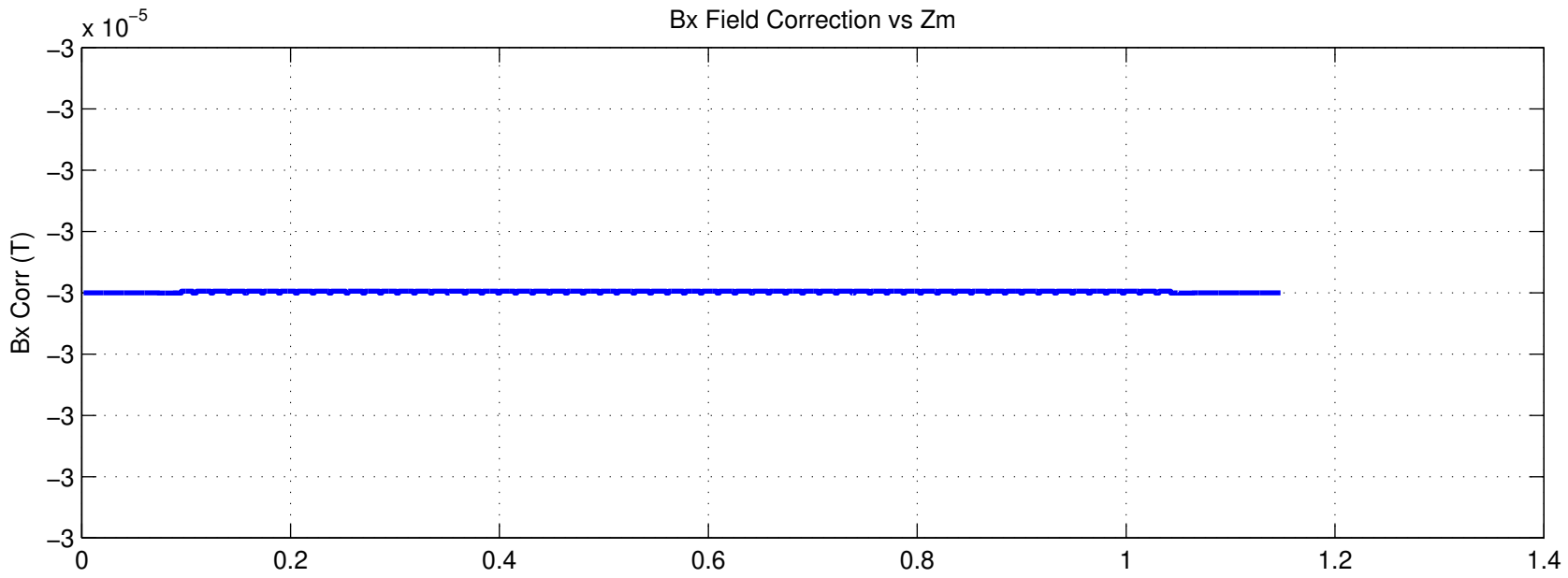
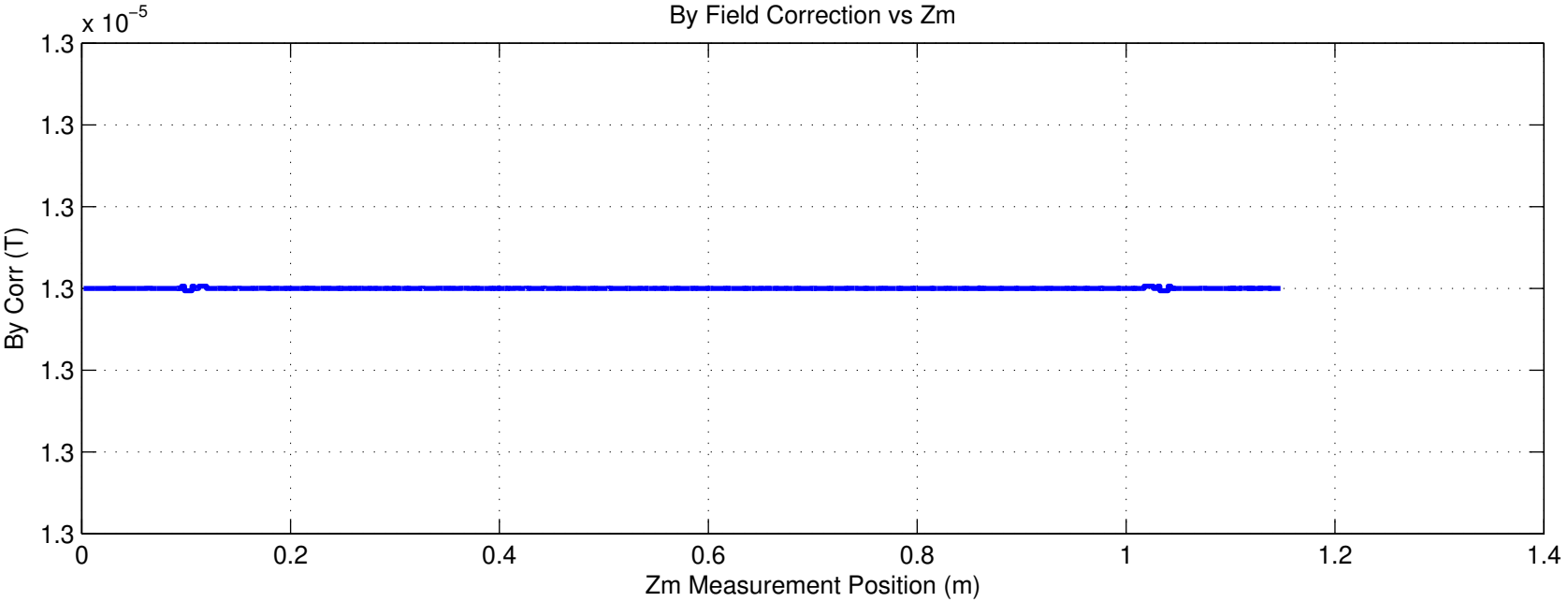
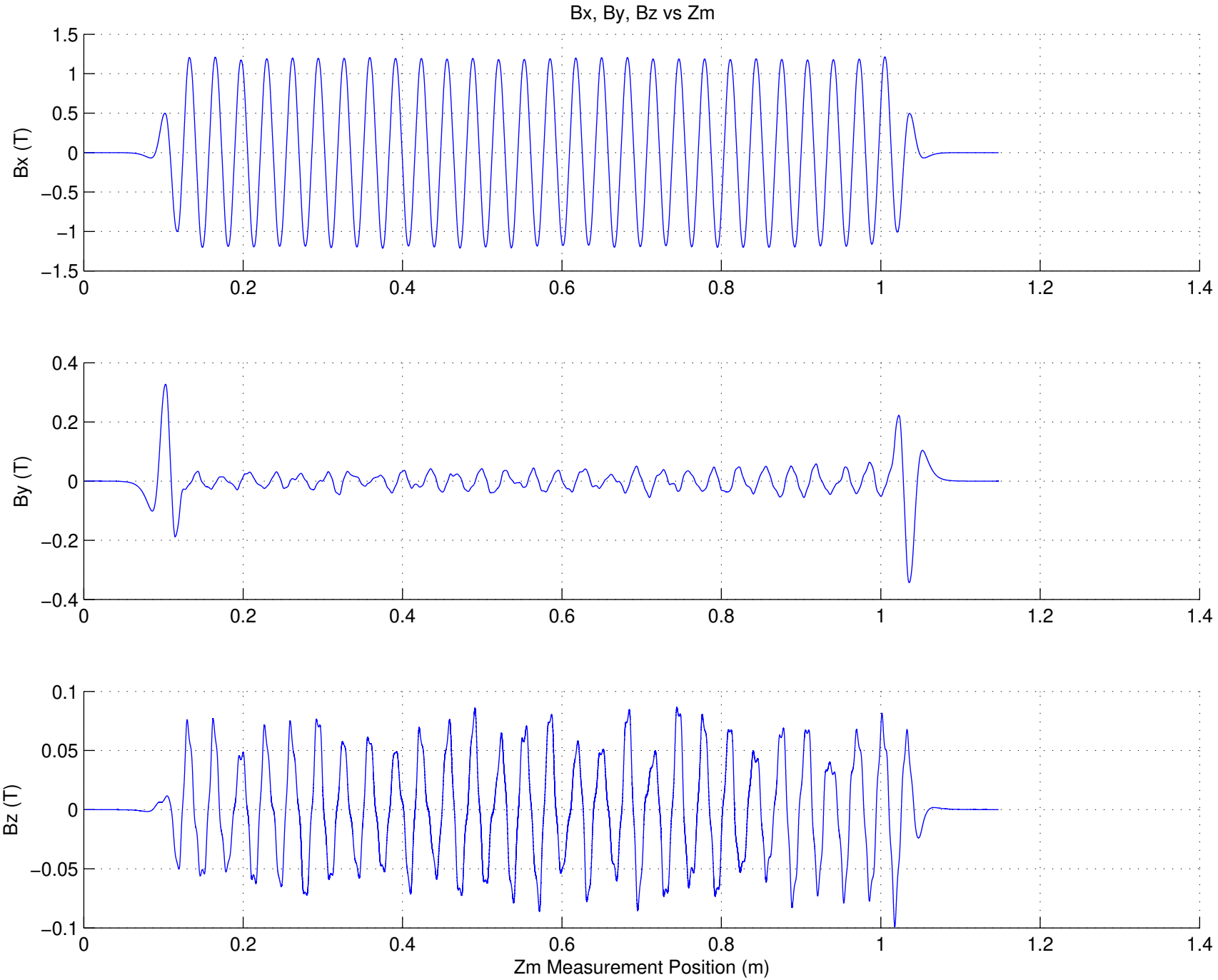
SLAC Magnetic Measurements

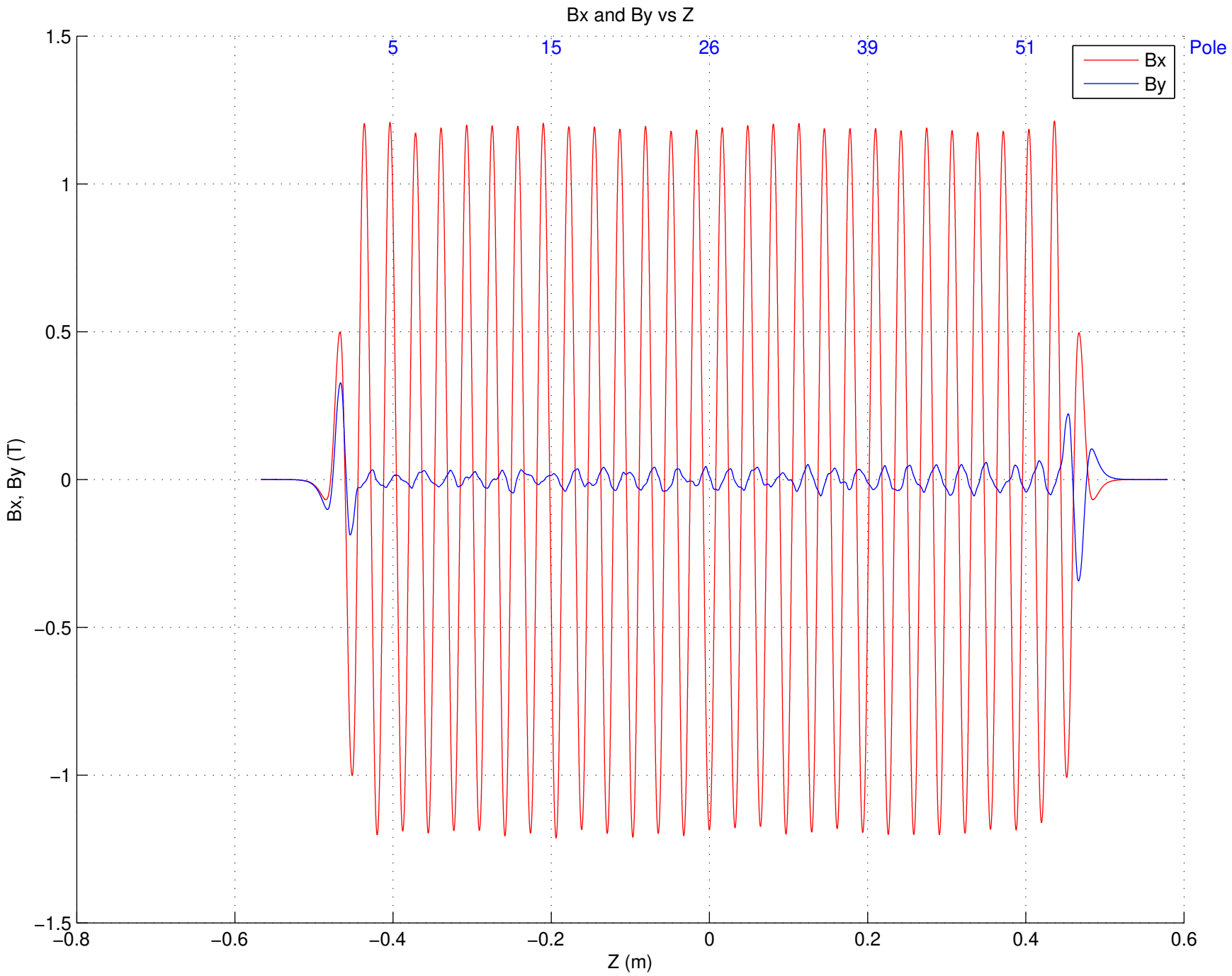
EPU Analysis
−−−−−−−−−−−

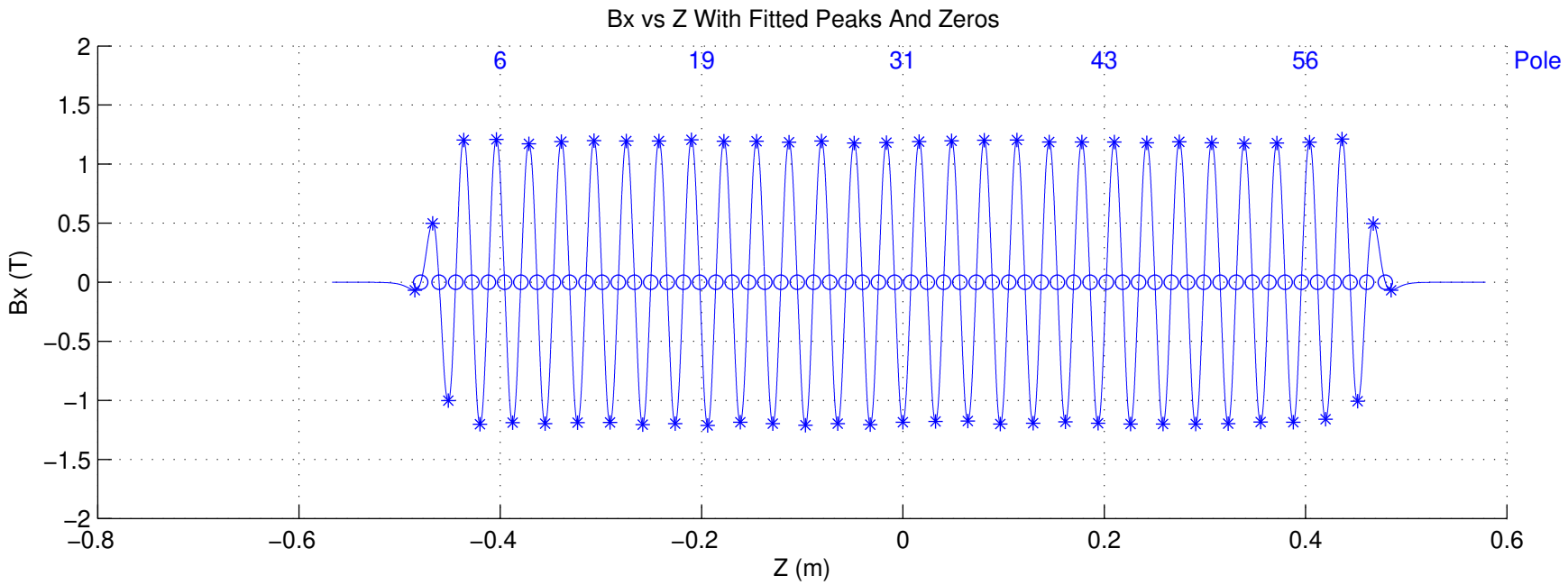
Parameters:
INPUT−FILE−DIR =s:\MagData\LCLS\Undulator\DELTA\Data\Run 428\
INPUT−FILE−NAME =hall2−anal−nom−beam−axis−field.dat
INPUT−FILE−TYPE =ZBXYZH
CORR−REQUIRED =1
GAMMA =26627.1
NOM−LAMBDA−U =0
NOM−K−VALUE =0
NOM−LAMBDA−R =0
NUM−POLES =60
NUM−END−POLES =4
CELL−LENGTH =3.126

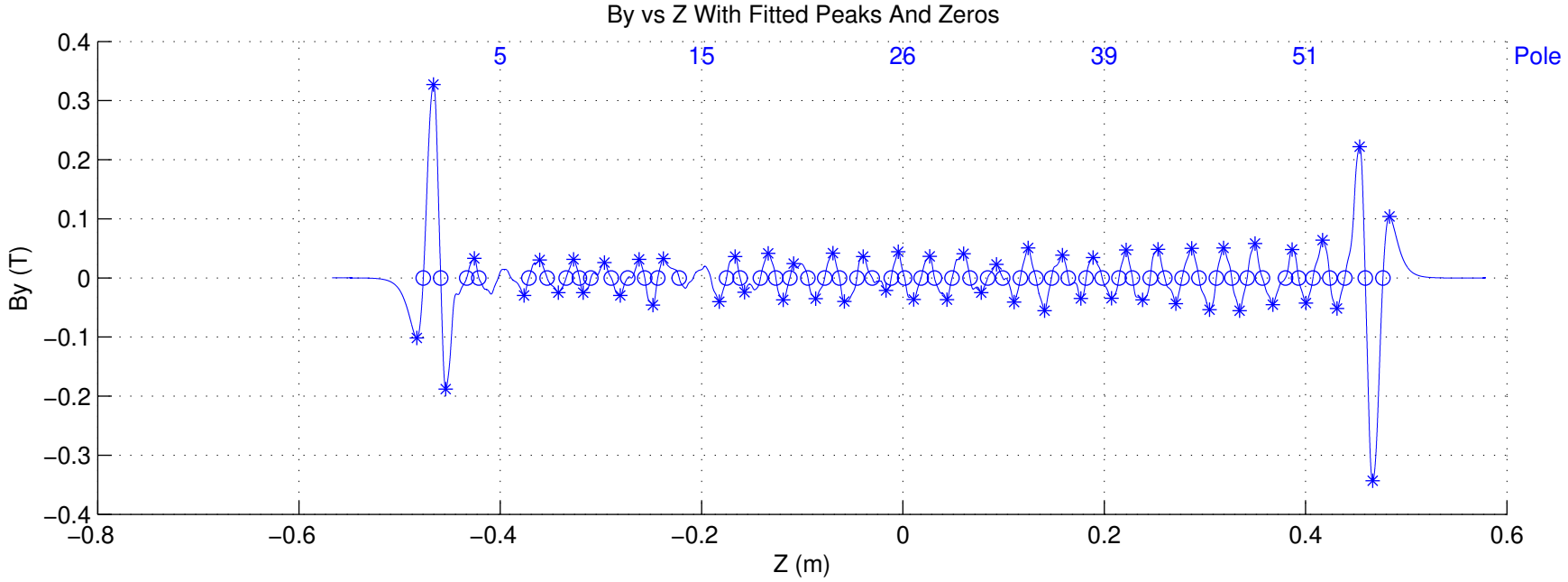

Bx Field Correction vs Zm
x 10^-5
Bx Corr (T)
−3
−3
−3
−3
−3
−3
−3
−3
0
0.2
0.4
0.6
0.8
1
1.2
1.4

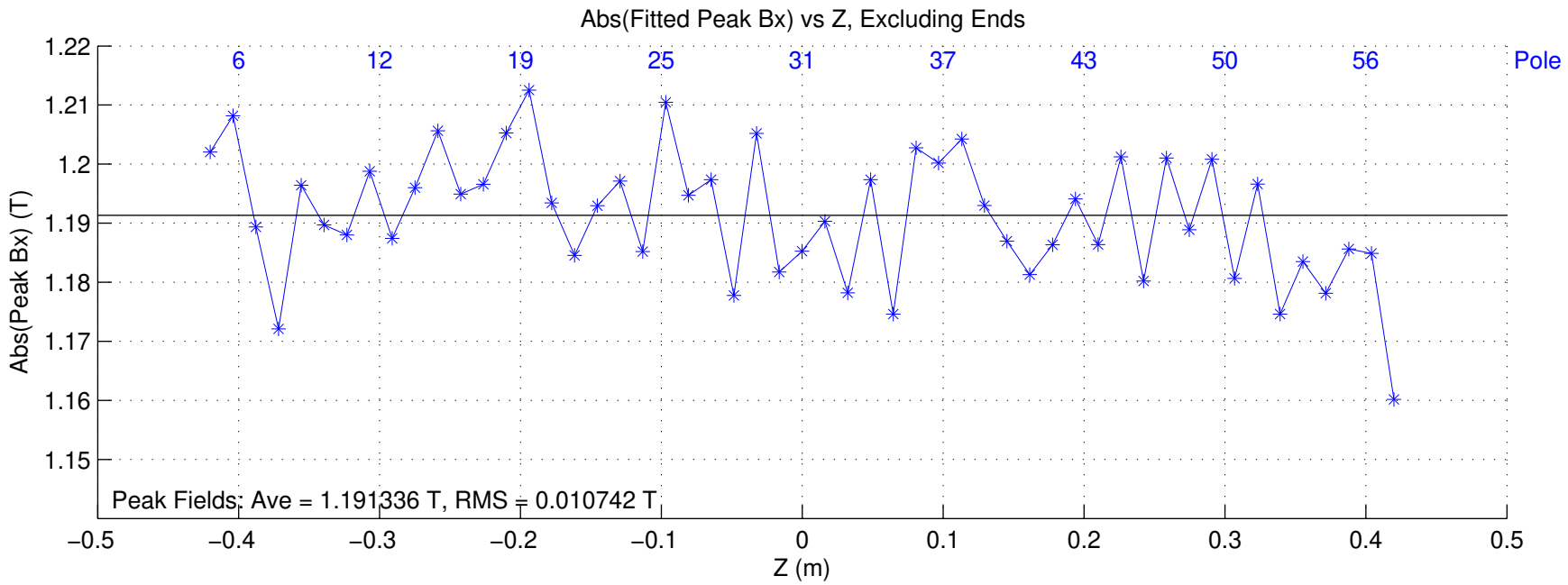

By Field Correction vs Zm
x 10^-5
By Corr (T)
1.3
1.3
1.3
1.3
1.3
1.3
1.3
0
0.2
0.4
0.6
0.8
1
1.2
1.4
Zm Measurement Position (m)

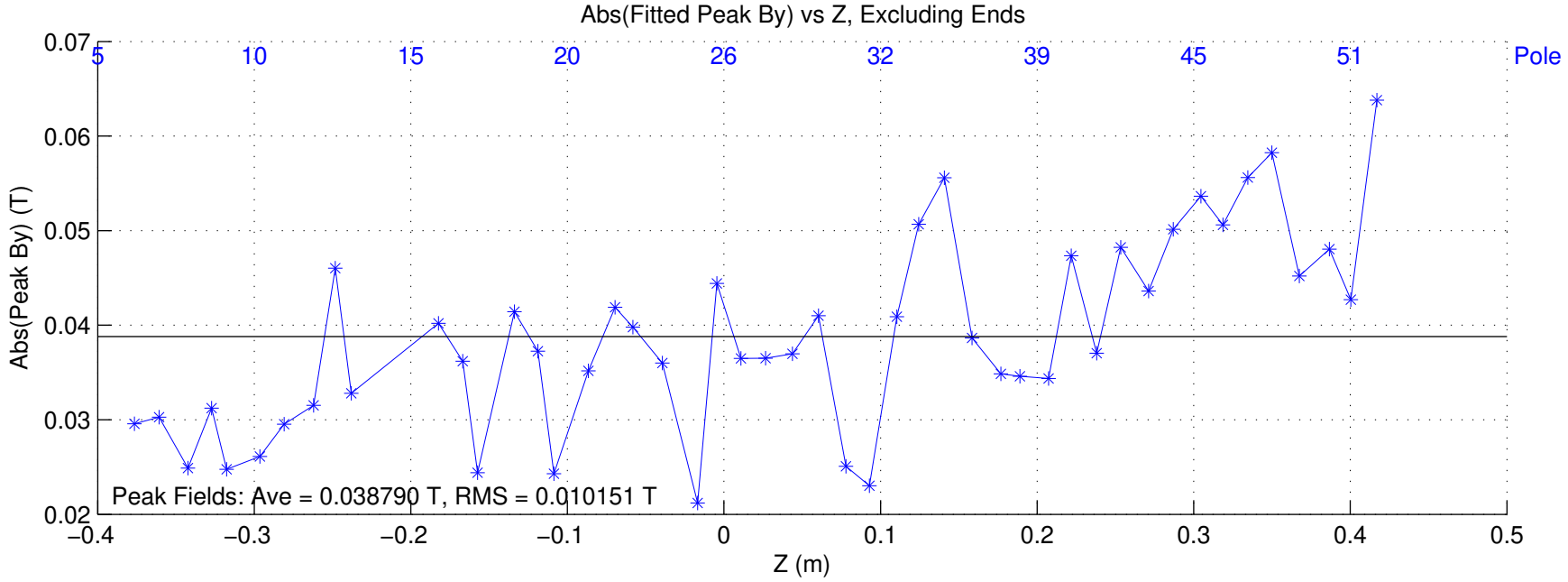

Bx, By, Bz vs Zm
Bx (T)
1.5
1
0.5
0
−0.5
−1
−1.5
By (T)
0.4
0.2
0
−0.2
−0.4
Bz (T)
0.1
0.05
0
−0.05
−0.1
0
0.2
0.4
0.6
0.8
1
1.2
1.4
Zm Measurement Position (m)

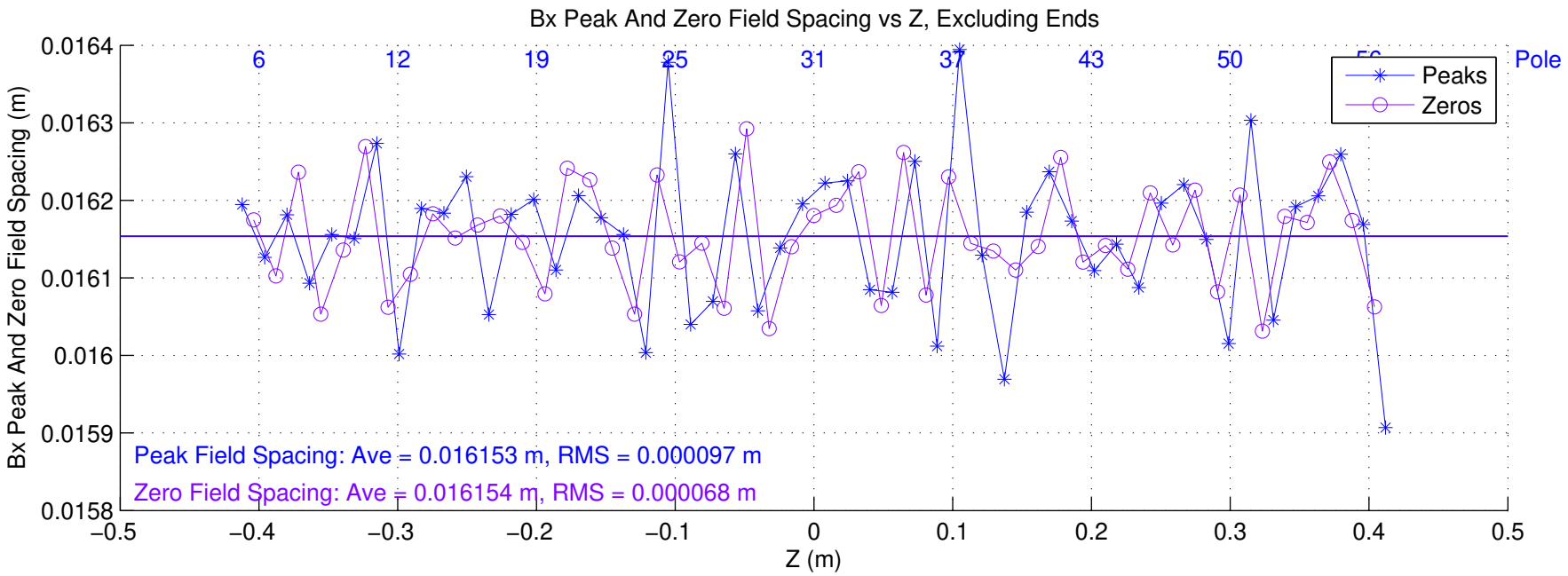

Bx and By vs Z
5
15
26
39
51
Pole
Bx
By
1.5
1
0.5
0
−0.5
−1
−1.5
Bx, By (T)
−0.8
−0.6
−0.4
−0.2
0
0.2
0.4
0.6
Z (m)

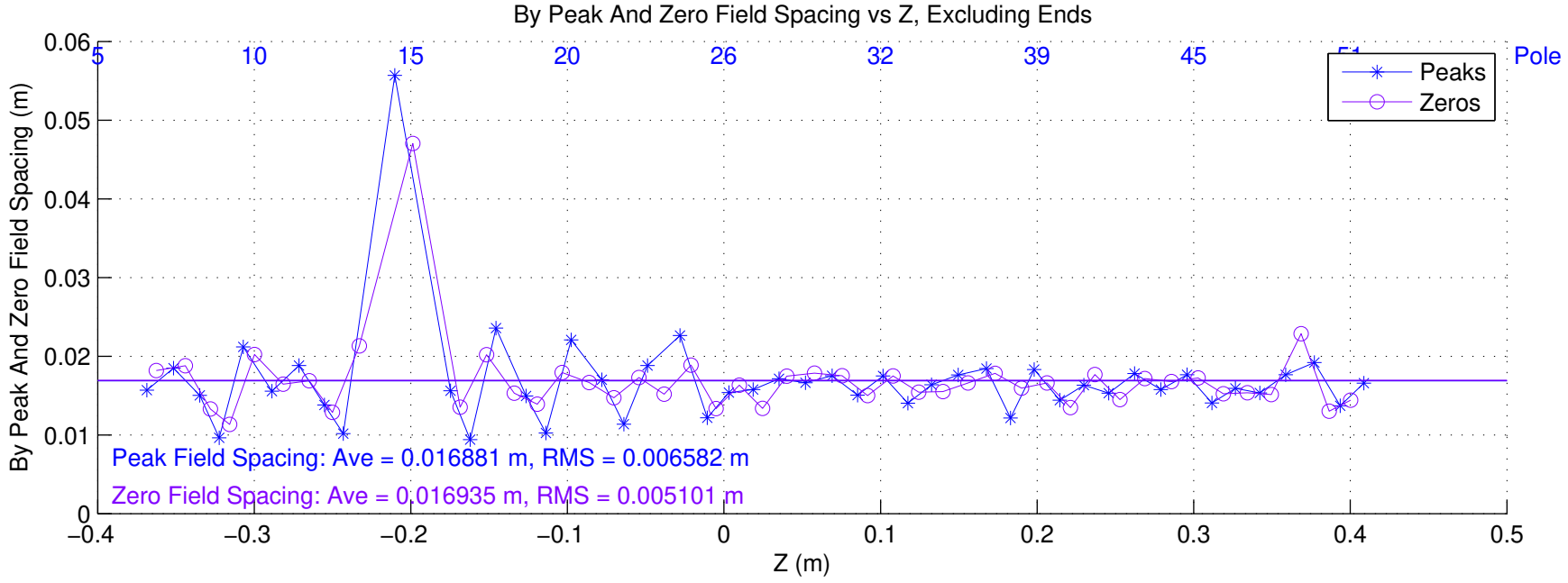

Bx vs Z With Fitted Peaks And Zeros
6
19
31
43
56
Pole
2
1.5
1
0.5
0
−0.5
−1
−1.5
−2
Bx (T)
−0.8
−0.6
−0.4
−0.2
0
0.2
0.4
0.6
Z (m)

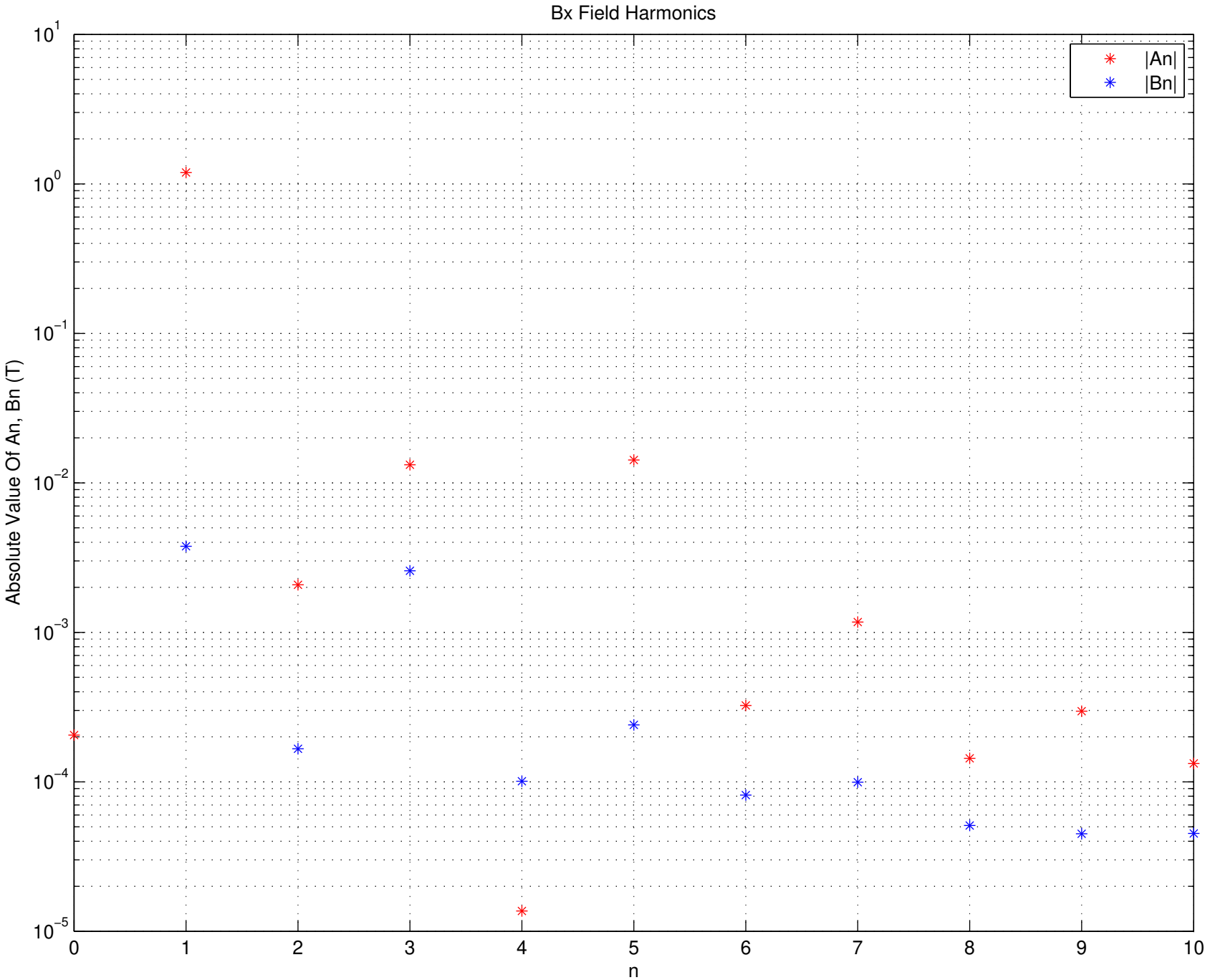

By vs Z With Fitted Peaks And Zeros
5
15
26
39
51
Pole
0.4
0.3
0.2
0.1
0
−0.1
−0.2
−0.3
−0.4
By (T)
−0.8
−0.6
−0.4
−0.2
0
0.2
0.4
0.6
Z (m)

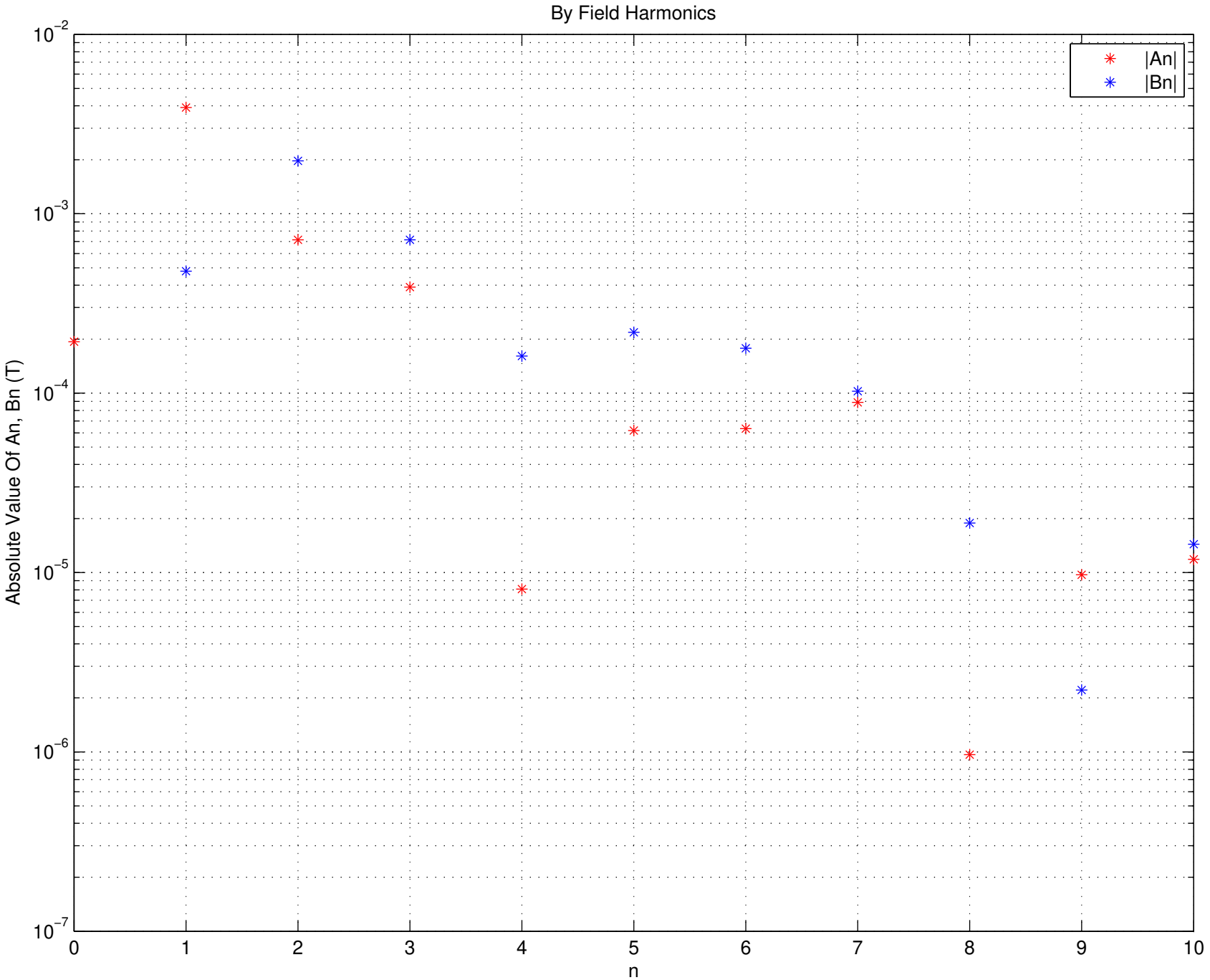

Abs(Fitted Peak Bx) vs Z, Excluding Ends
6
12
19
25
31
37
43
50
56
Pole
1.22
1.21
1.2
1.19
1.18
1.17
1.16
1.15
Abs(Peak Bx) (T)
Peak Fields: Ave = 1.191336 T, RMS = 0.010742 T
−0.5
−0.4
−0.3
−0.2
−0.1
0
0.1
0.2
0.3
0.4
0.5
Z (m)

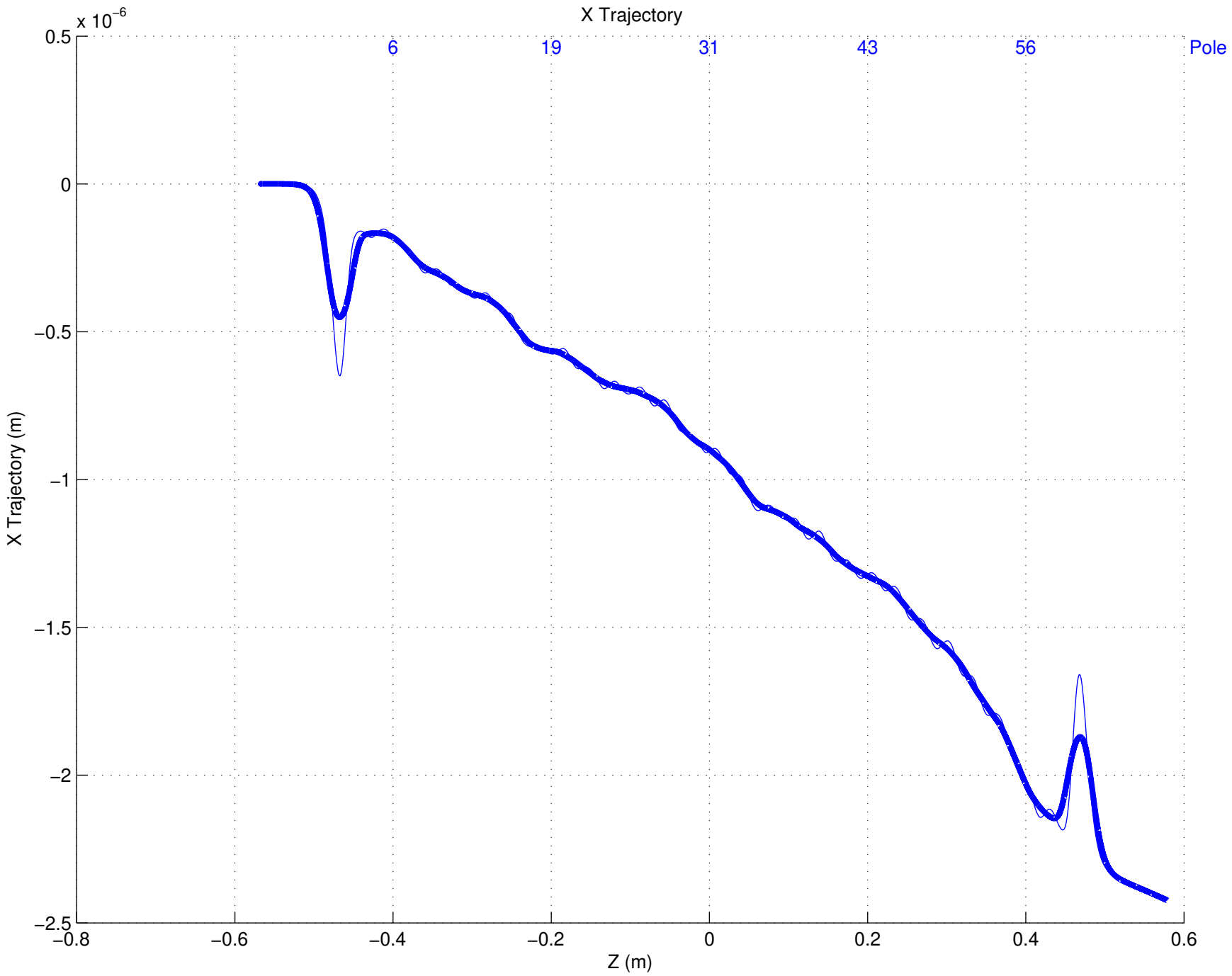

Abs(Fitted Peak By) vs Z, Excluding Ends
5
10
15
20
26
32
39
45
51
Pole
0.07
0.06
0.05
0.04
0.03
0.02
Abs(Peak By) (T)
Peak Fields: Ave = 0.038790 T, RMS = 0.010151 T
−0.4
−0.3
−0.2
−0.1
0
0.1
0.2
0.3
0.4
0.5
Z (m)

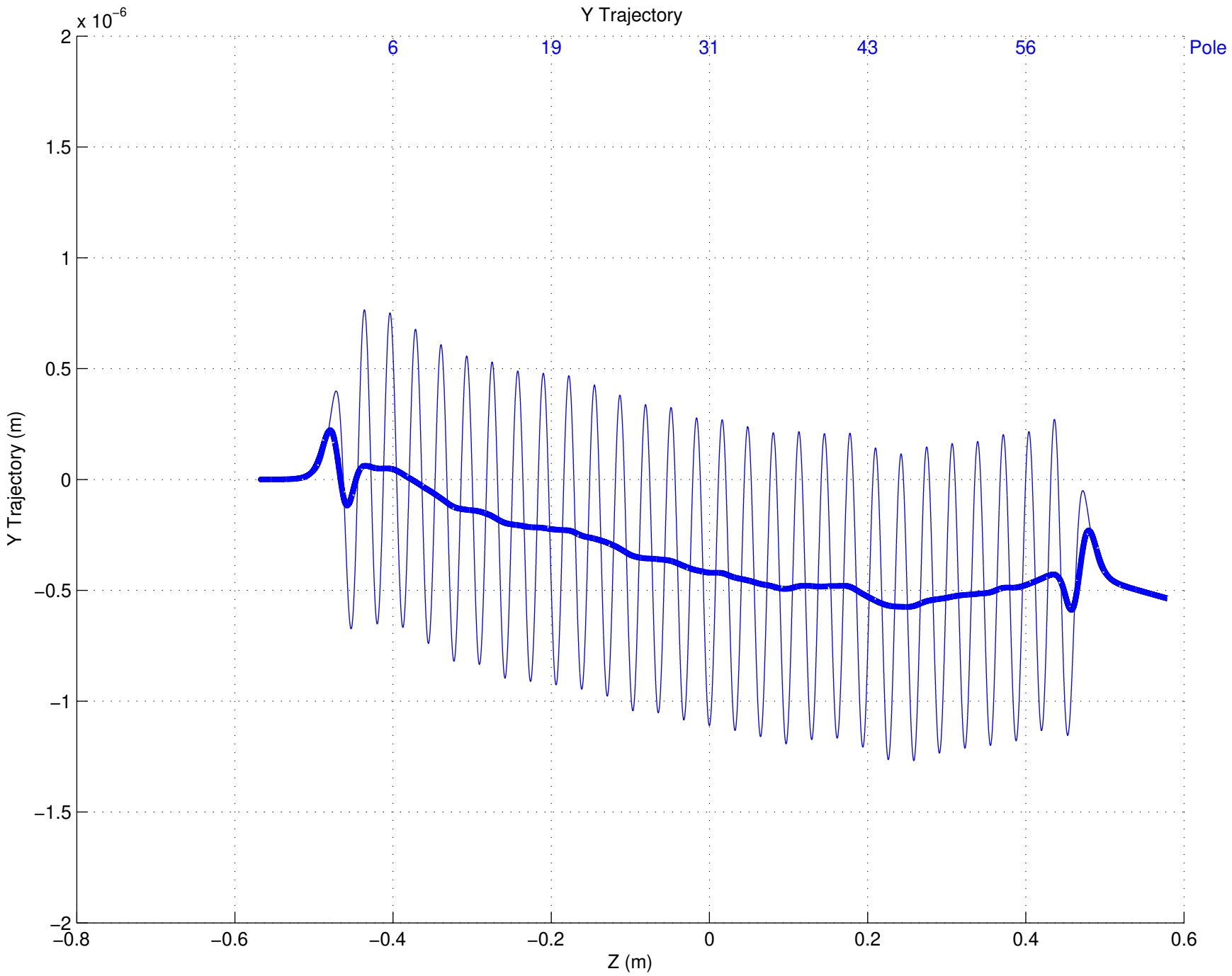

Bx Peak And Zero Field Spacing vs Z, Excluding Ends
Bx Peak And Zero Field Spacing (m)
Z (m)
Pole
Peaks
Zeros
Peak Field Spacing: Ave = 0.016153 m, RMS = 0.000097 m
Zero Field Spacing: Ave = 0.016154 m, RMS = 0.000068 m

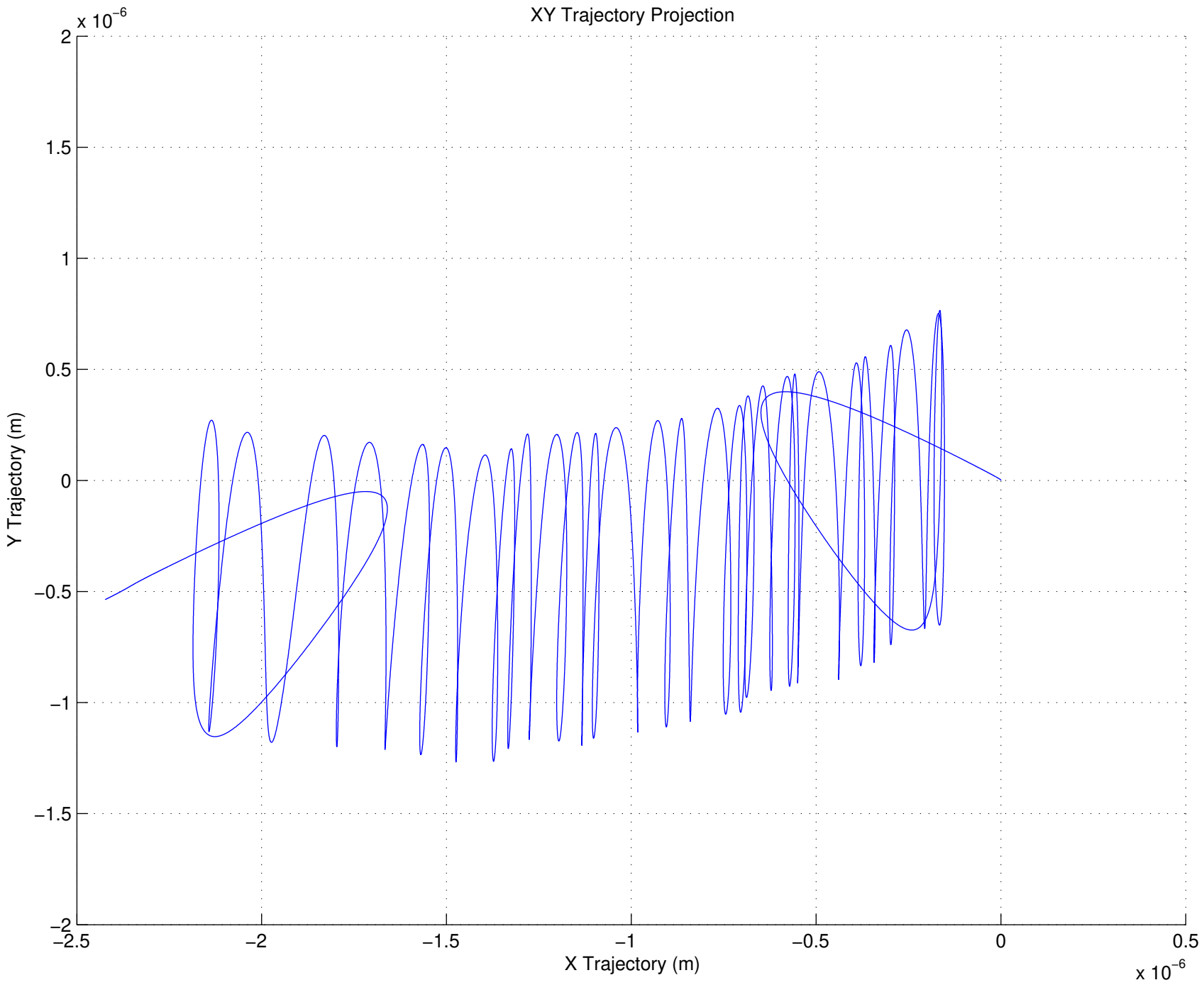

By Peak And Zero Field Spacing vs Z, Excluding Ends
By Peak And Zero Field Spacing (m)
Z (m)
Pole
Peaks
Zeros
Peak Field Spacing: Ave = 0.016881 m, RMS = 0.006582 m
Zero Field Spacing: Ave = 0.016935 m, RMS = 0.005101 m

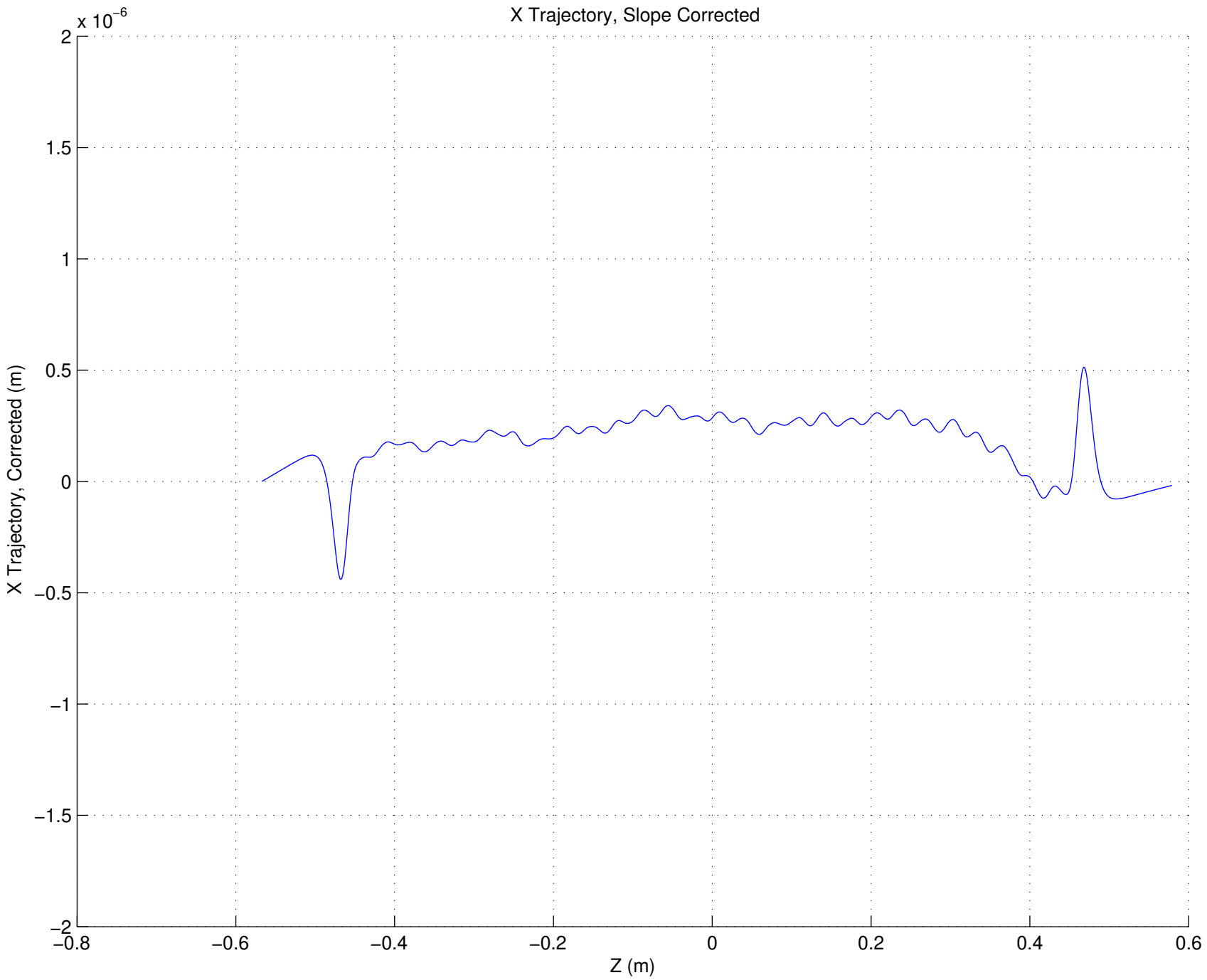

Bx Field Harmonics
|An|
|Bn|
Absolute Value Of An, Bn (T)
n
10^{1}
10^{0}
10^{-1}
10^{-2}
10^{-3}
10^{-4}
10^{-5}
0
1
2
3
4
5
6
7
8
9
10

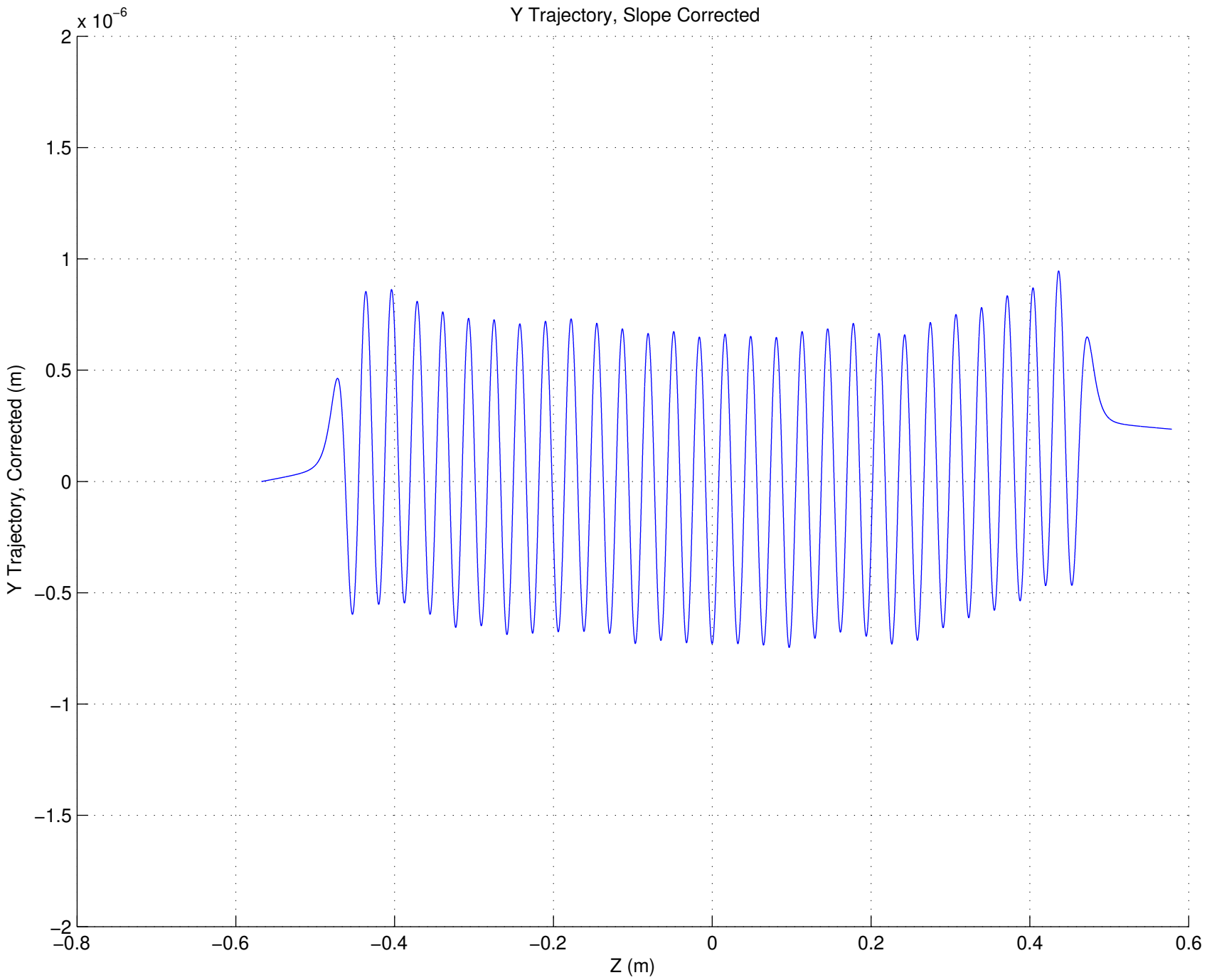

By Field Harmonics
|An|
|Bn|
Absolute Value Of An, Bn (T)
n
10^{-2}
10^{-3}
10^{-4}
10^{-5}
10^{-6}
10^{-7}
0
1
2
3
4
5
6
7
8
9
10

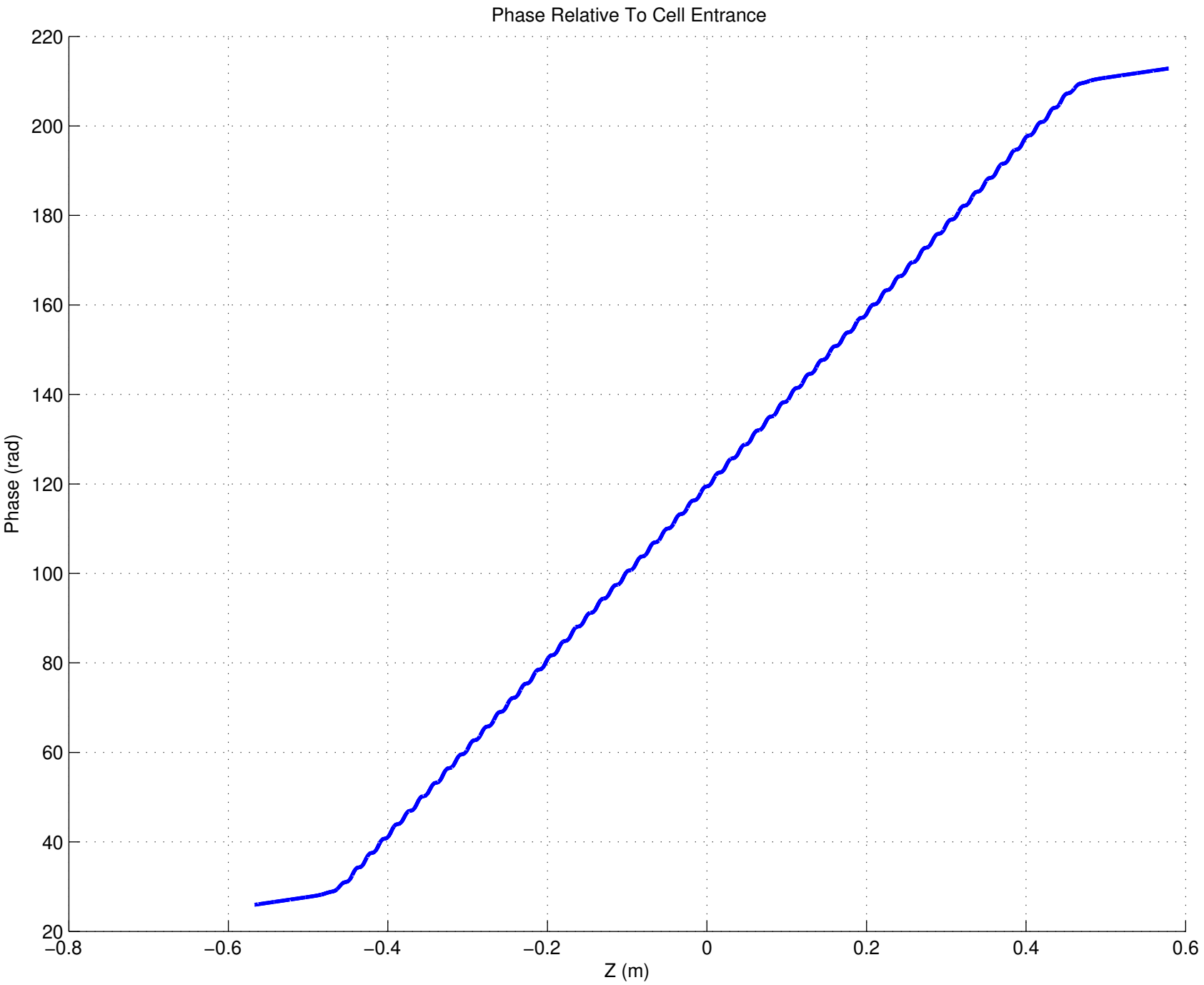

X Trajectory
x 10^-6
0.5
0
−0.5
−1
−1.5
−2
−2.5
X Trajectory (m)
6
19
31
43
56
Pole
−0.8
−0.6
−0.4
−0.2
0
0.2
0.4
0.6
Z (m)

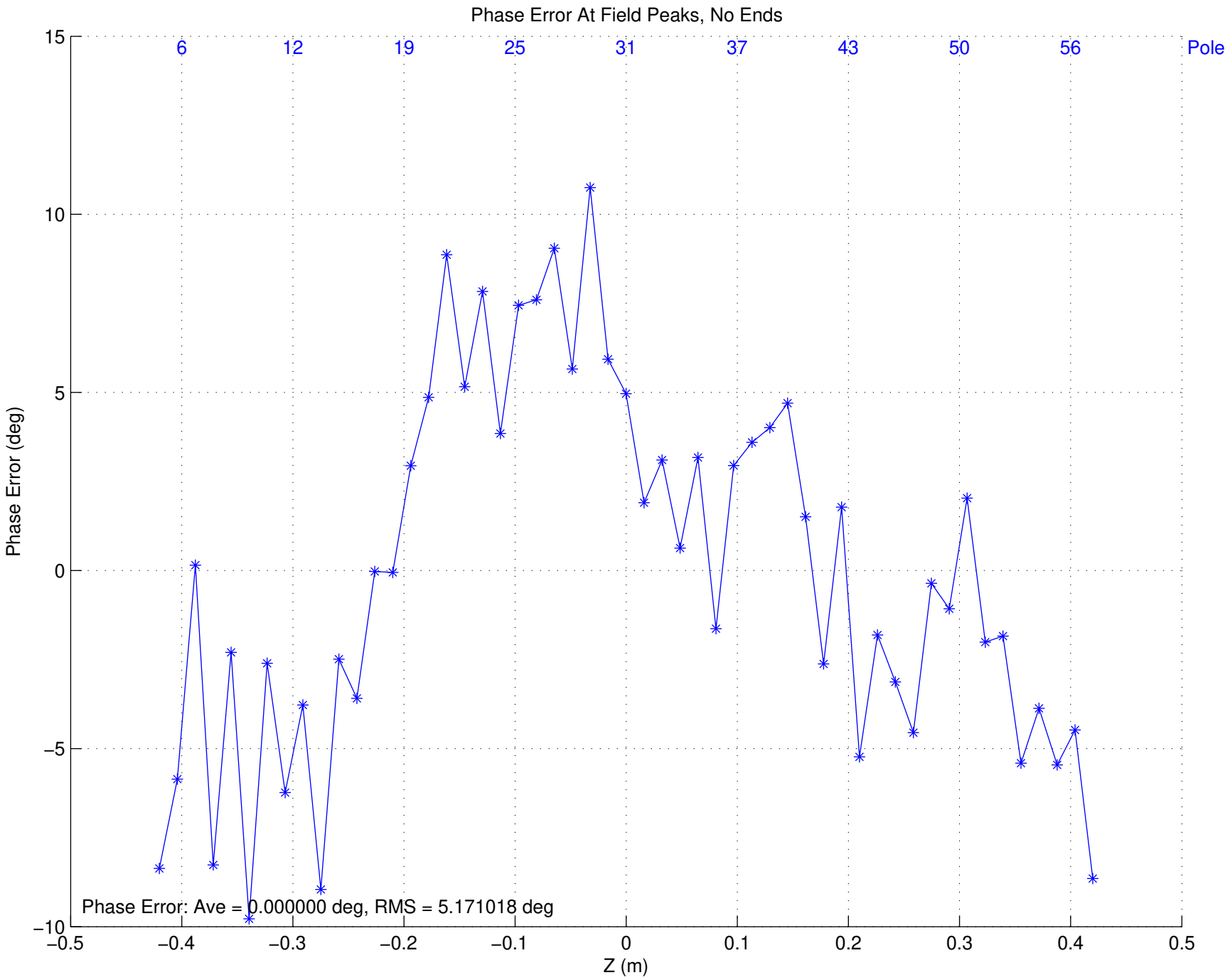

Y Trajectory
x 10^-6
2
1.5
1
0.5
0
−0.5
−1
−1.5
−2
6
19
31
43
56
Pole
Y Trajectory (m)
−0.8
−0.6
−0.4
−0.2
0
0.2
0.4
0.6
Z (m)

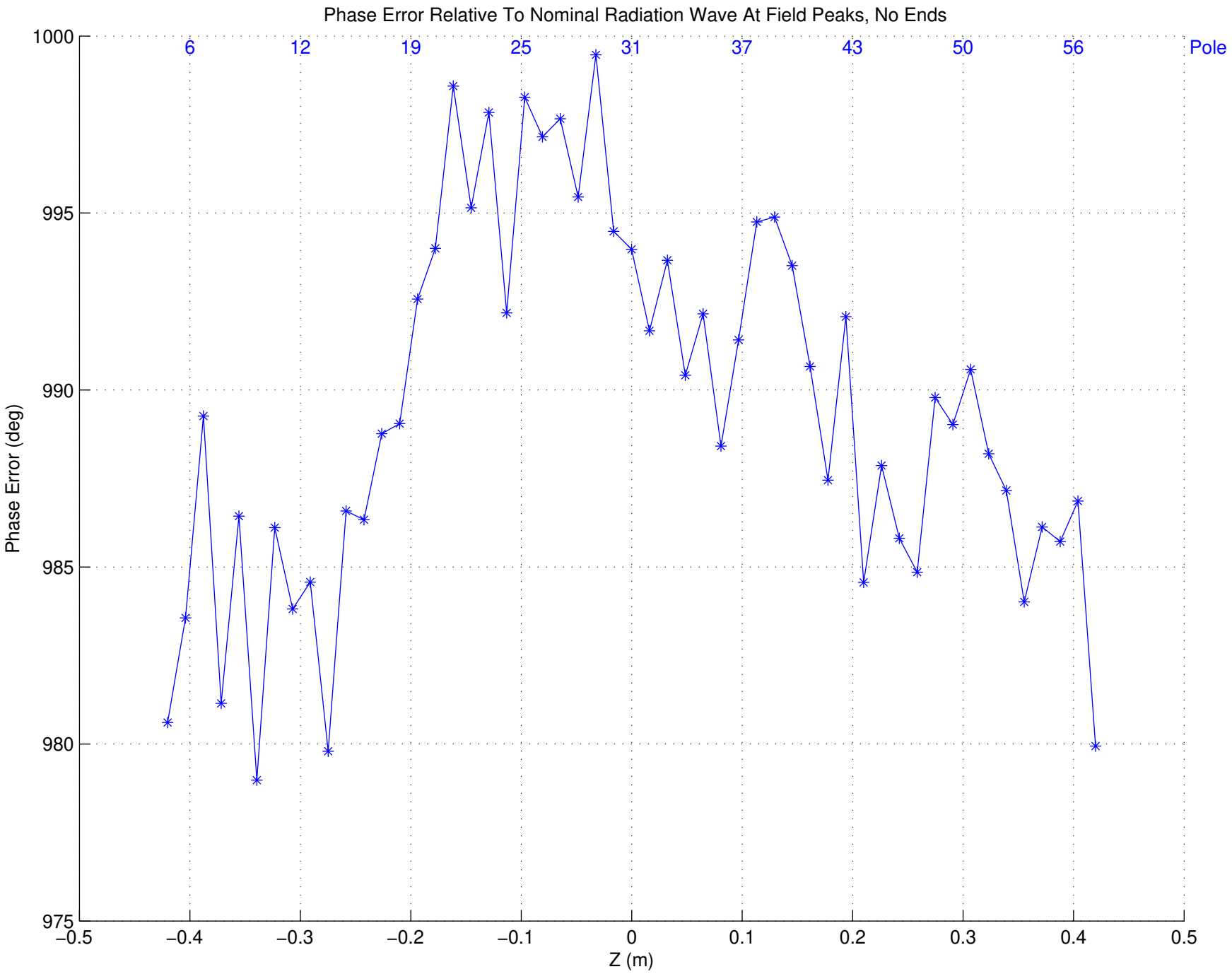

XY Trajectory Projection
x 10^-6
2
1.5
1
0.5
0
−0.5
−1
−1.5
−2
Y Trajectory (m)
−2.5
−2
−1.5
−1
−0.5
0
0.5
X Trajectory (m)
x 10^-6

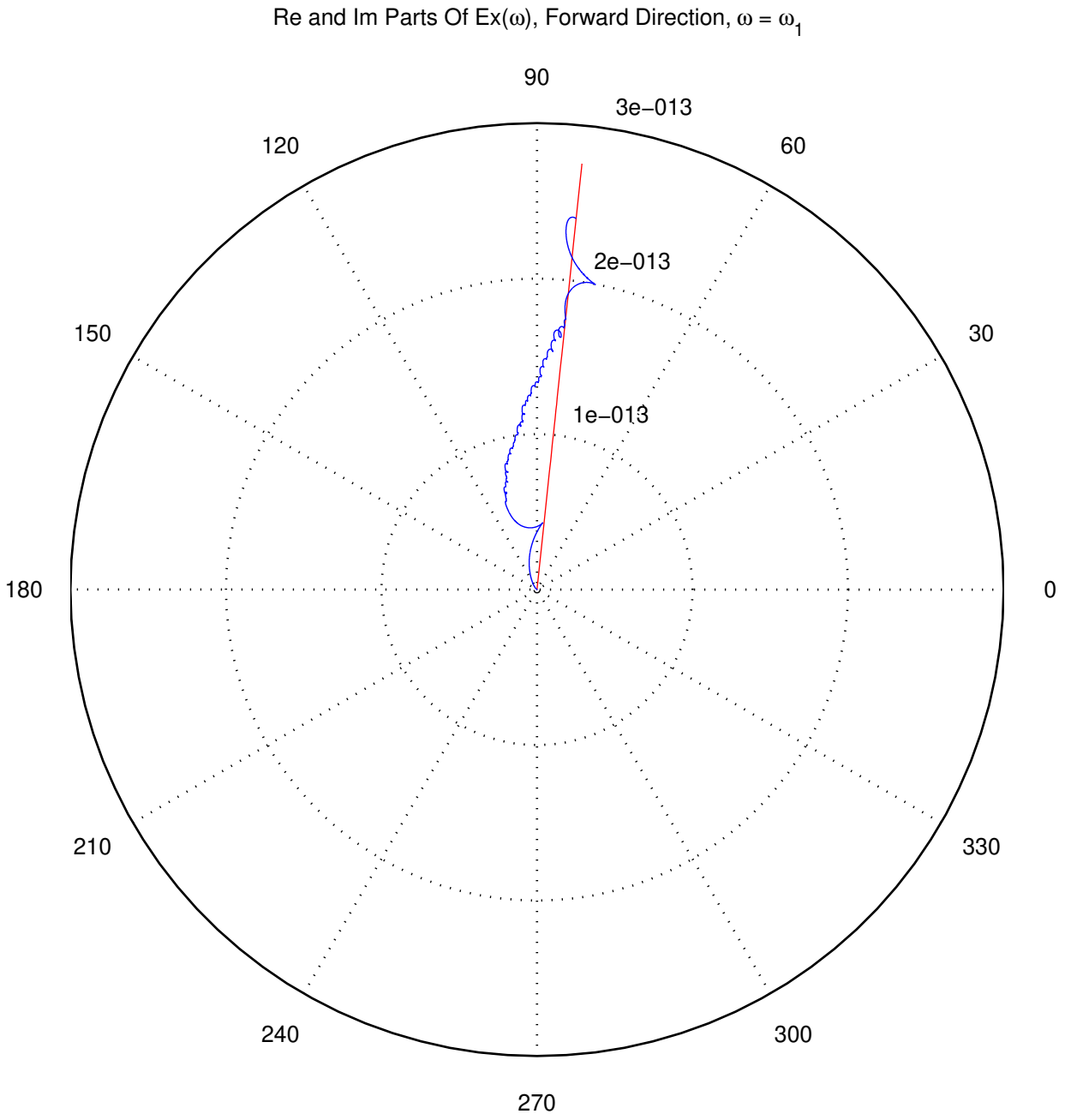

X Trajectory, Slope Corrected
x 10^-6
2
1.5
1
0.5
0
−0.5
−1
−1.5
−2
X Trajectory, Corrected (m)
−0.8
−0.6
−0.4
−0.2
0
0.2
0.4
0.6
Z (m)

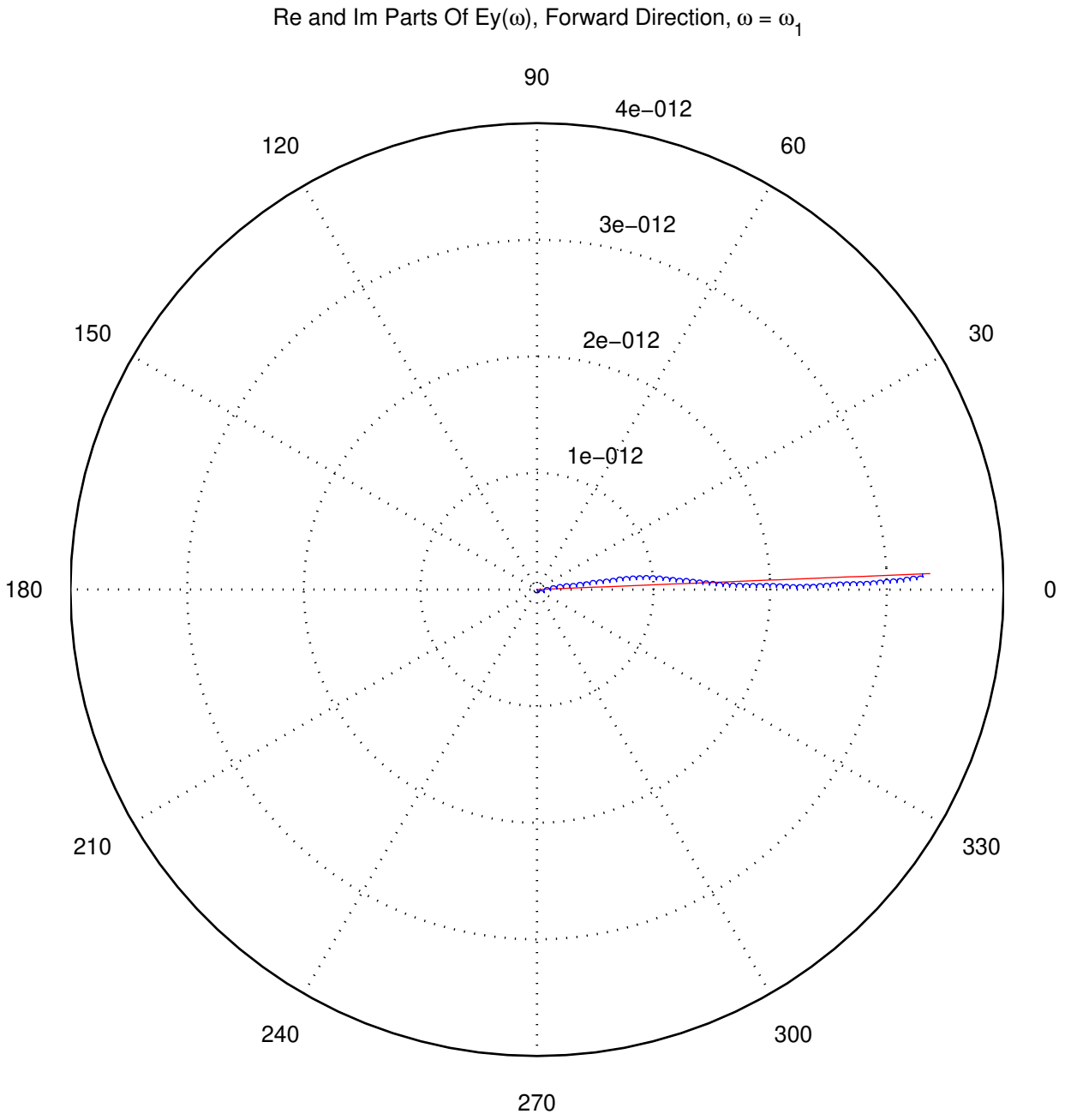

Y Trajectory, Slope Corrected
x 10^-6
2
1.5
1
0.5
0
−0.5
−1
−1.5
−2
Y Trajectory, Corrected (m)
−0.8
−0.6
−0.4
−0.2
0
0.2
0.4
0.6
Z (m)

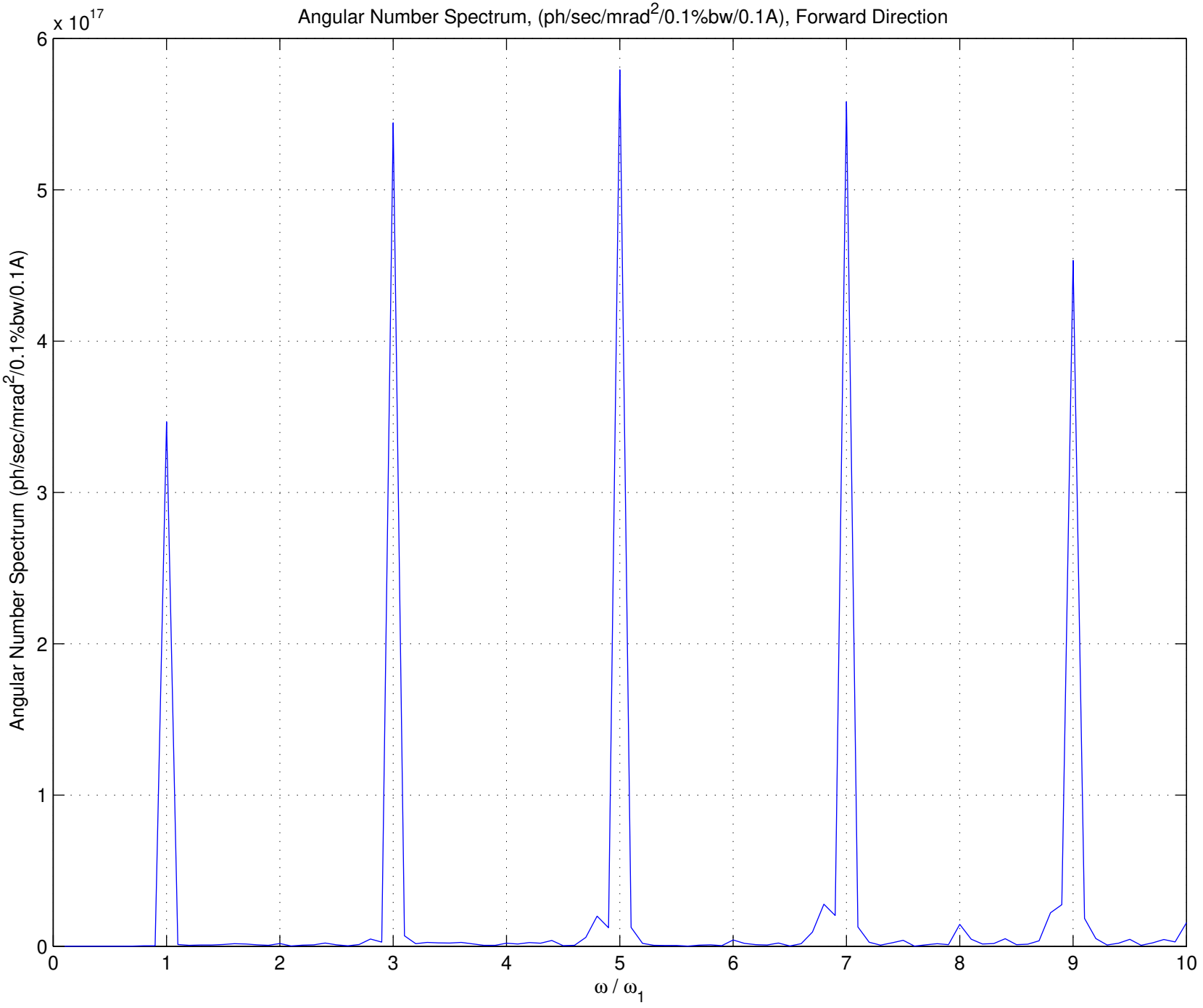

Phase Relative To Cell Entrance
Phase (rad)
Z (m)
220
200
180
160
140
120
100
80
60
40
20
−0.8
−0.6
−0.4
−0.2
0
0.2
0.4
0.6

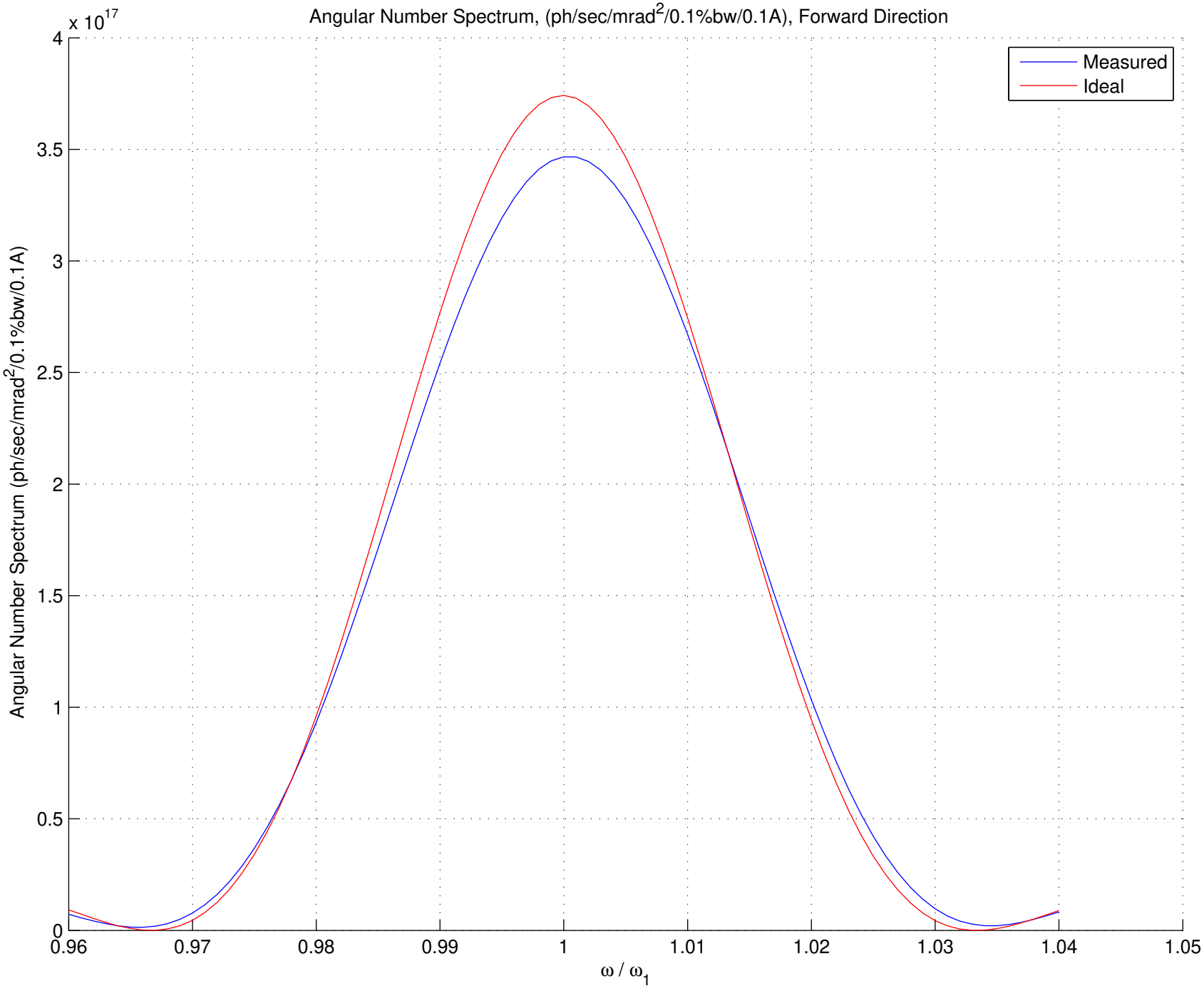

Phase Error At Field Peaks, No Ends
6
12
19
25
31
37
43
50
56
Pole
15
10
5
0
−5
−10
Phase Error (deg)
−0.5
−0.4
−0.3
−0.2
−0.1
0
0.1
0.2
0.3
0.4
0.5
Z (m)
Phase Error: Ave = 0.000000 deg, RMS = 5.171018 deg

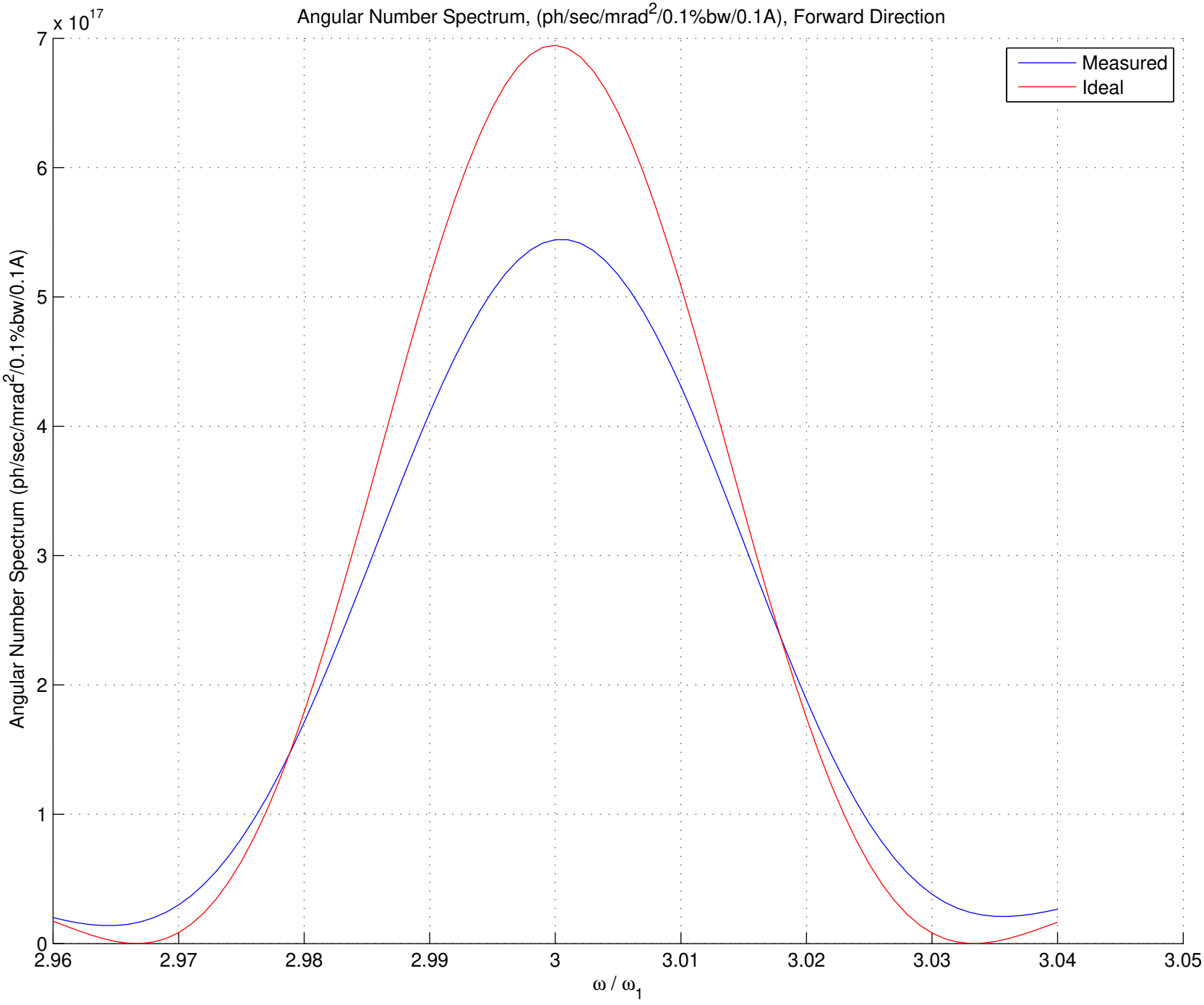

Phase Error Relative To Nominal Radiation Wave At Field Peaks, No Ends
6
12
19
25
31
37
43
50
56
Pole
1000
995
990
985
980
975
Phase Error (deg)
−0.5
−0.4
−0.3
−0.2
−0.1
0
0.1
0.2
0.3
0.4
0.5
Z (m)

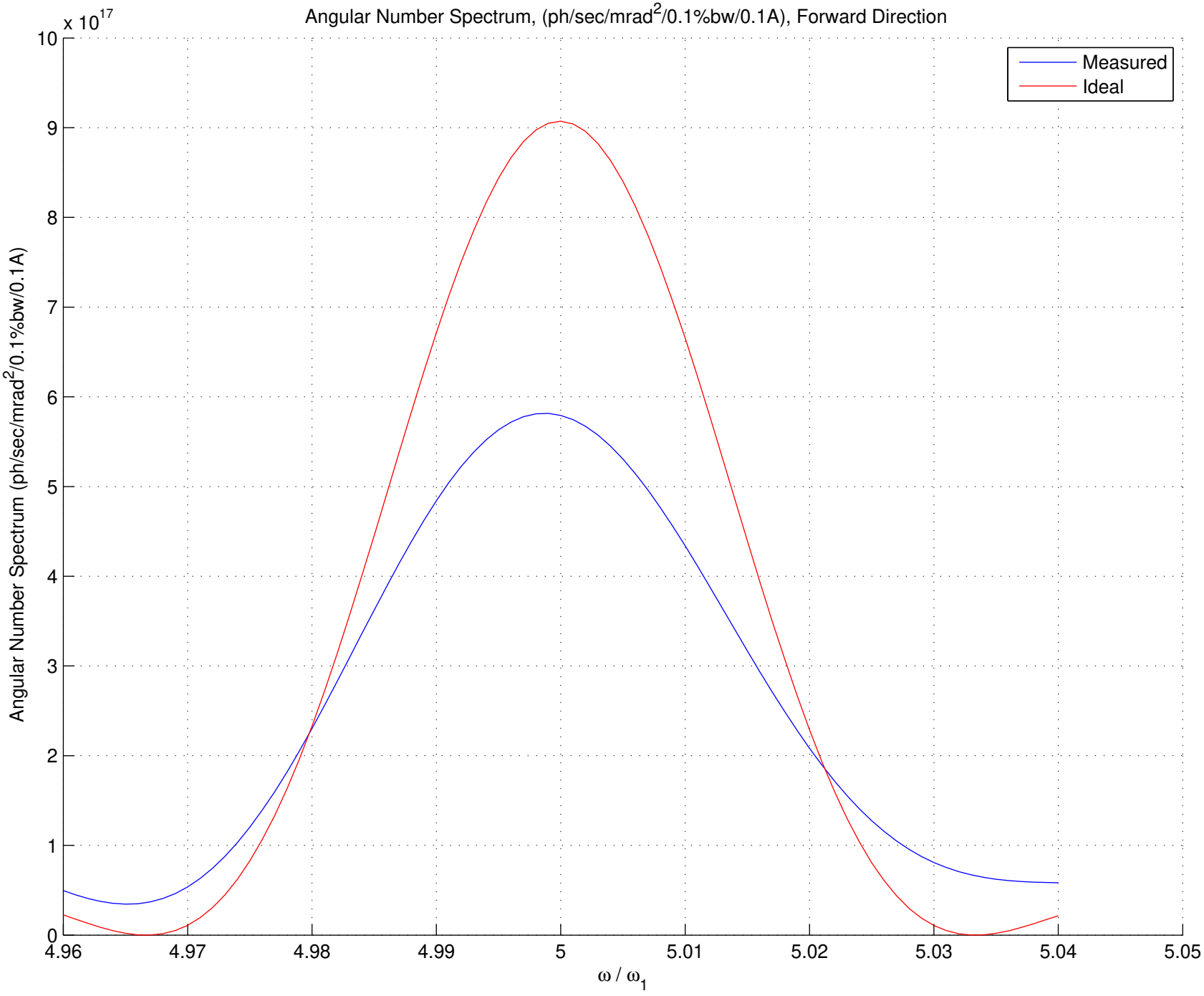

Re and Im Parts Of Ex(ω), Forward Direction, ω = ω1
90
3e−013
120
60
2e−013
150
30
1e−013
180
0
210
330
240
300
270


Re and Im Parts Of Ey(ω), Forward Direction, ω = ω1
90
4e−012
120
60
3e−012
150
30
2e−012
1e−012
180
0
210
330
240
300
270


Angular Number Spectrum, (ph/sec/mrad2/0.1%bw/0.1A), Forward Direction
x 10^17
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/mrad2/0.1%bw/0.1A), Forward Direction
x 10^17
Measured
Ideal
Angular Number Spectrum (ph/sec/mrad2/0.1%bw/0.1A)
ω / ω1
0
0.5
1
1.5
2
2.5
3
3.5
4
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 10^17
Angular Number Spectrum (ph/sec/mrad2/0.1%bw/0.1A)
ω / ω1
Measured
Ideal
0
1
2
3
4
5
6
7
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^{17}
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
9
10
4.96
4.97
4.98
4.99
5
5.01
5.02
5.03
5.04
5.05