0.000074 m
Zero Field Spacing: Ave = 0.016001 m, RMS = 0.000049 m

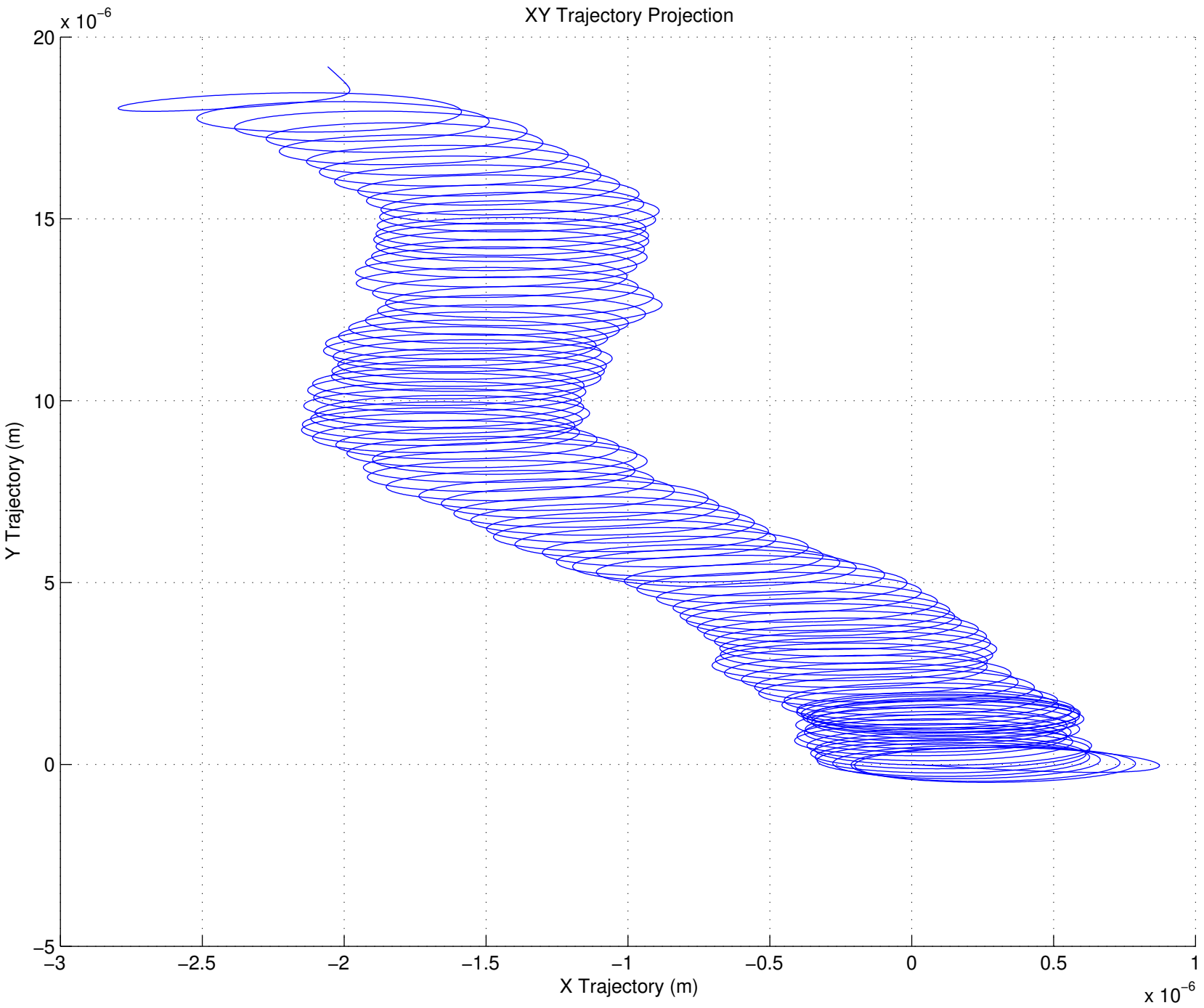

By Peak And Zero Field Spacing vs Z, Excluding Ends
By Peak And Zero Field Spacing (m)
Z (m)
Pole
Peaks
Zeros
Peak Field Spacing: Ave = 0.016001 m, RMS = 0.000076 m
Zero Field Spacing: Ave = 0.016001 m, RMS = 0.000054 m

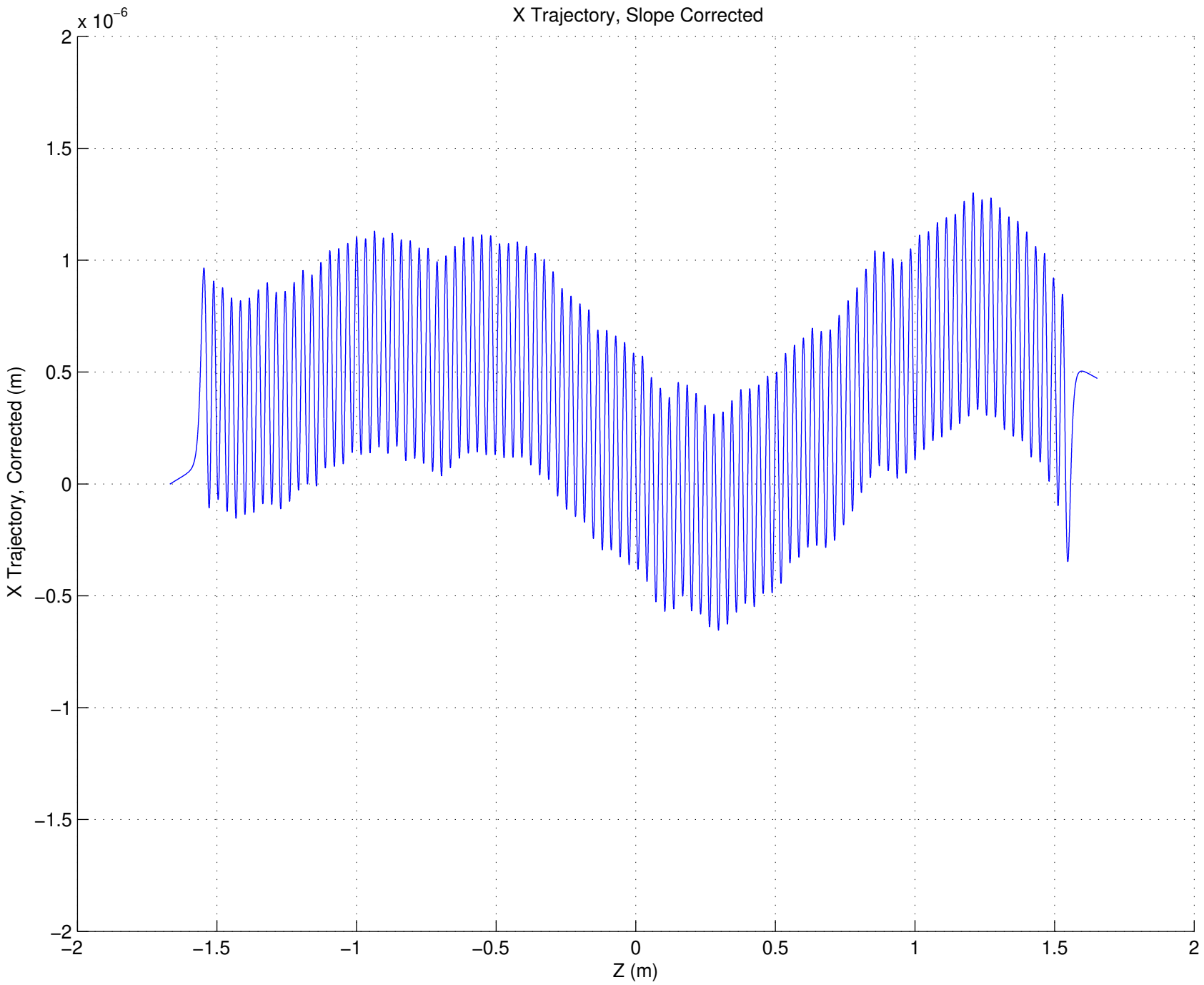

Bx Field Harmonics
|An|
|Bn|
Absolute Value Of An, Bn (T)
n
10^{0}
10^{-1}
10^{-2}
10^{-3}
10^{-4}
10^{-5}
10^{-6}
0
1
2
3
4
5
6
7
8
9
10

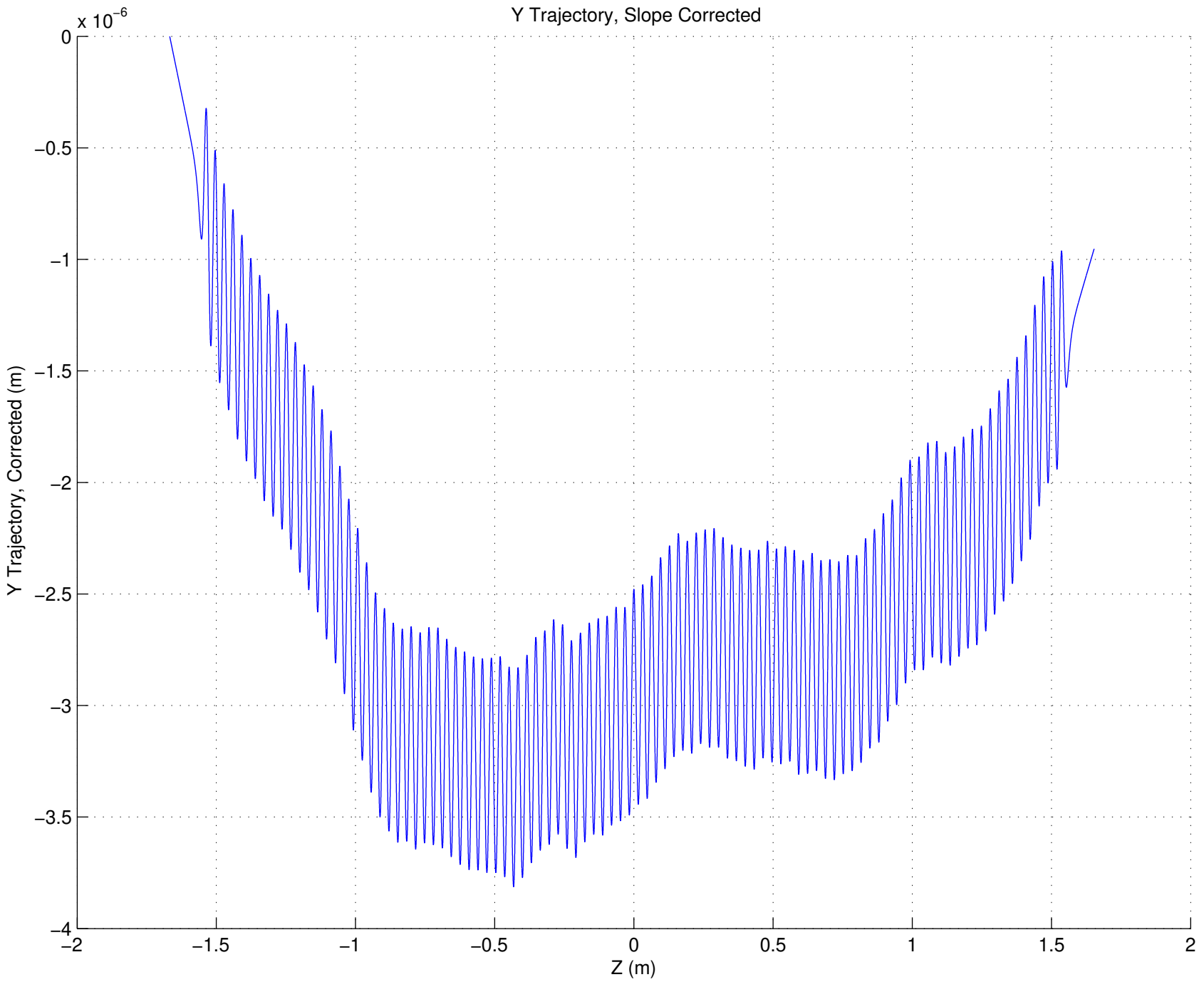

By Field Harmonics
|An|
|Bn|
Absolute Value Of An, Bn (T)
n
10^{0}
10^{-1}
10^{-2}
10^{-3}
10^{-4}
10^{-5}
10^{-6}
0
1
2
3
4
5
6
7
8
9
10

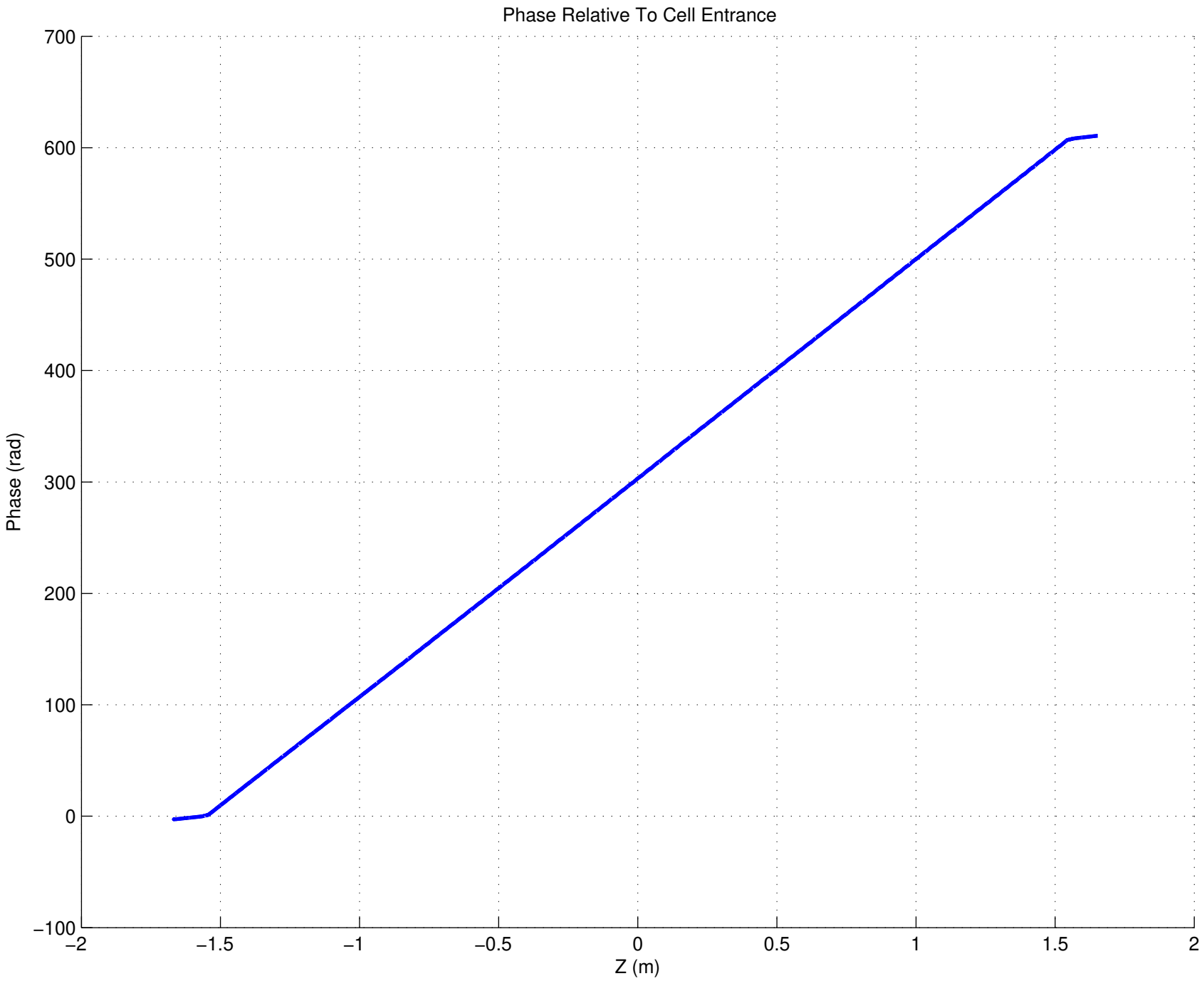

X Trajectory
x 10^-6
5
36
68
99
130
161
193
Pole
1
0.5
0
−0.5
−1
−1.5
−2
−2.5
−3
X Trajectory (m)
−2
−1.5
−1
−0.5
0
0.5
1
1.5
2
Z (m)

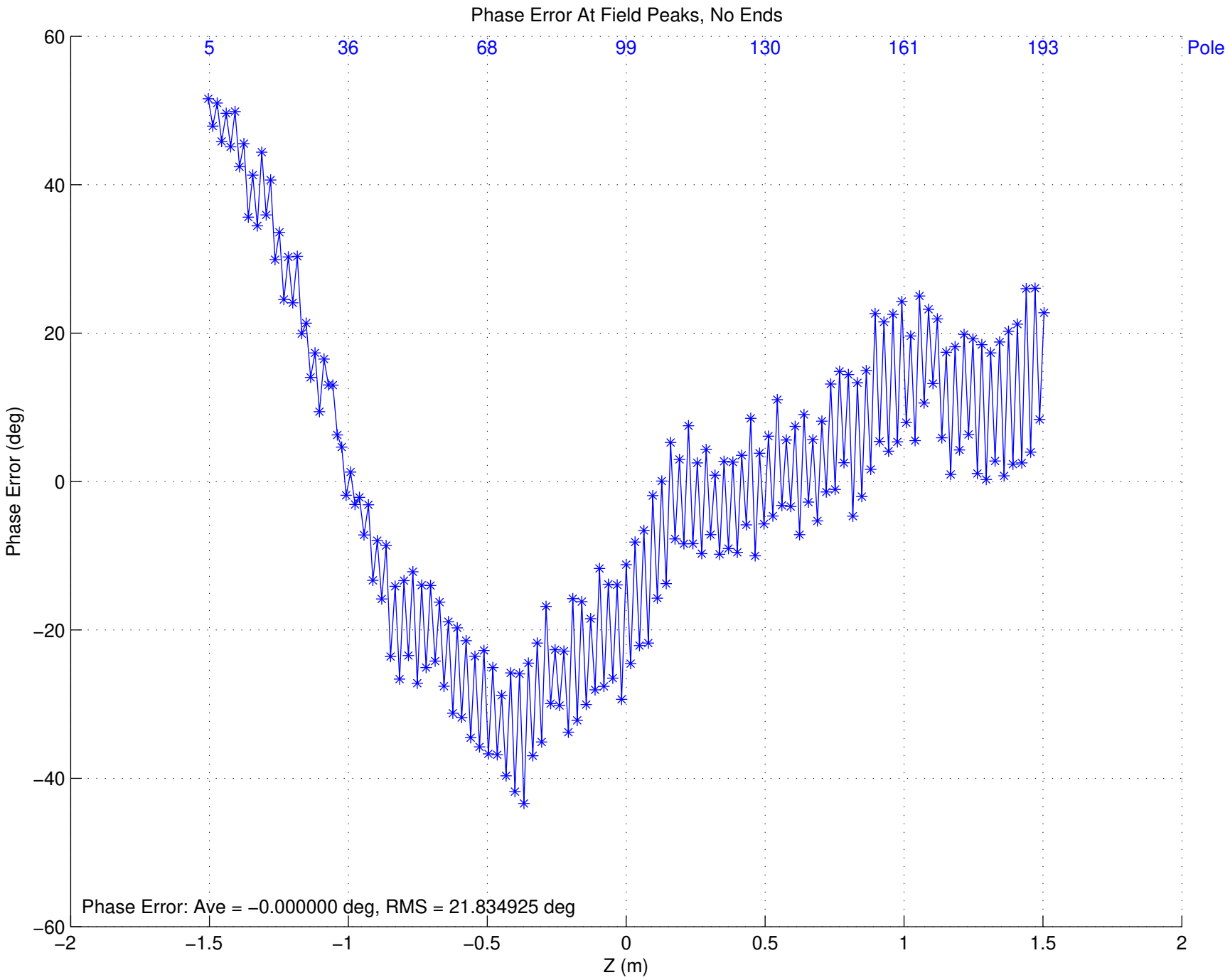

Y Trajectory
x 10^-6
20
15
10
5
0
−5
5
36
68
99
130
161
193
Pole
Y Trajectory (m)
−2
−1.5
−1
−0.5
0
0.5
1
1.5
2
Z (m)

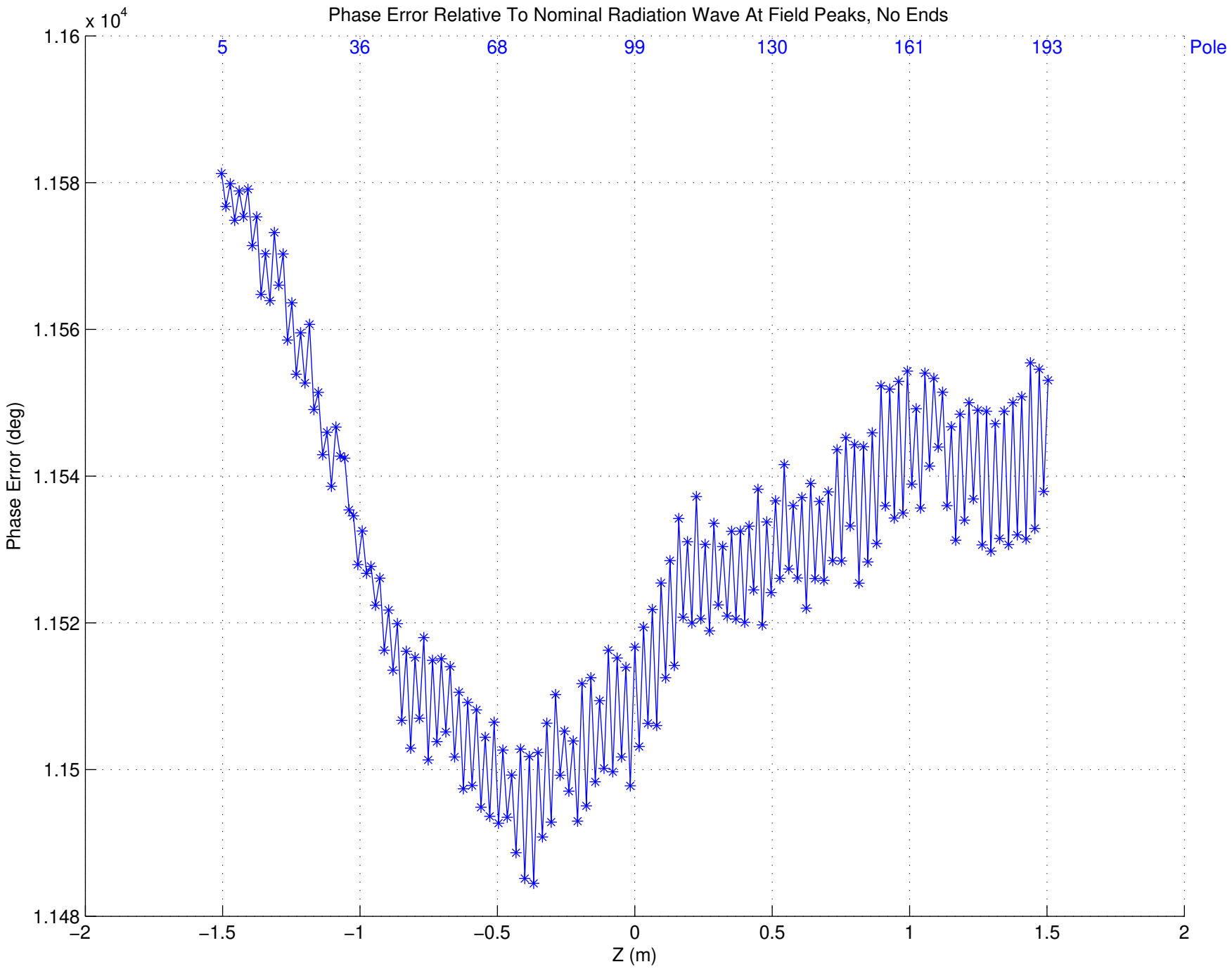

XY Trajectory Projection
x 10^-6
20
15
10
5
0
−5
Y Trajectory (m)
−3
−2.5
−2
−1.5
−1
−0.5
0
0.5
1
X Trajectory (m)
x 10^-6

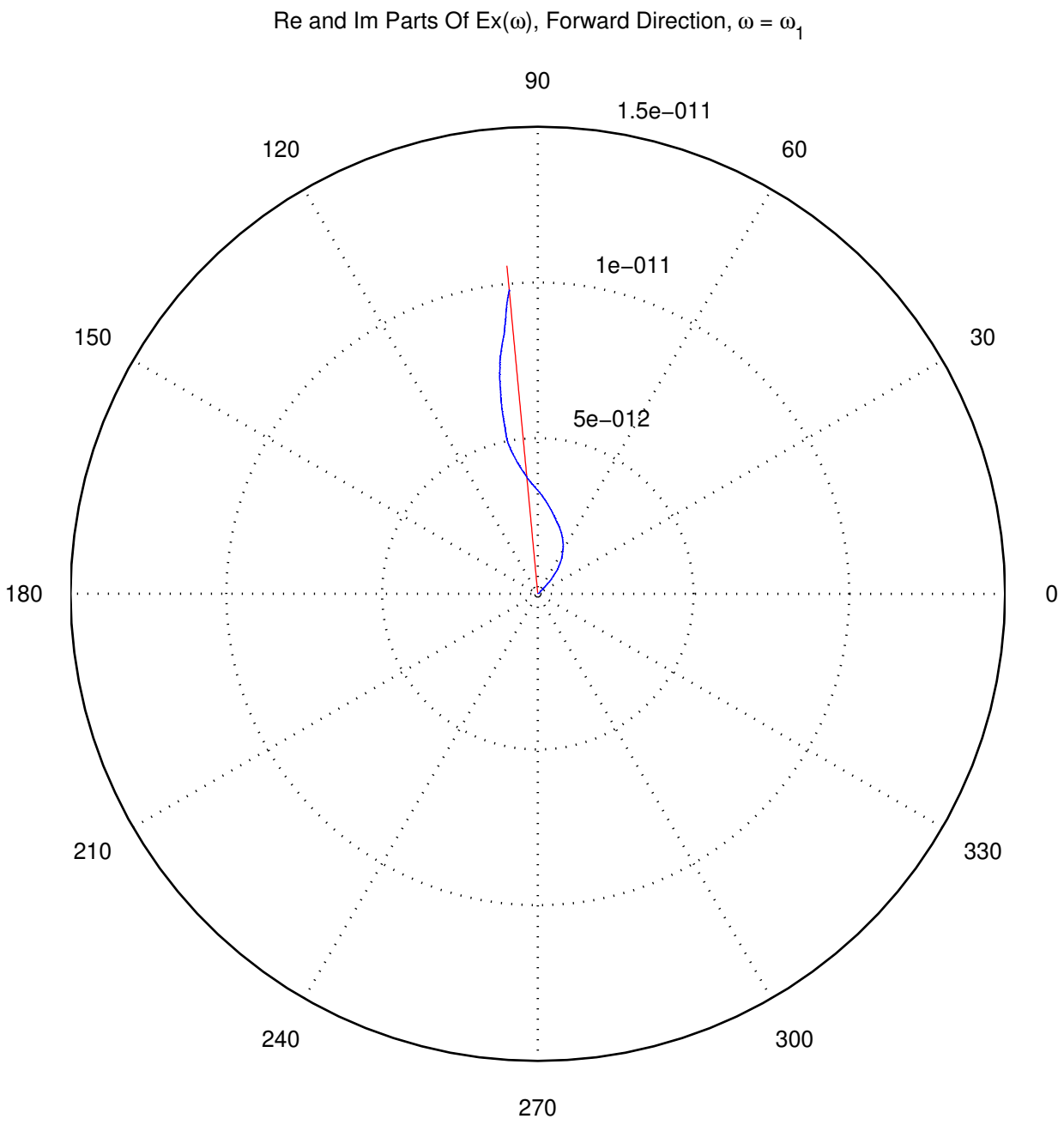

X Trajectory, Slope Corrected
x 10^-6
2
1.5
1
0.5
0
−0.5
−1
−1.5
−2
X Trajectory, Corrected (m)
−2
−1.5
−1
−0.5
0
0.5
1
1.5
2
Z (m)

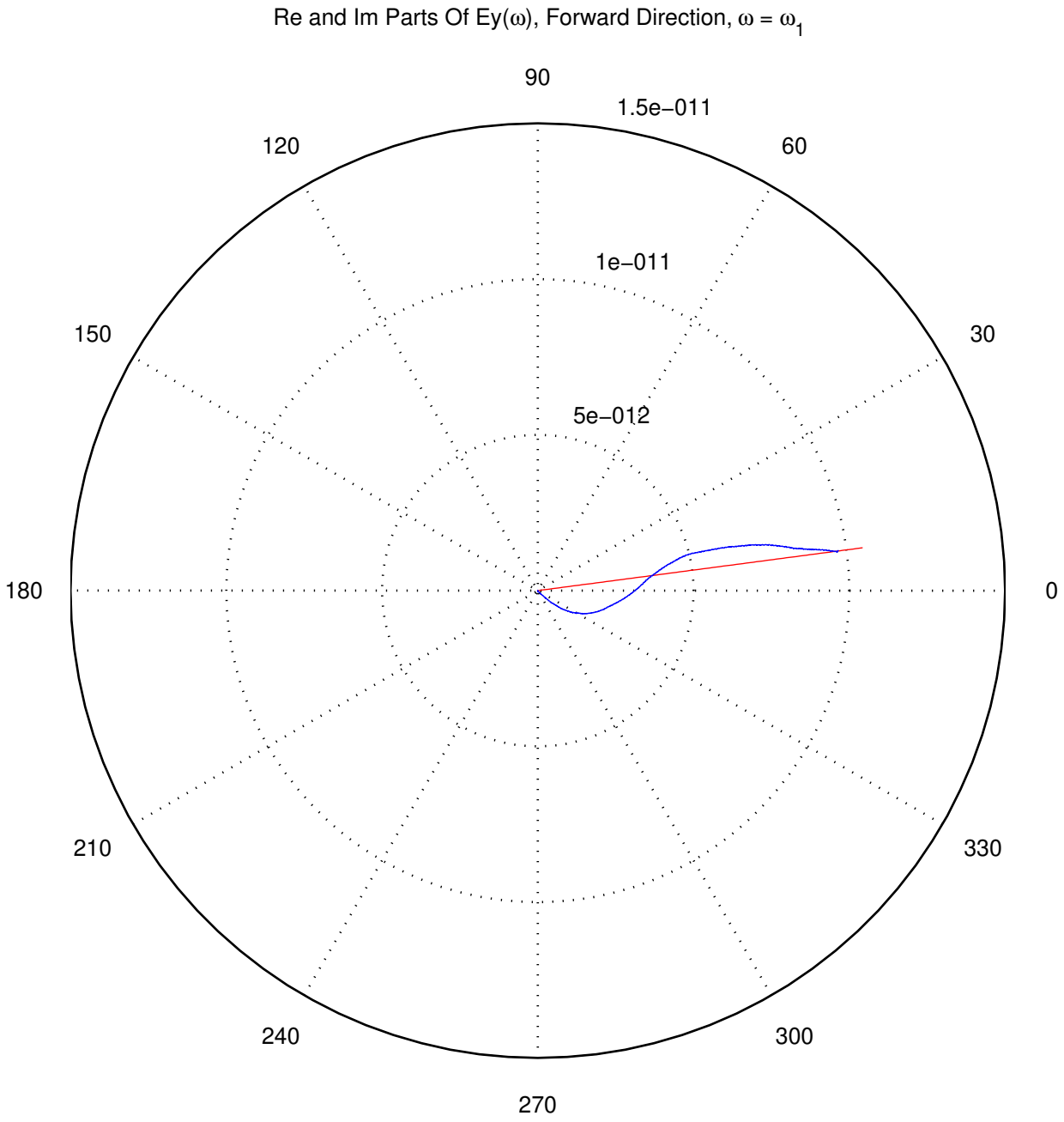

Y Trajectory, Slope Corrected
x 10^-6
0
−0.5
−1
−1.5
−2
−2.5
−3
−3.5
−4
Y Trajectory, Corrected (m)
−2
−1.5
−1
−0.5
0
0.5
1
1.5
2
Z (m)

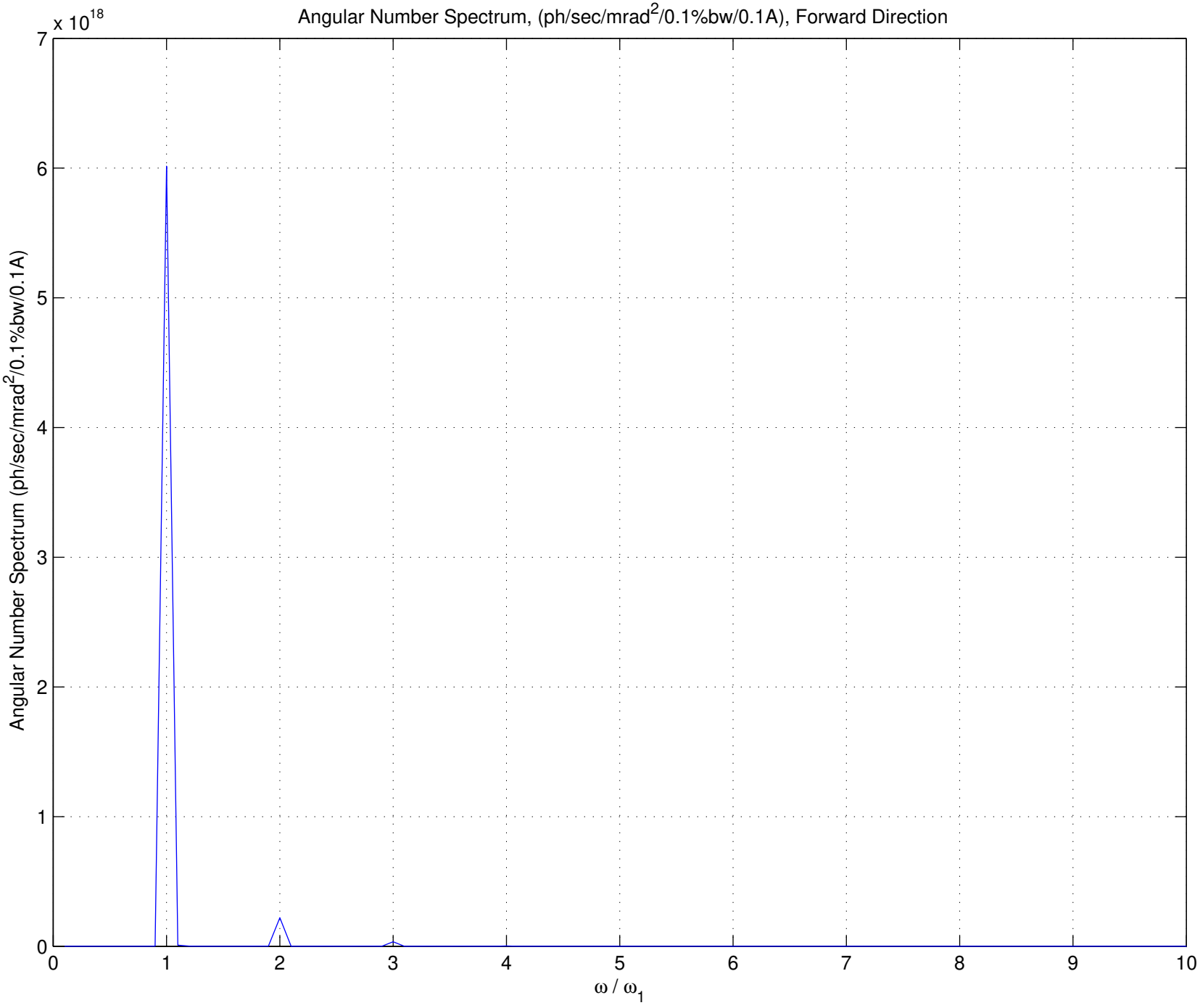

Phase Relative To Cell Entrance
700
600
500
400
300
200
100
0
−100
Phase (rad)
−2
−1.5
−1
−0.5
0
0.5
1
1.5
2
Z (m)

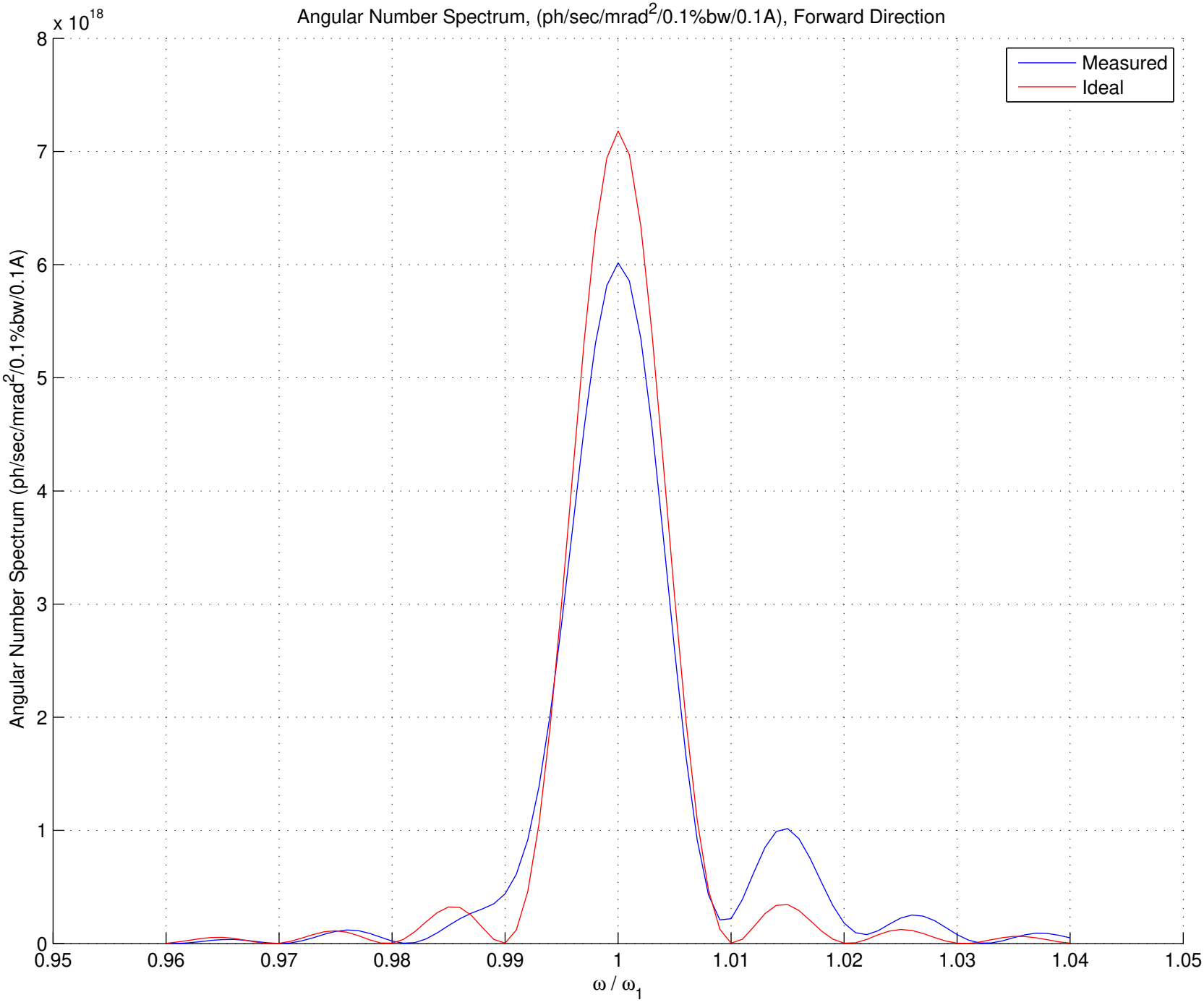

Phase Error At Field Peaks, No Ends
5
36
68
99
130
161
193
Pole
60
40
20
0
−20
−40
−60
Phase Error (deg)
−2
−1.5
−1
−0.5
0
0.5
1
1.5
2
Z (m)
Phase Error: Ave = −0.000000 deg, RMS = 21.834925 deg

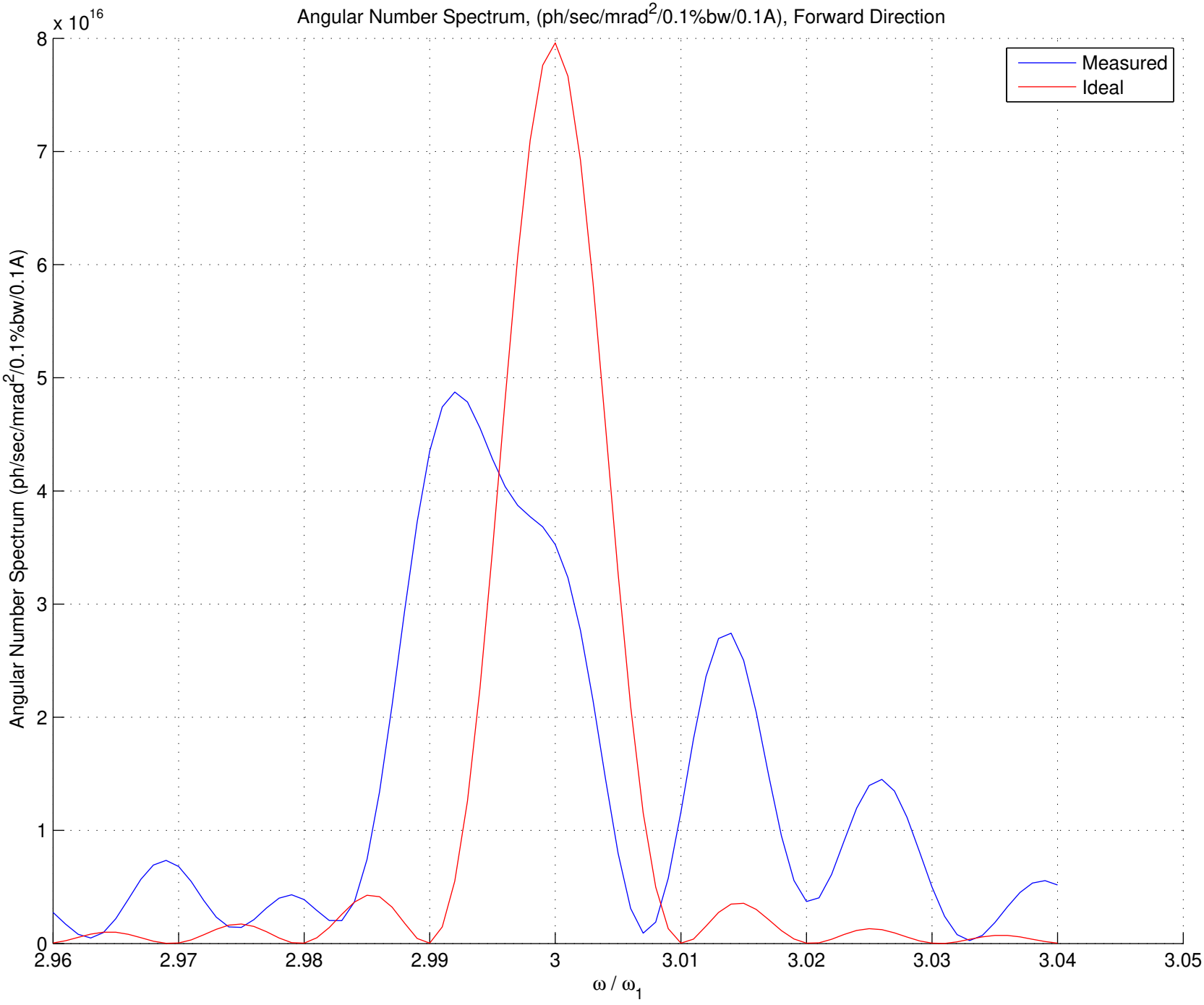

Phase Error Relative To Nominal Radiation Wave At Field Peaks, No Ends
x 10^4
1.16
1.158
1.156
1.154
1.152
1.15
1.148
Phase Error (deg)
5
36
68
99
130
161
193
Pole
−2
−1.5
−1
−0.5
0
0.5
1
1.5
2
Z (m)

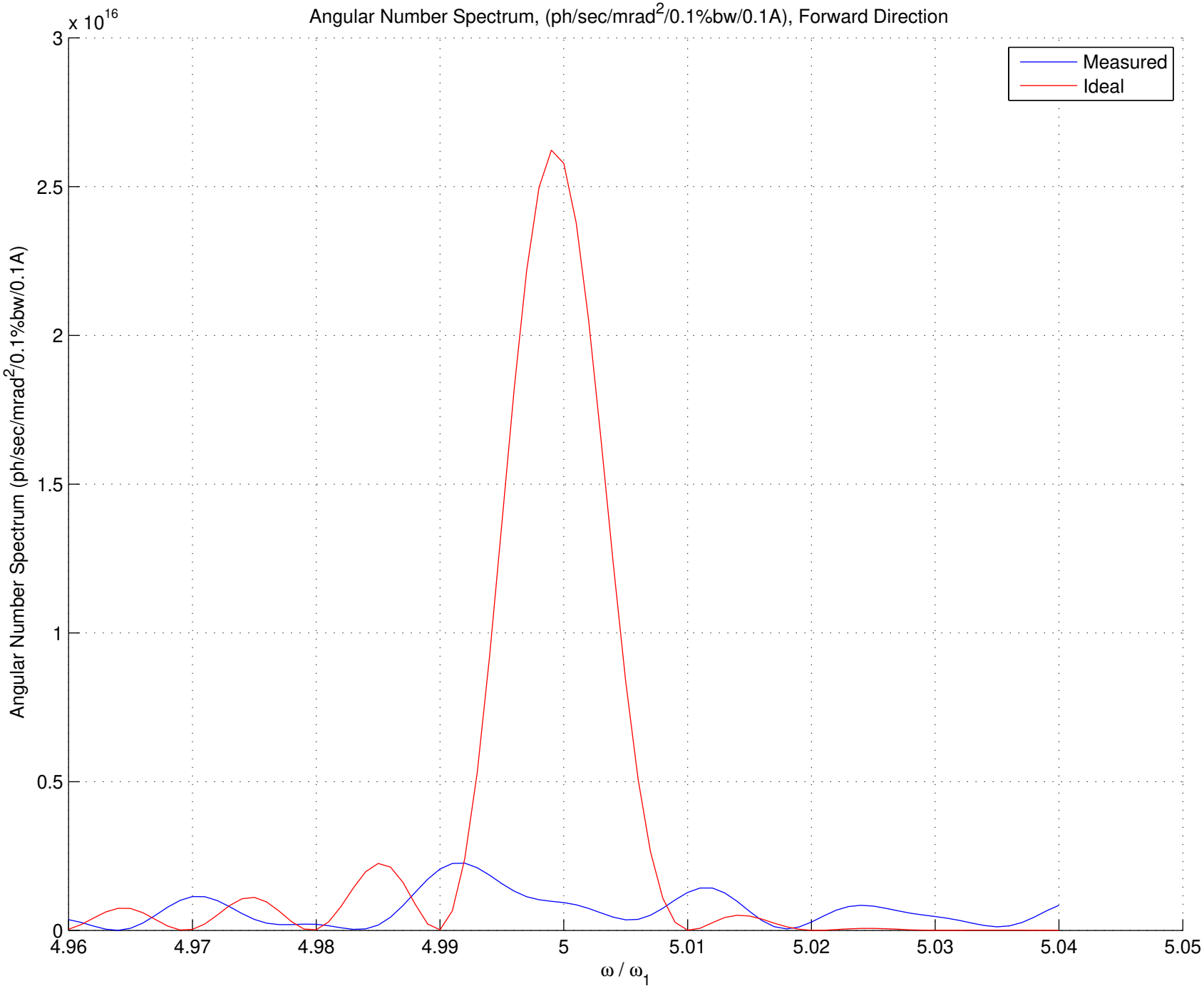

Re and Im Parts Of Ex(ω), Forward Direction, ω = ω1
90
1.5e−011
120
60
1e−011
150
30
5e−012
180
0
210
330
240
300
270


Re and Im Parts Of Ey(ω), Forward Direction, ω = ω1
90
1.5e−011
120
60
1e−011
150
30
5e−012
180
0
210
330
240
300
270


Angular Number Spectrum, (ph/sec/mrad2/0.1%bw/0.1A), Forward Direction
x 10^18
Angular Number Spectrum (ph/sec/mrad2/0.1%bw/0.1A)
ω / ω1
0
1
2
3
4
5
6
7
8
9
10


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)
ω / ω_1
0
1
2
3
4
5
6
7
8
0.95
0.96
0.97
0.98
0.99
1
1.01
1.02
1.03
1.04
1.05


Angular Number Spectrum, (ph/sec/mrad2/0.1%bw/0.1A), Forward Direction
x 10^16
Measured
Ideal
Angular Number Spectrum (ph/sec/mrad2/0.1%bw/0.1A)
ω / ω1
0
1
2
3
4
5
6
7
8
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^{16}
Angular Number Spectrum (ph/sec/mrad^2/0.1%bw/0.1A)
ω / $ω_1$
Measured
Ideal
3
2.5
2
1.5
1
0.5
0
4.96
4.97
4.98
4.99
5
5.01
5.02
5.03
5.04
5.05