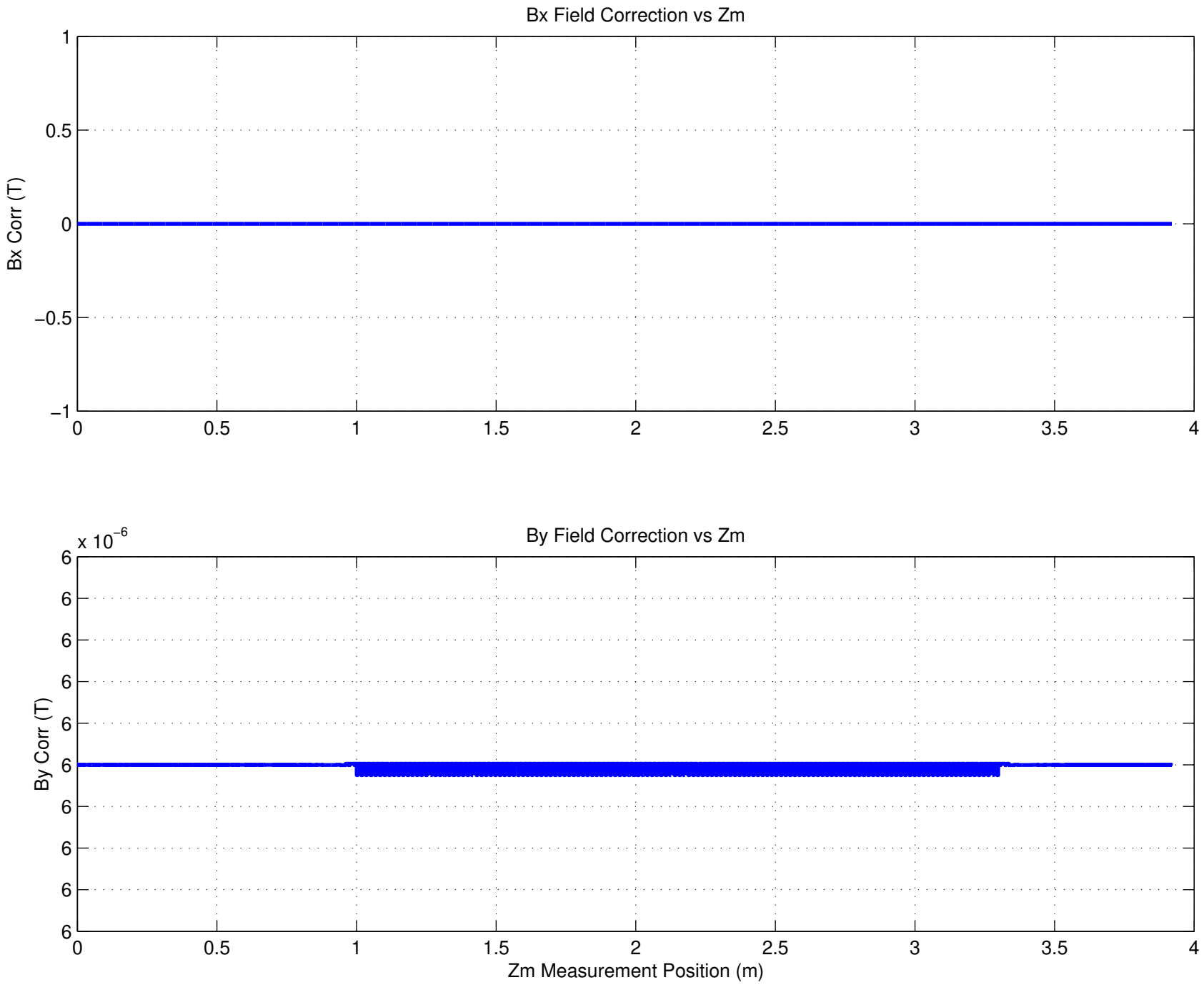
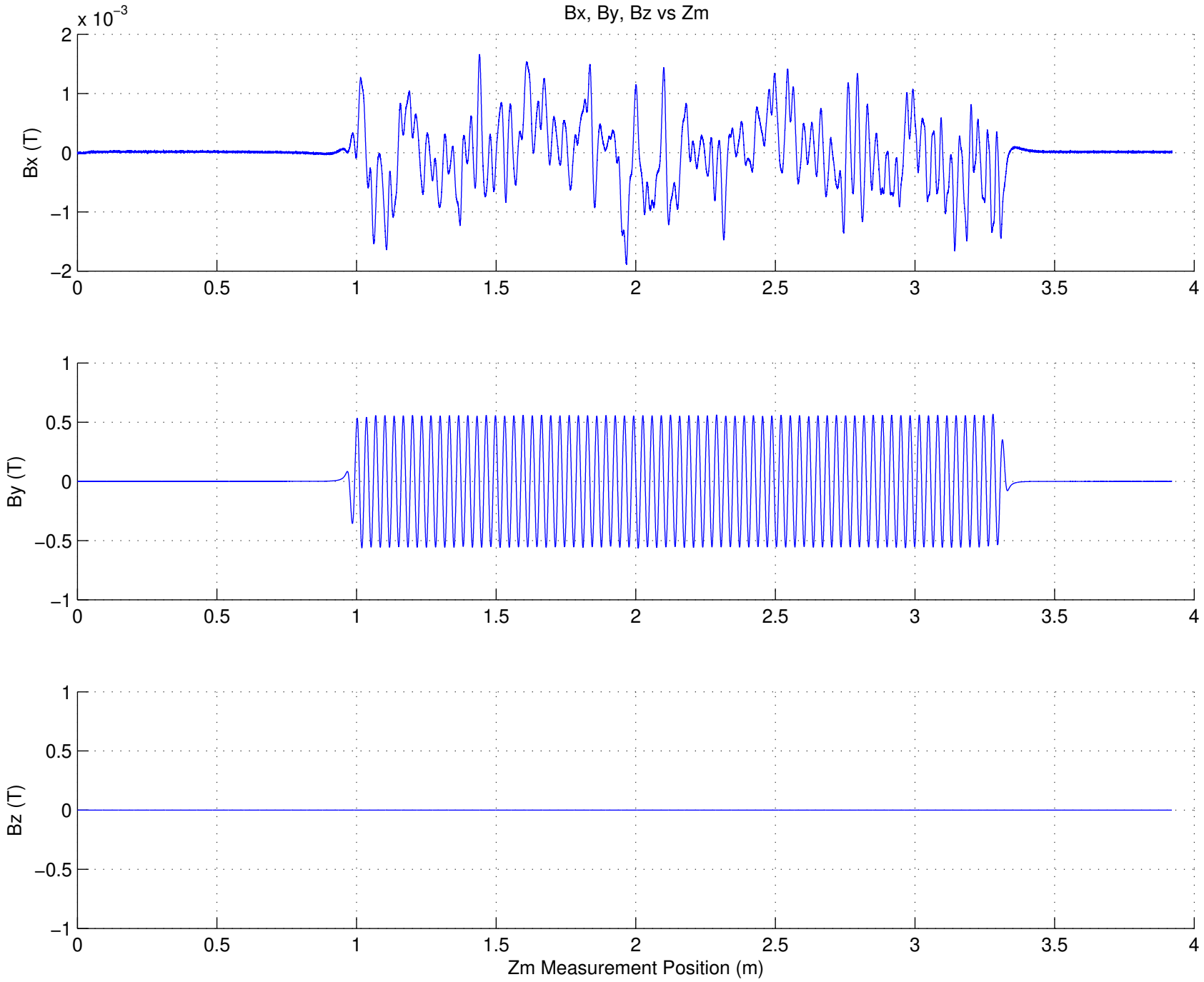
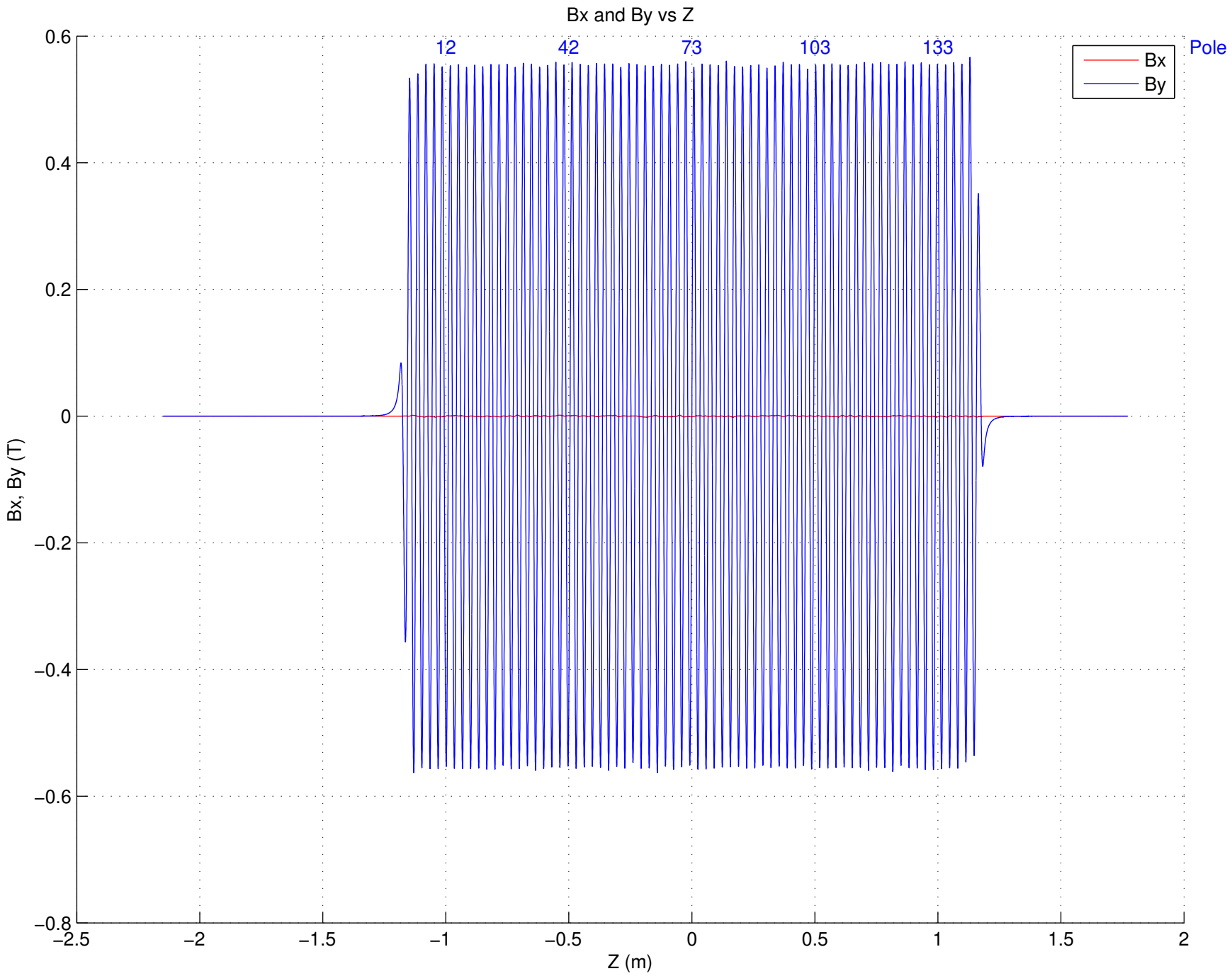
SLAC Magnetic Measurements

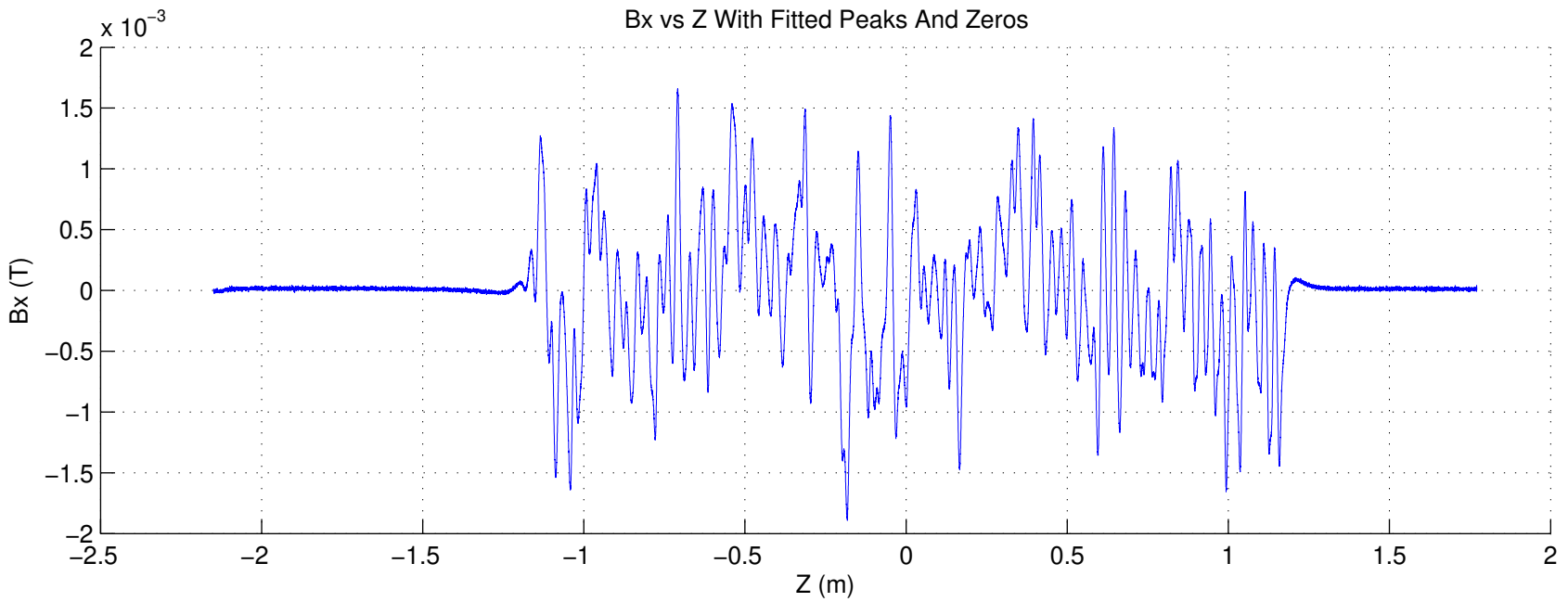
EPU Analysis
−−−−−−−−−−−

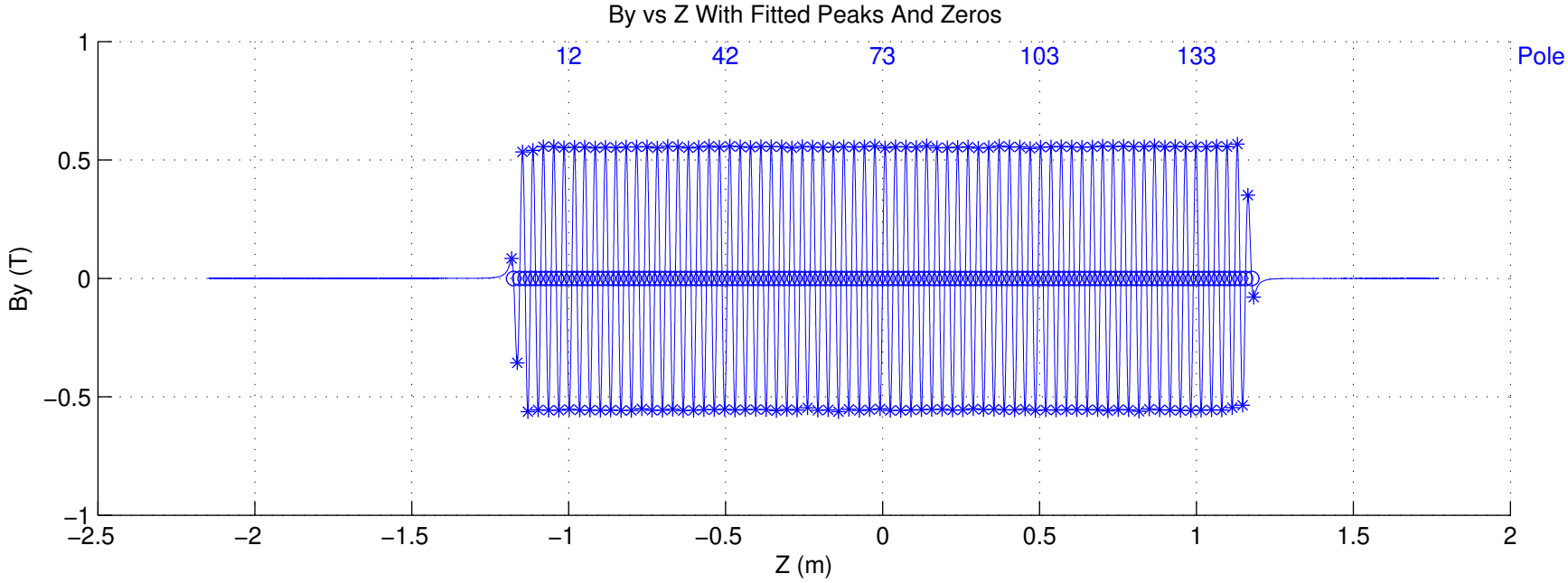
Parameters:
INPUT−FILE−DIR =V:\MET\MagServe\MagData\LCLS\Undulator\A1−ANL\DATASET0002\Rough Tuning\Z Scans\Run 009\
INPUT−FILE−NAME =x+00000−y+000−bscanz.dat
INPUT−FILE−TYPE =ZVXYBXYH
CORR−REQUIRED =1
GAMMA =26627.1
NOM−LAMBDA−U =0
NOM−K−VALUE =0
NOM−LAMBDA−R =0
NUM−POLES =144
NUM−END−POLES =4
CELL−LENGTH =3.126

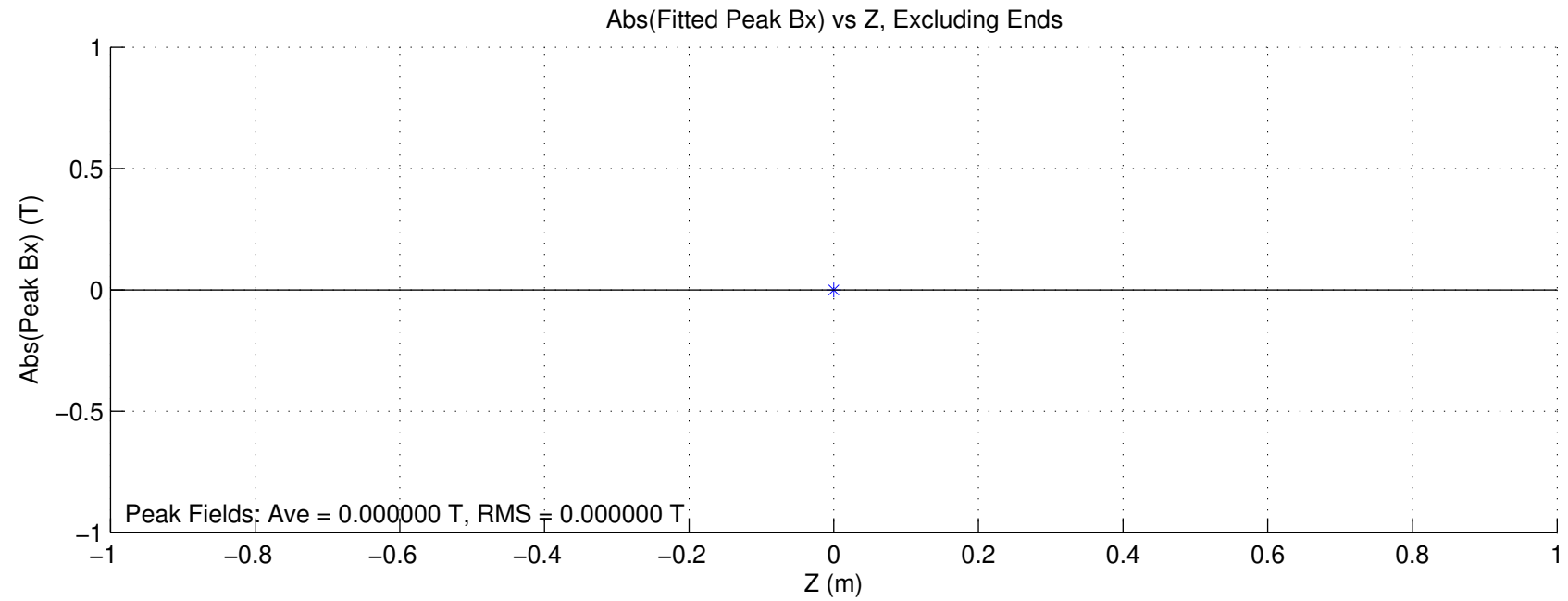

Bx Field Correction vs Zm
Bx Corr (T)
1
0.5
0
−0.5
−1
0
0.5
1
1.5
2
2.5
3
3.5
4
By Field Correction vs Zm
x 10^−6
By Corr (T)
6
6
6
6
6
6
6
6
6
0
0.5
1
1.5
2
2.5
3
3.5
4
Zm Measurement Position (m)

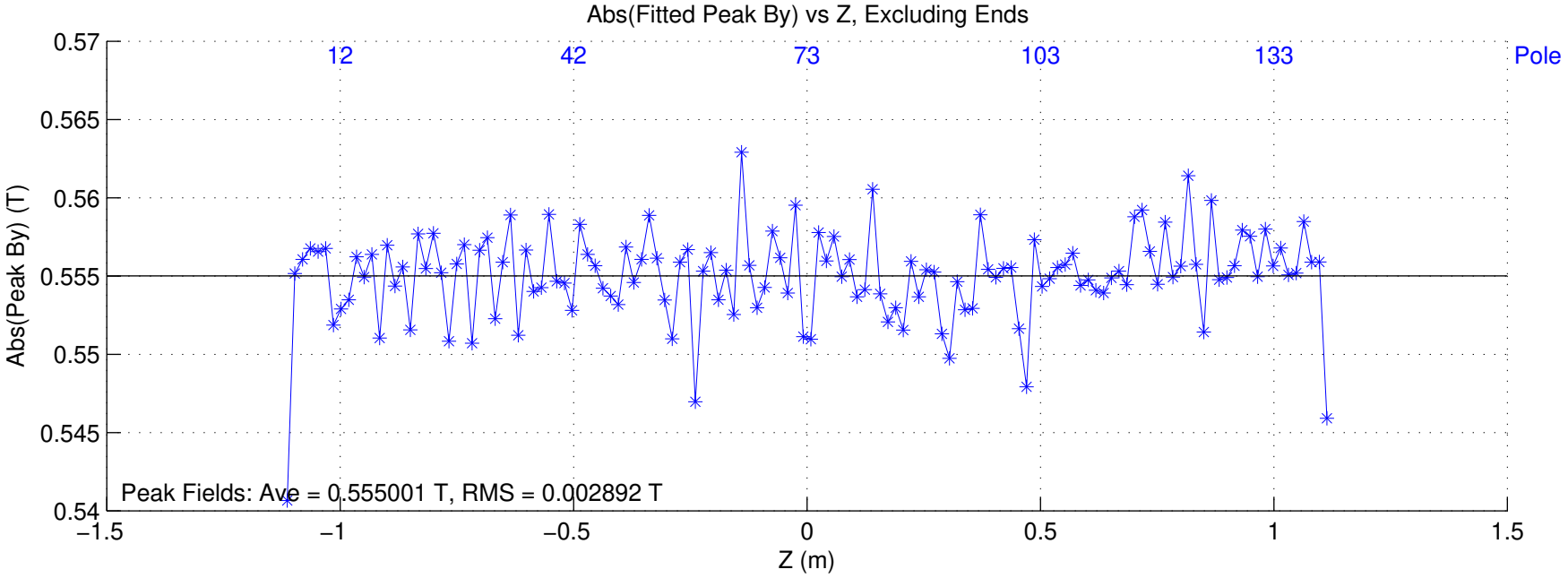

Bx, By, Bz vs Zm
x 10^-3
Bx (T)
By (T)
Bz (T)
Zm Measurement Position (m)
2
1
0
−1
−2
0.5
1.5
2.5
3
3.5
4

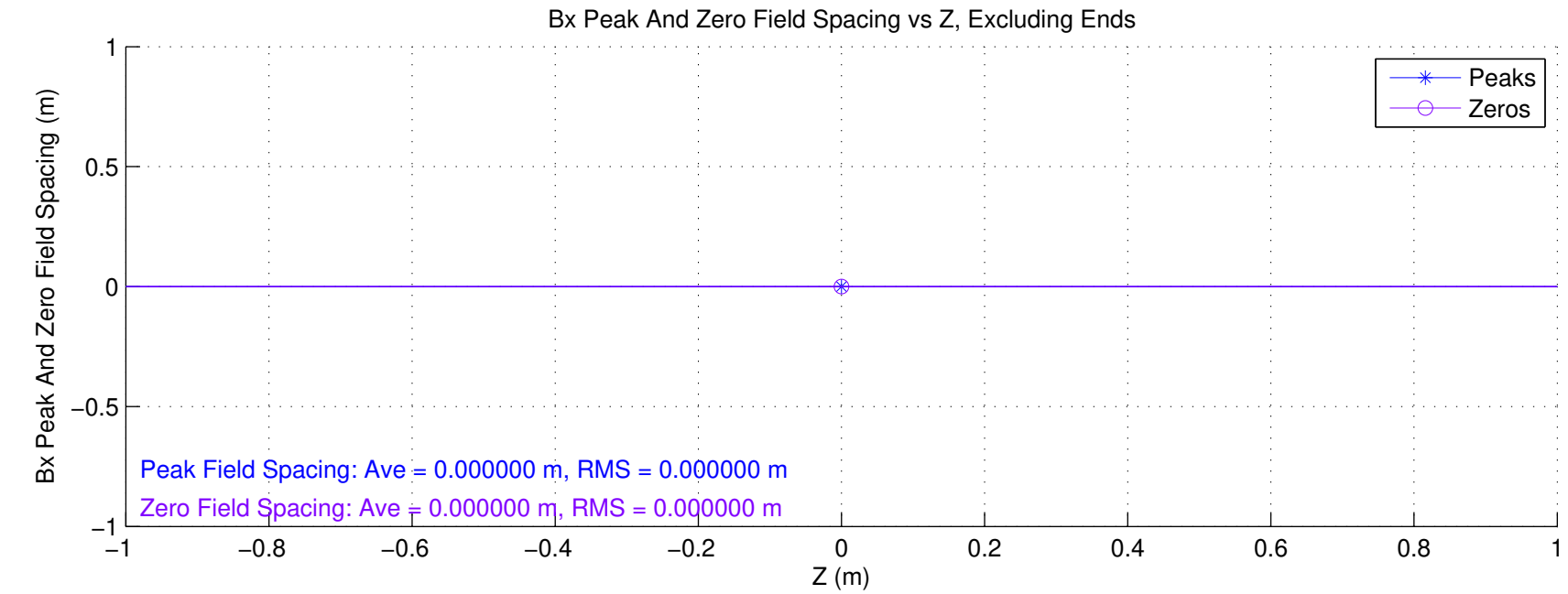

Bx and By vs Z
12
42
73
103
133
Pole
Bx
By
0.6
0.4
0.2
0
−0.2
−0.4
−0.6
−0.8
Bx, By (T)
−2.5
−2
−1.5
−1
−0.5
0
0.5
1
1.5
2
Z (m)

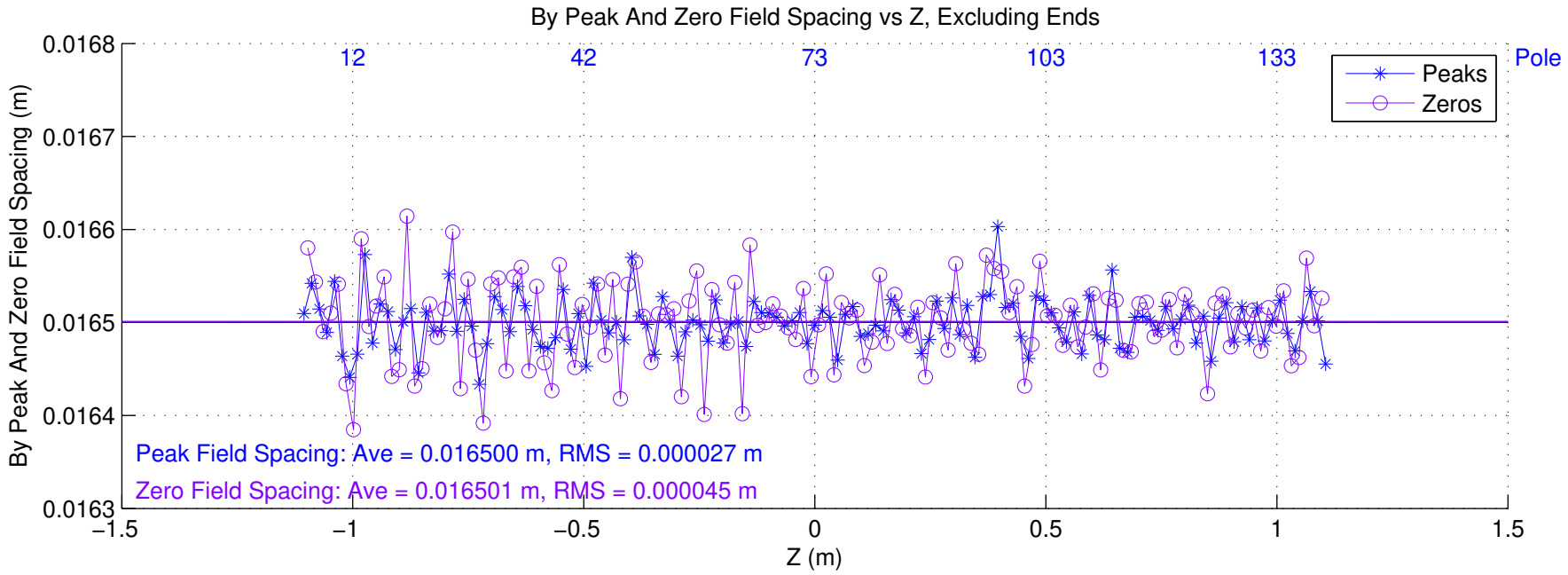

Bx vs Z With Fitted Peaks And Zeros
x 10^-3
Bx (T)
Z (m)
2
1.5
1
0.5
0
−0.5
−1
−1.5
−2
−2.5
−2
−1.5
−1
−0.5
0
0.5
1
1.5
2

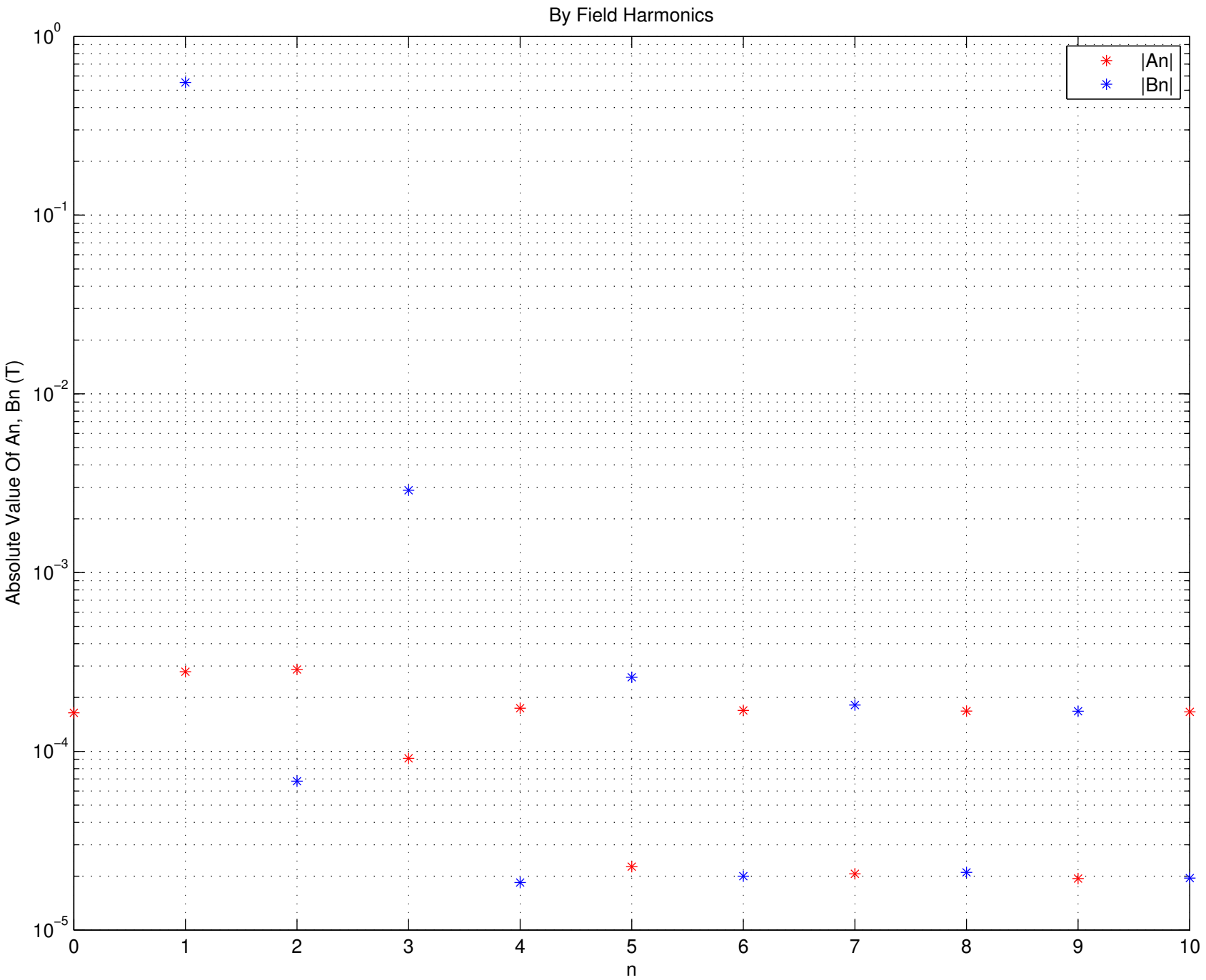

By vs Z With Fitted Peaks And Zeros
12
42
73
103
133
Pole
By (T)
Z (m)
1
0.5
0
−0.5
−1
−2.5
−2
−1.5
−1
−0.5
0
0.5
1
1.5
2

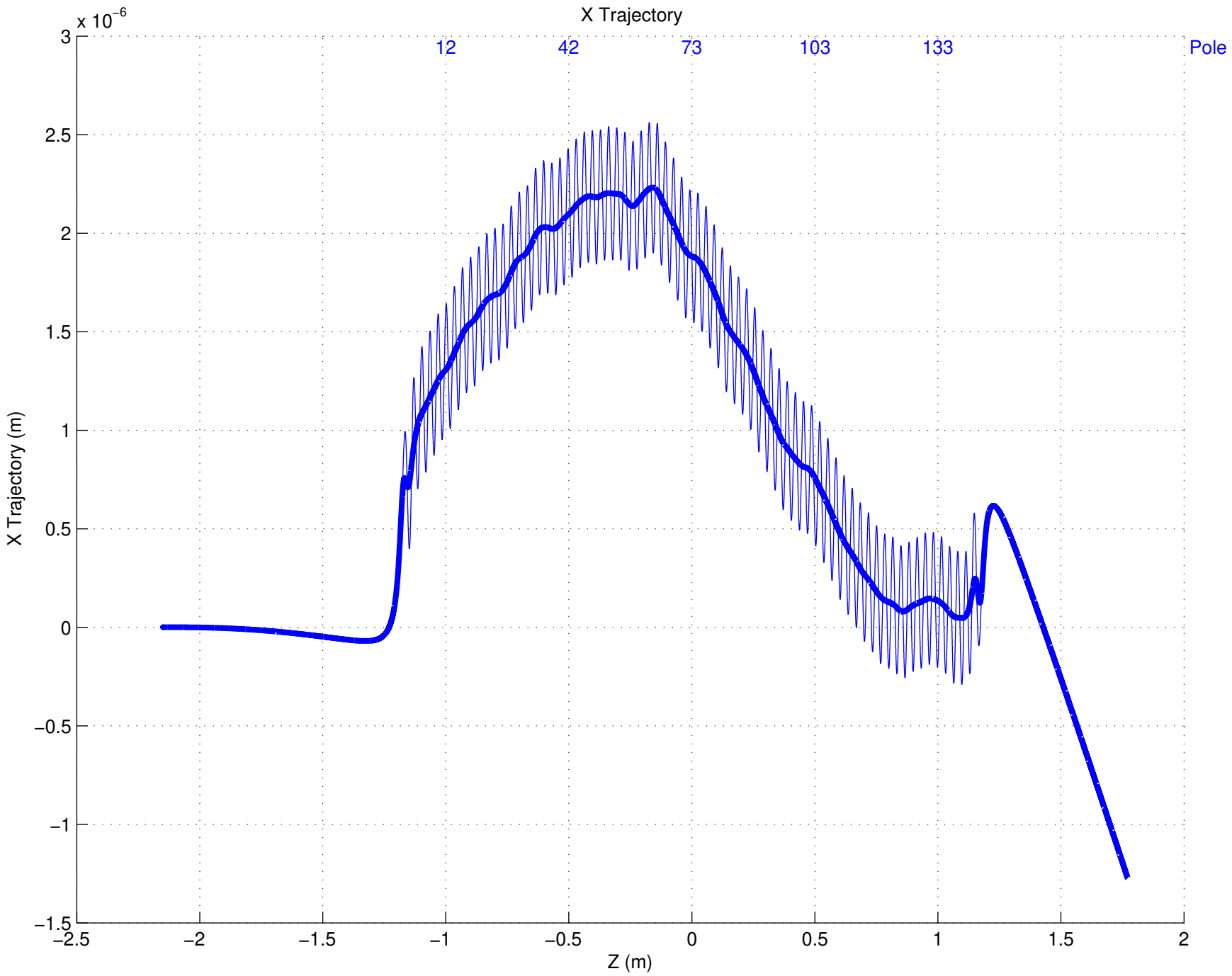

Abs(Fitted Peak Bx) vs Z, Excluding Ends
Abs(Peak Bx) (T)
Z (m)
Peak Fields: Ave = 0.000000 T, RMS = 0.000000 T
1
0.5
0
−0.5
−1
−1
−0.8
−0.6
−0.4
−0.2
0
0.2
0.4
0.6
0.8
1

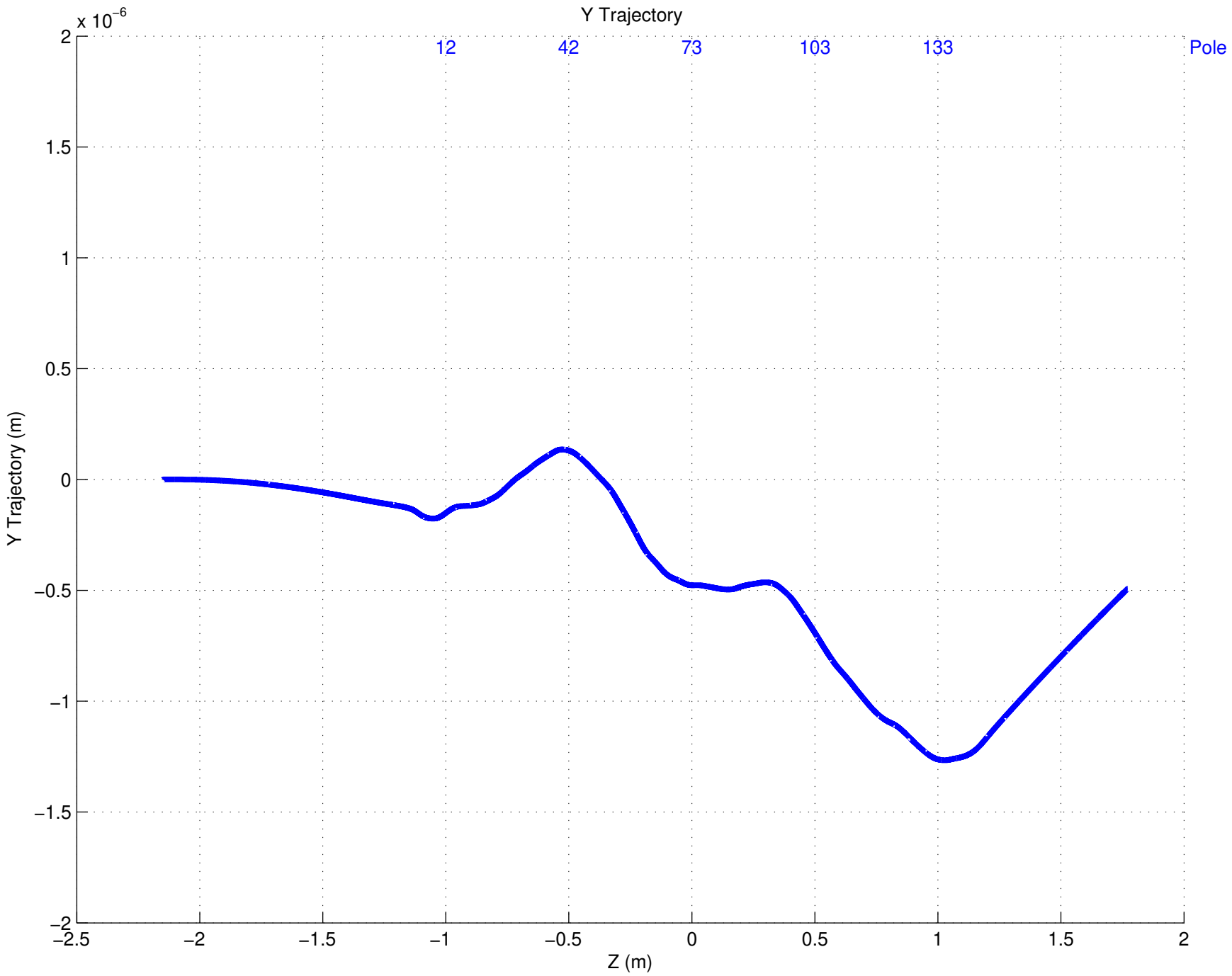

Abs(Fitted Peak By) vs Z, Excluding Ends
Abs(Peak By) (T)
Z (m)
Peak Fields: Ave = 0.555001 T, RMS = 0.002892 T
12
42
73
103
133
Pole
0.57
0.565
0.56
0.555
0.55
0.545
0.54
−1.5
−1
−0.5
0
0.5
1
1.5

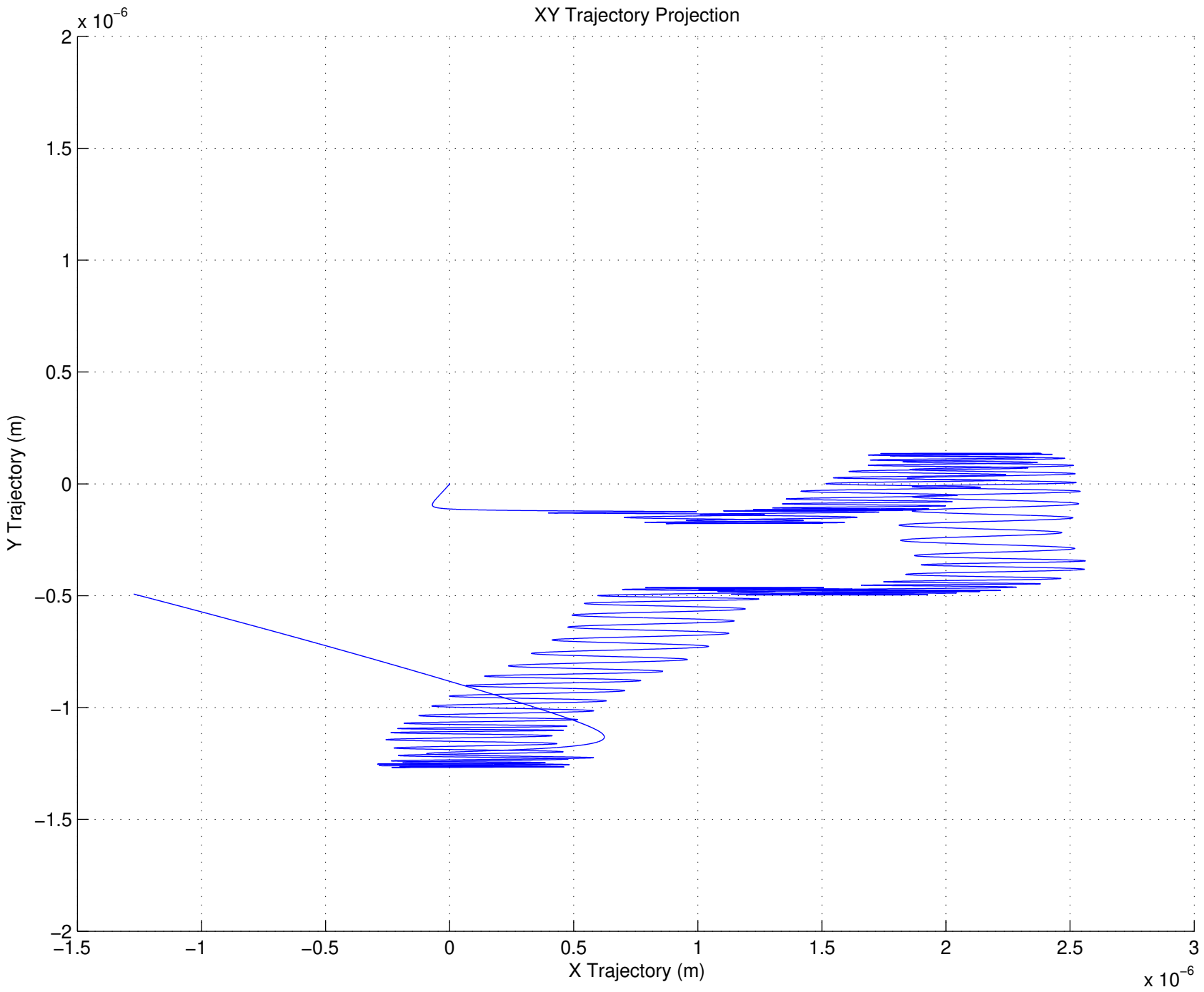

Bx Peak And Zero Field Spacing vs Z, Excluding Ends
Bx Peak And Zero Field Spacing (m)
Z (m)
Peaks
Zeros
Peak Field Spacing: Ave = 0.000000 m, RMS = 0.000000 m
Zero Field Spacing: Ave = 0.000000 m, RMS = 0.000000 m
1
0.5
0
−0.5
−1
−1
−0.8
−0.6
−0.4
−0.2
0
0.2
0.4
0.6
0.8
1

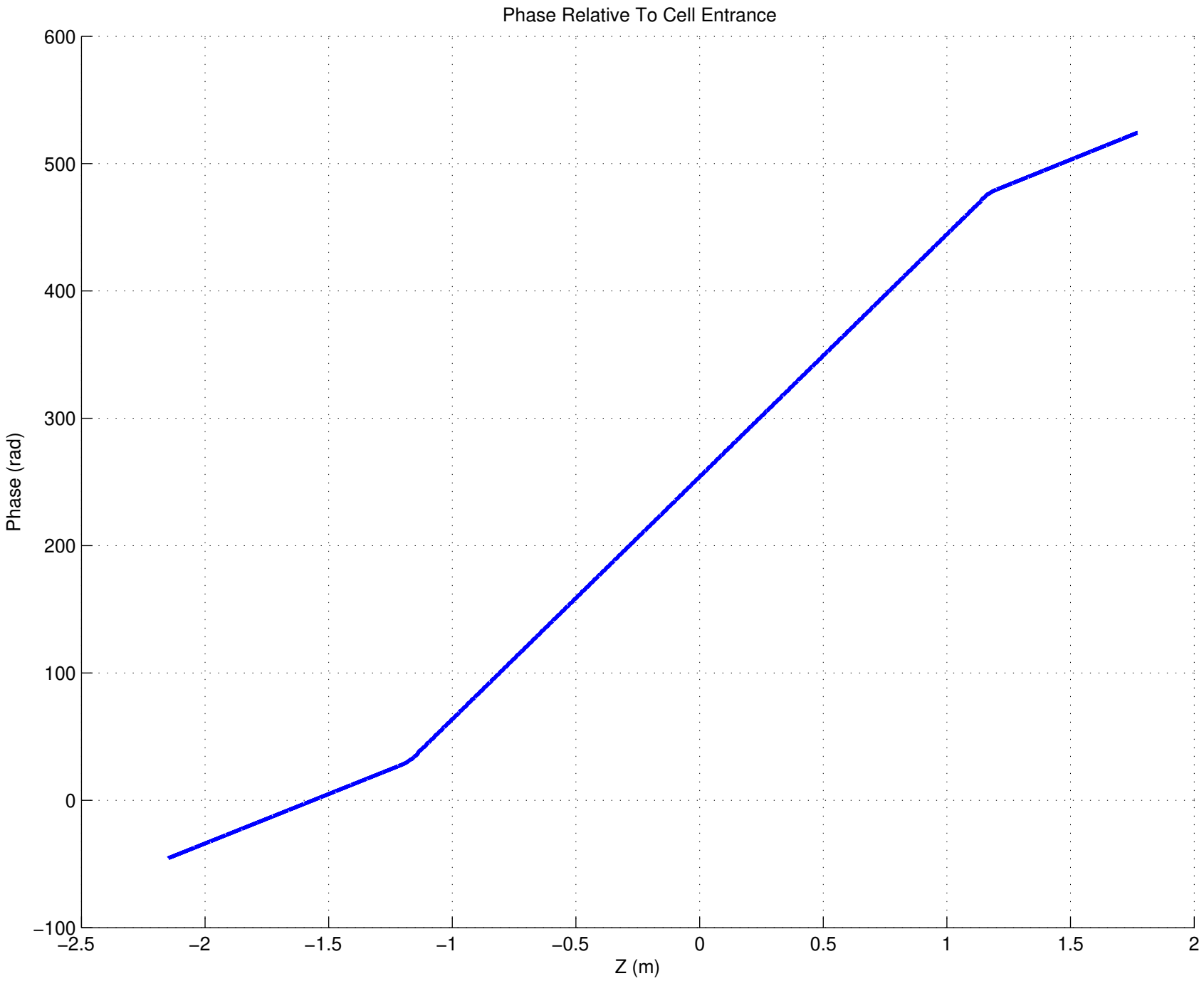

By Peak And Zero Field Spacing vs Z, Excluding Ends
By Peak And Zero Field Spacing (m)
Z (m)
12
42
73
103
133
Pole
Peaks
Zeros
Peak Field Spacing: Ave = 0.016500 m, RMS = 0.000027 m
Zero Field Spacing: Ave = 0.016501 m, RMS = 0.000045 m
0.0168
0.0167
0.0166
0.0165
0.0164
0.0163
−1.5
−1
−0.5
0
0.5
1
1.5

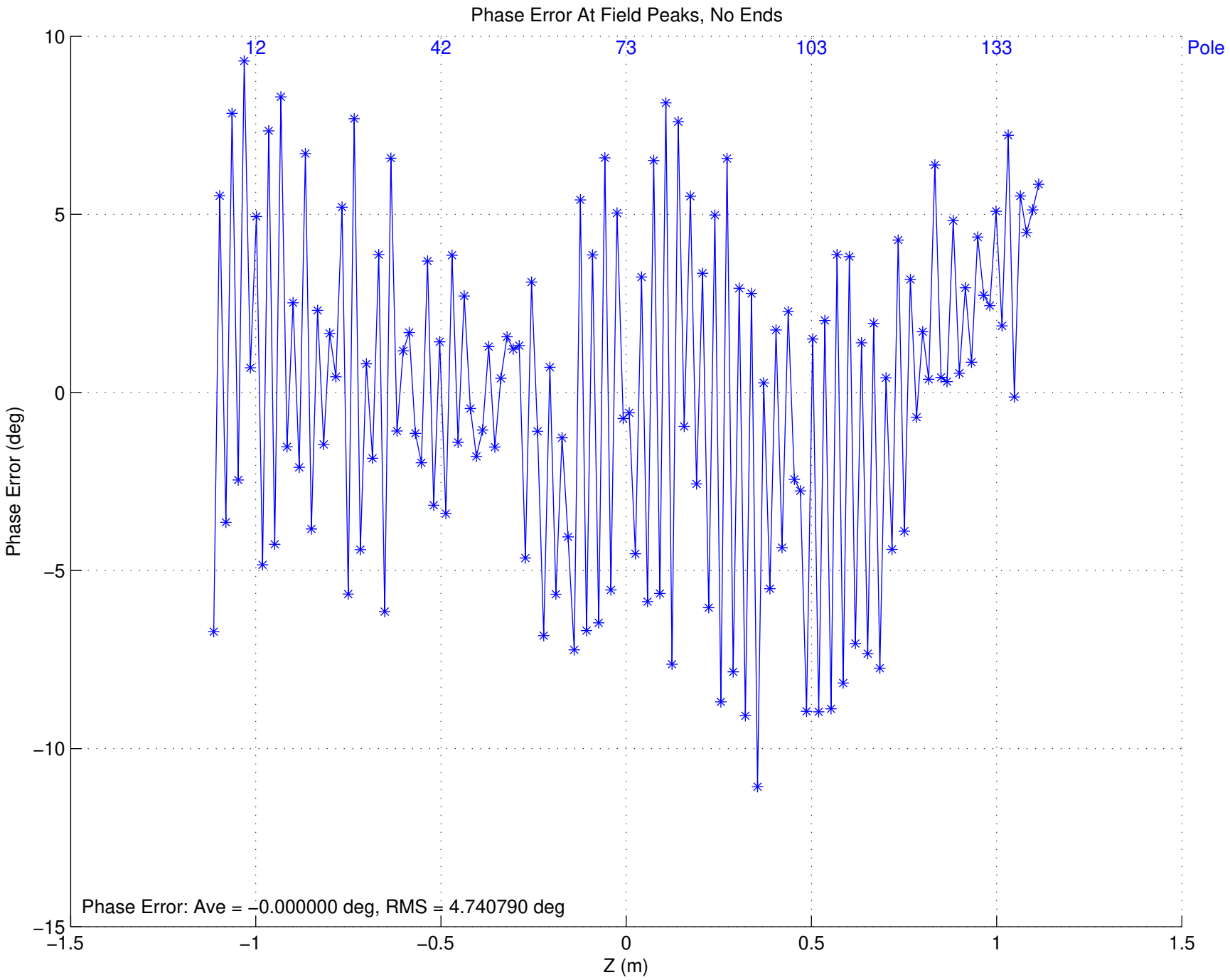

By Field Harmonics
|An|
|Bn|
Absolute Value Of An, Bn (T)
n
10^{0}
10^{-1}
10^{-2}
10^{-3}
10^{-4}
10^{-5}
0
1
2
3
4
5
6
7
8
9
10

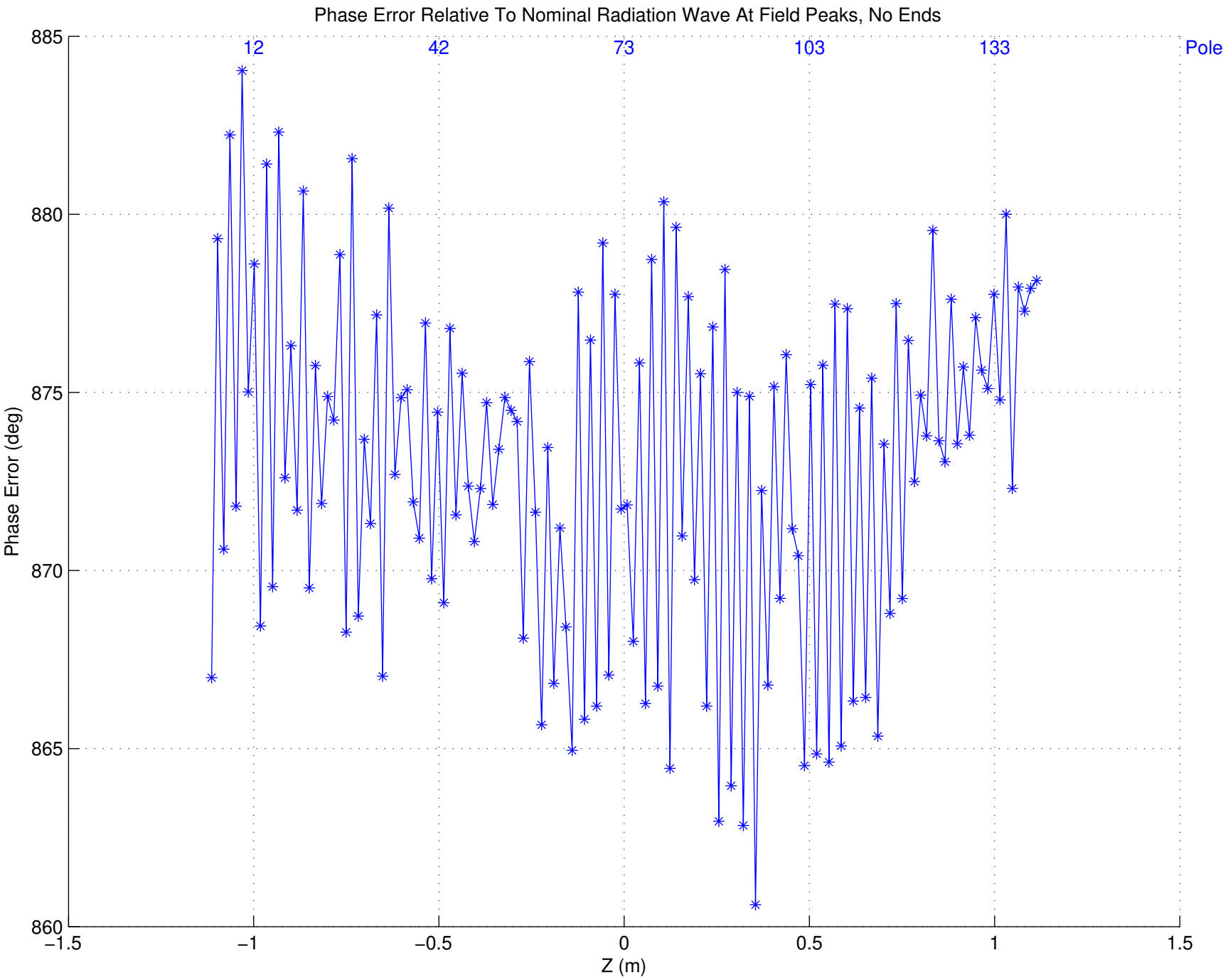

X Trajectory
x 10^-6
12
42
73
103
133
Pole
3
2.5
2
1.5
1
0.5
0
−0.5
−1
−1.5
X Trajectory (m)
−2.5
−2
−1.5
−1
−0.5
0
0.5
1
1.5
2
Z (m)

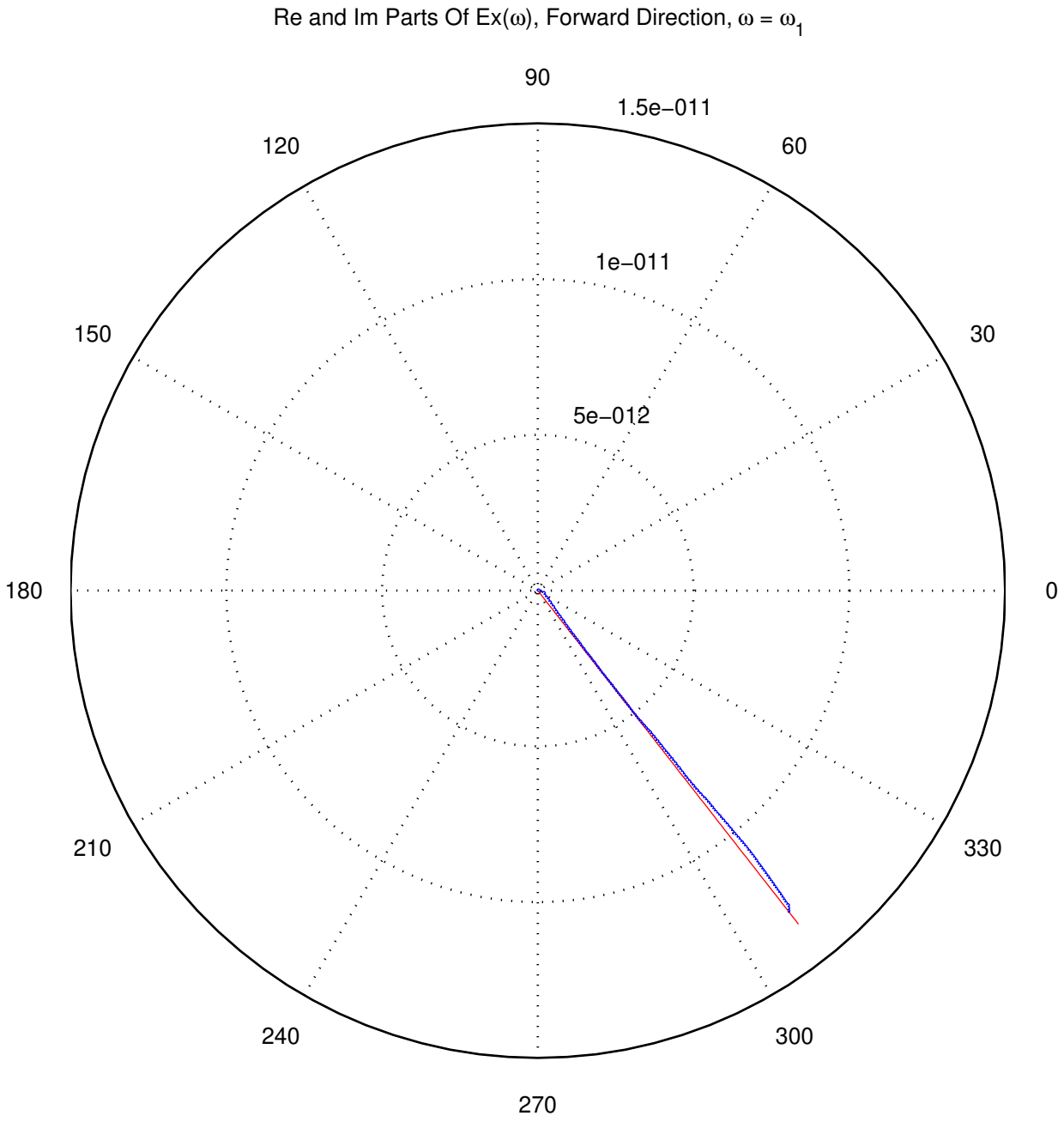

Y Trajectory
x 10^-6
12
42
73
103
133
Pole
Y Trajectory (m)
Z (m)
2
1.5
1
0.5
0
−0.5
−1
−1.5
−2
−2.5
−2
−1.5
−1
−0.5
0
0.5
1
1.5
2

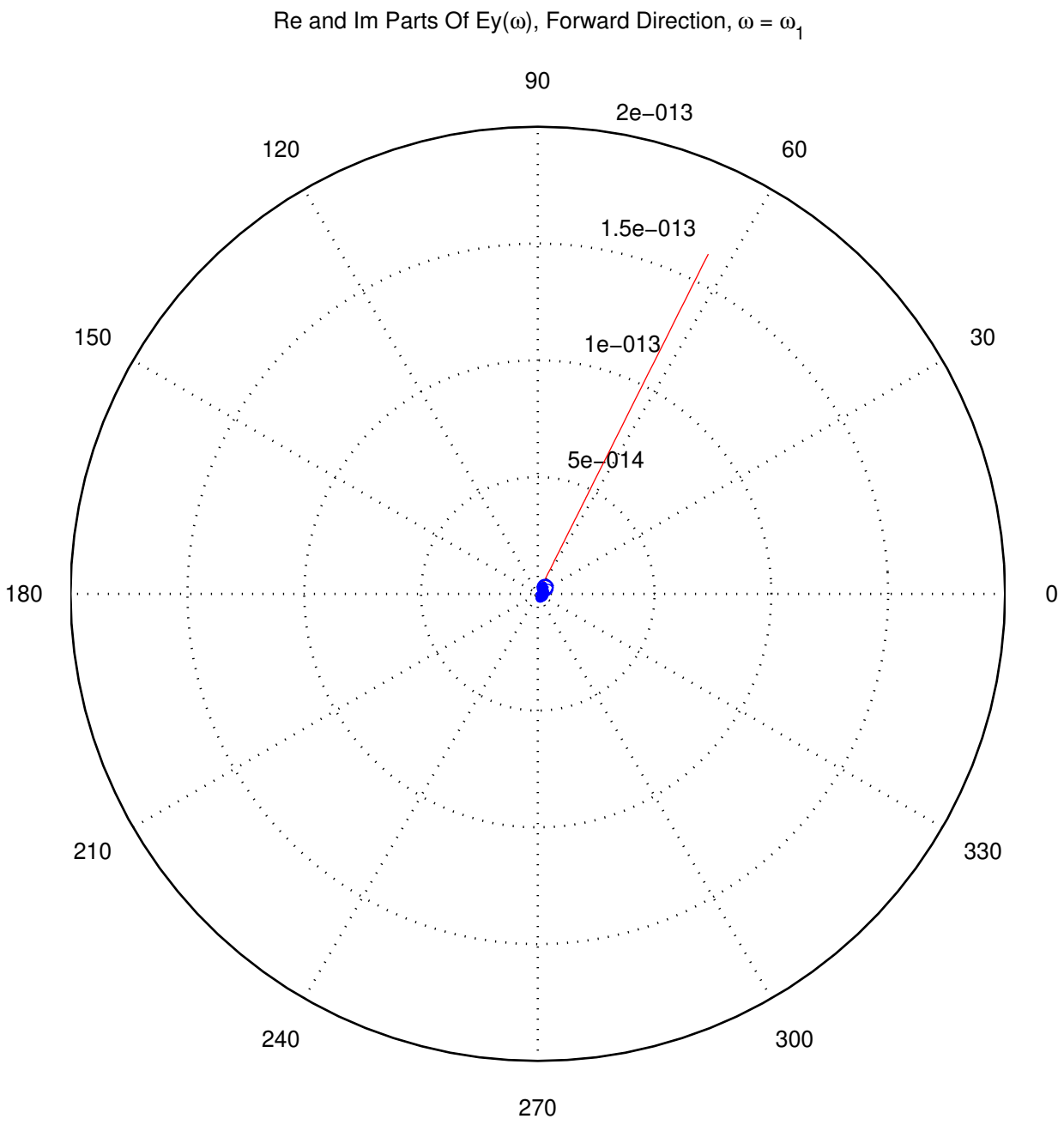

XY Trajectory Projection
x 10^-6
2
1.5
1
0.5
0
−0.5
−1
−1.5
−2
Y Trajectory (m)
−1.5
−1
−0.5
0
0.5
1
1.5
2
2.5
3
X Trajectory (m)
x 10^-6

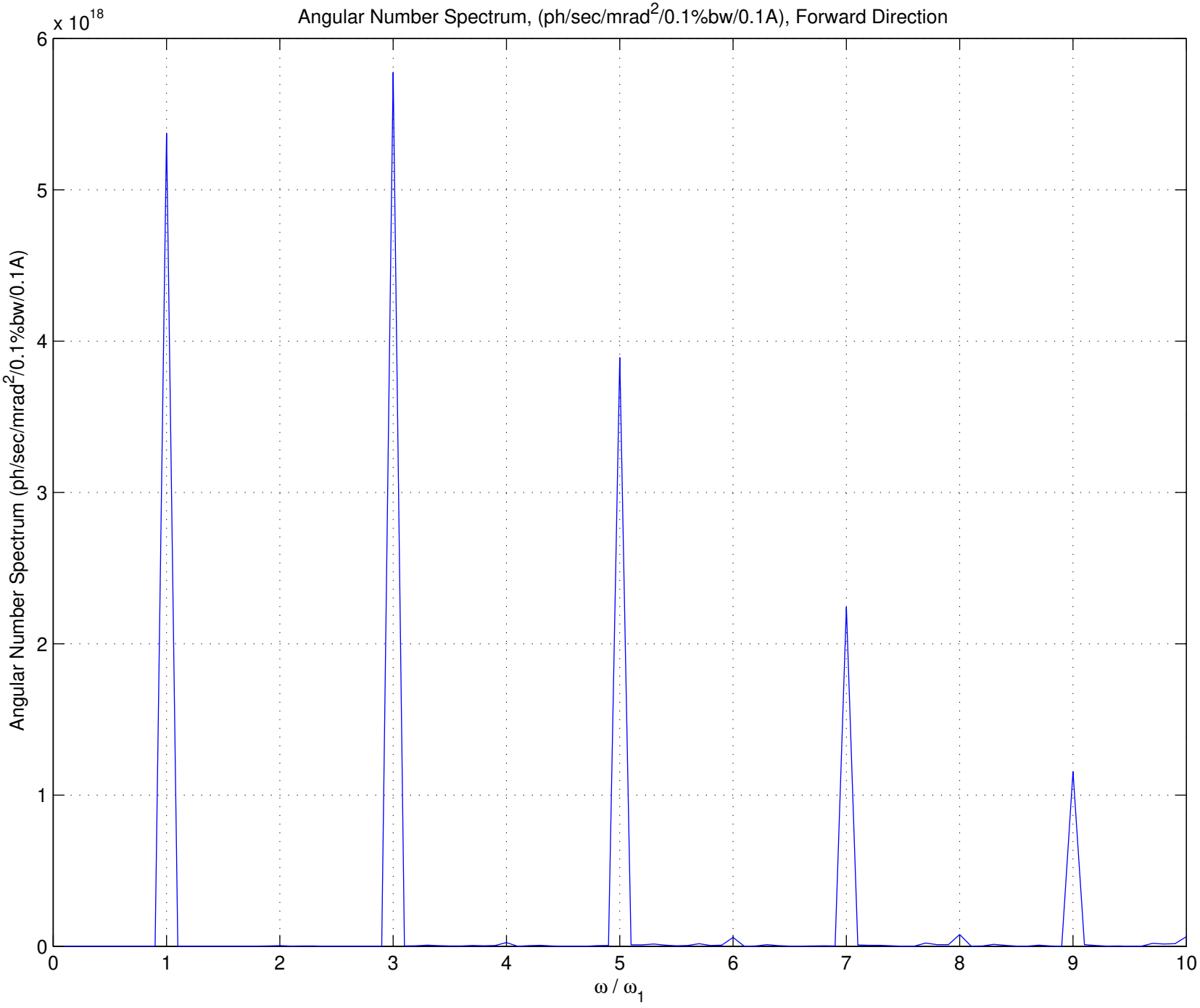

Phase Relative To Cell Entrance
600
500
400
300
200
100
0
−100
Phase (rad)
−2.5
−2
−1.5
−1
−0.5
0
0.5
1
1.5
2
Z (m)

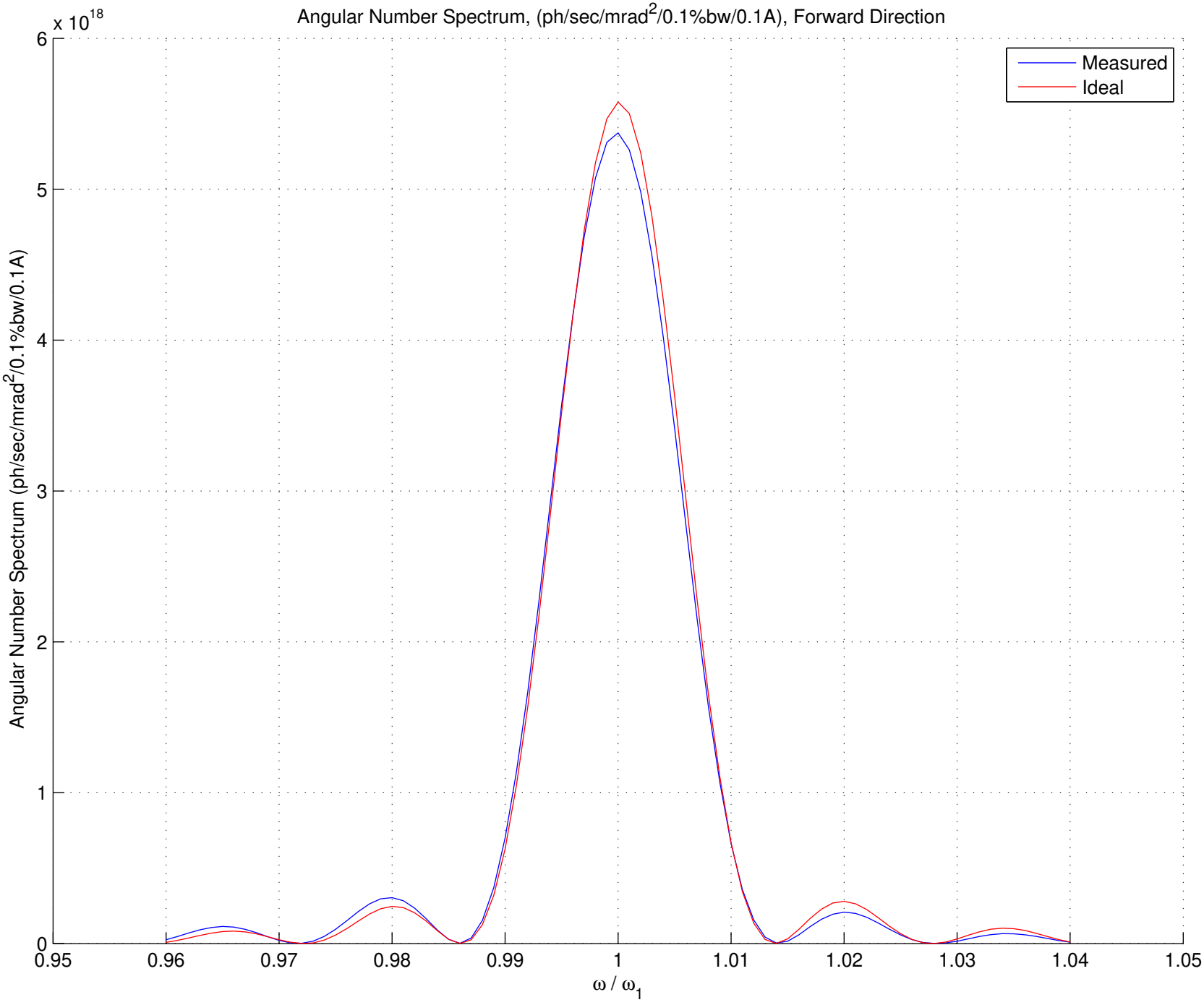

Phase Error At Field Peaks, No Ends
12
42
73
103
133
Pole
10
5
0
−5
−10
−15
−1.5
−1
−0.5
0
0.5
1
1.5
Phase Error (deg)
Z (m)
Phase Error: Ave = −0.000000 deg, RMS = 4.740790 deg

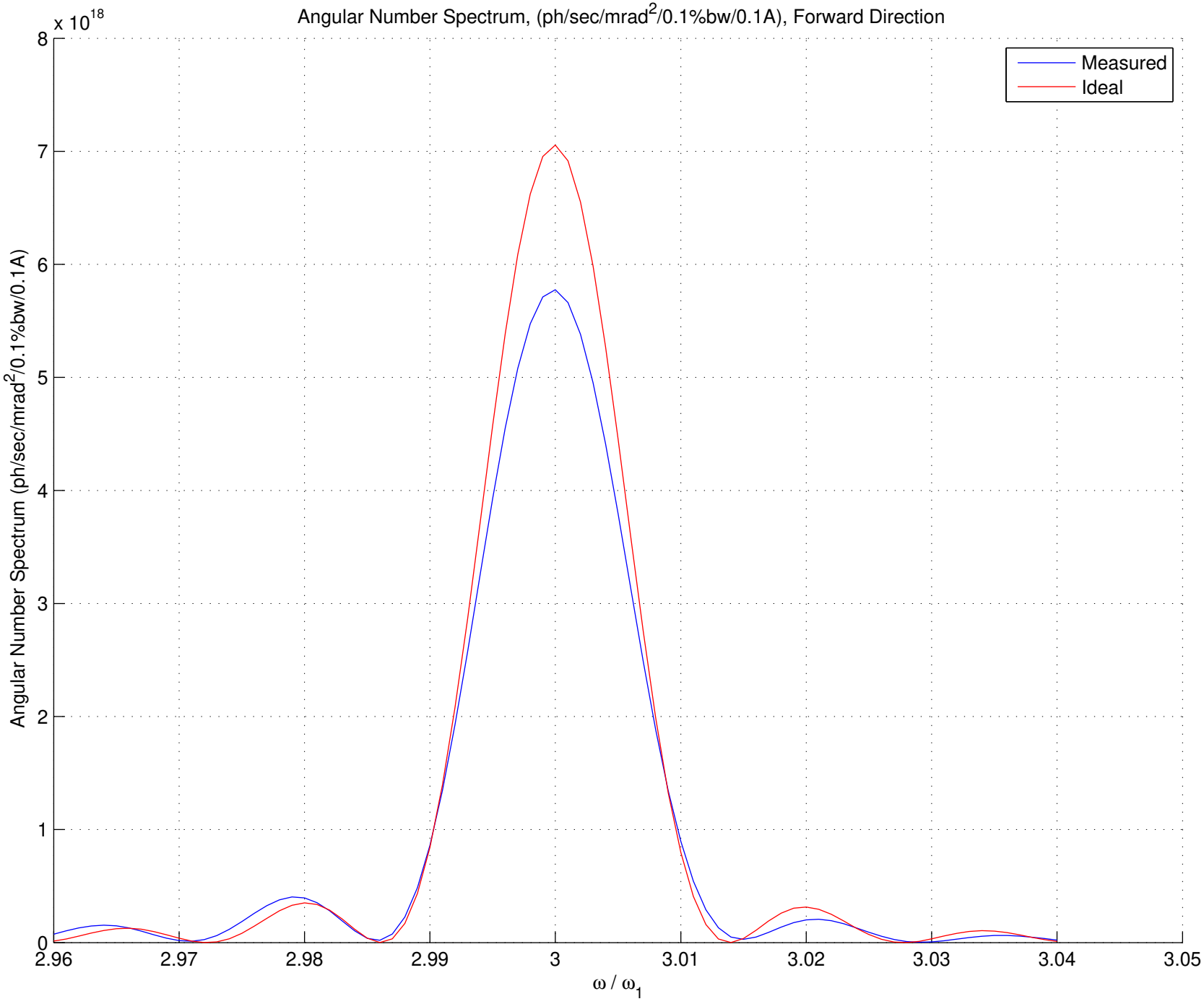

Phase Error Relative To Nominal Radiation Wave At Field Peaks, No Ends
12
42
73
103
133
Pole
885
880
875
870
865
860
Phase Error (deg)
−1.5
−1
−0.5
0
0.5
1
1.5
Z (m)

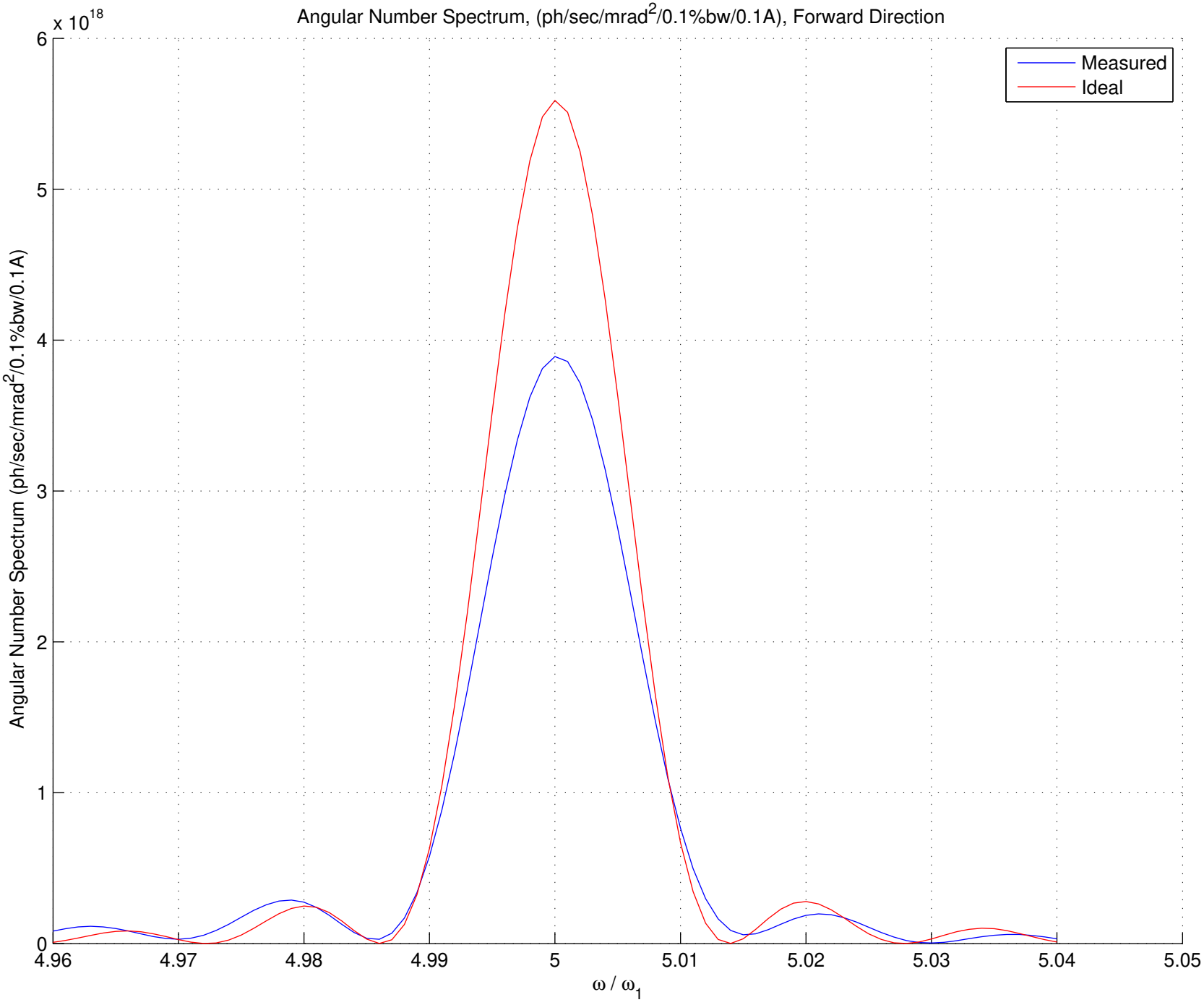

Re and Im Parts Of Ex(ω), Forward Direction, ω = ω1
90
1.5e−011
120
60
1e−011
150
30
5e−012
180
0
210
330
240
300
270


Re and Im Parts Of Ey(ω), Forward Direction, ω = ω1
90
2e−013
120
60
1.5e−013
150
1e−013
30
5e−014
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
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/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
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
ω / $ω_1$


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
1
2
3
4
5
6
4.96
4.97
4.98
4.99
5
5.01
5.02
5.03
5.04
5.05
ω / $ω_1$