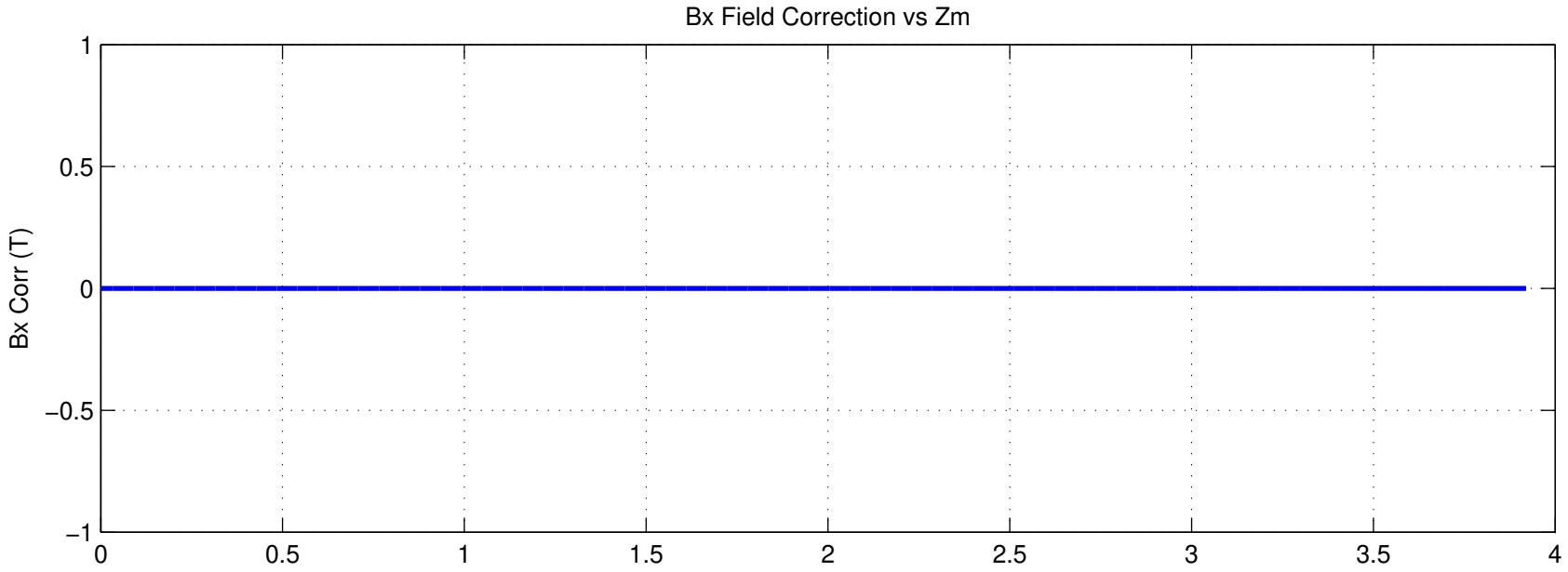
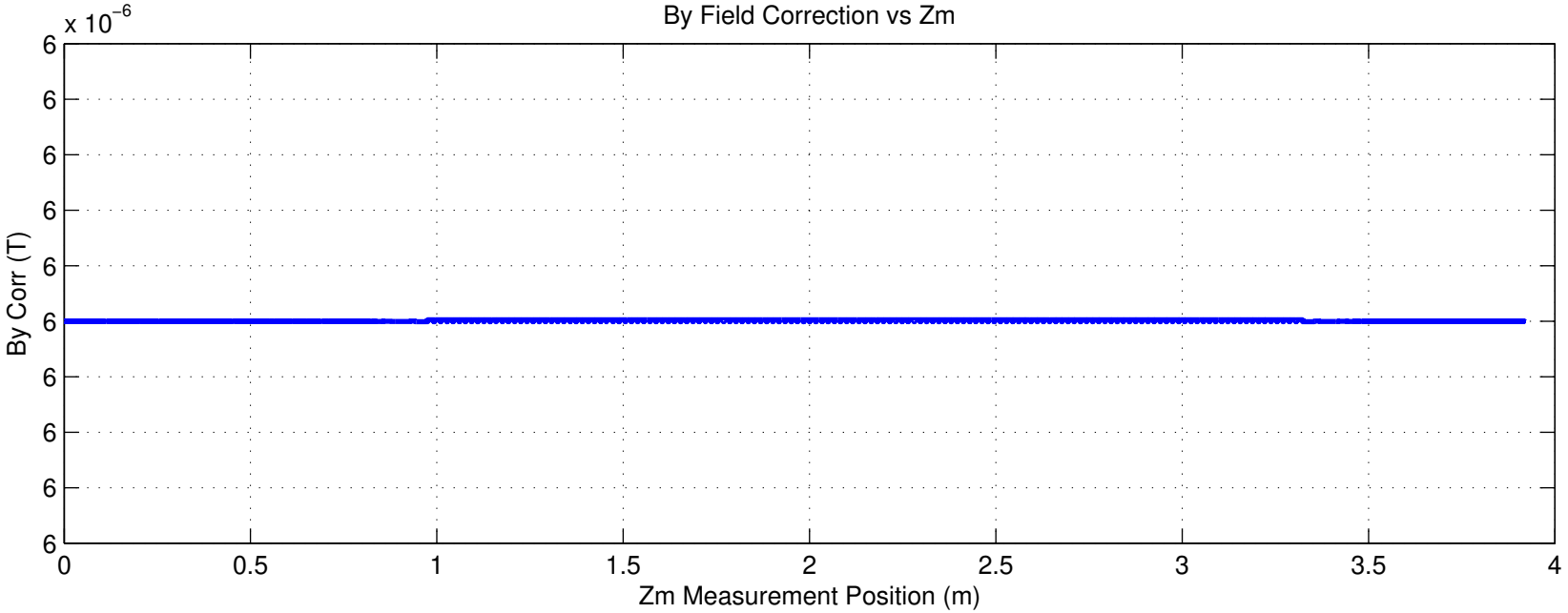
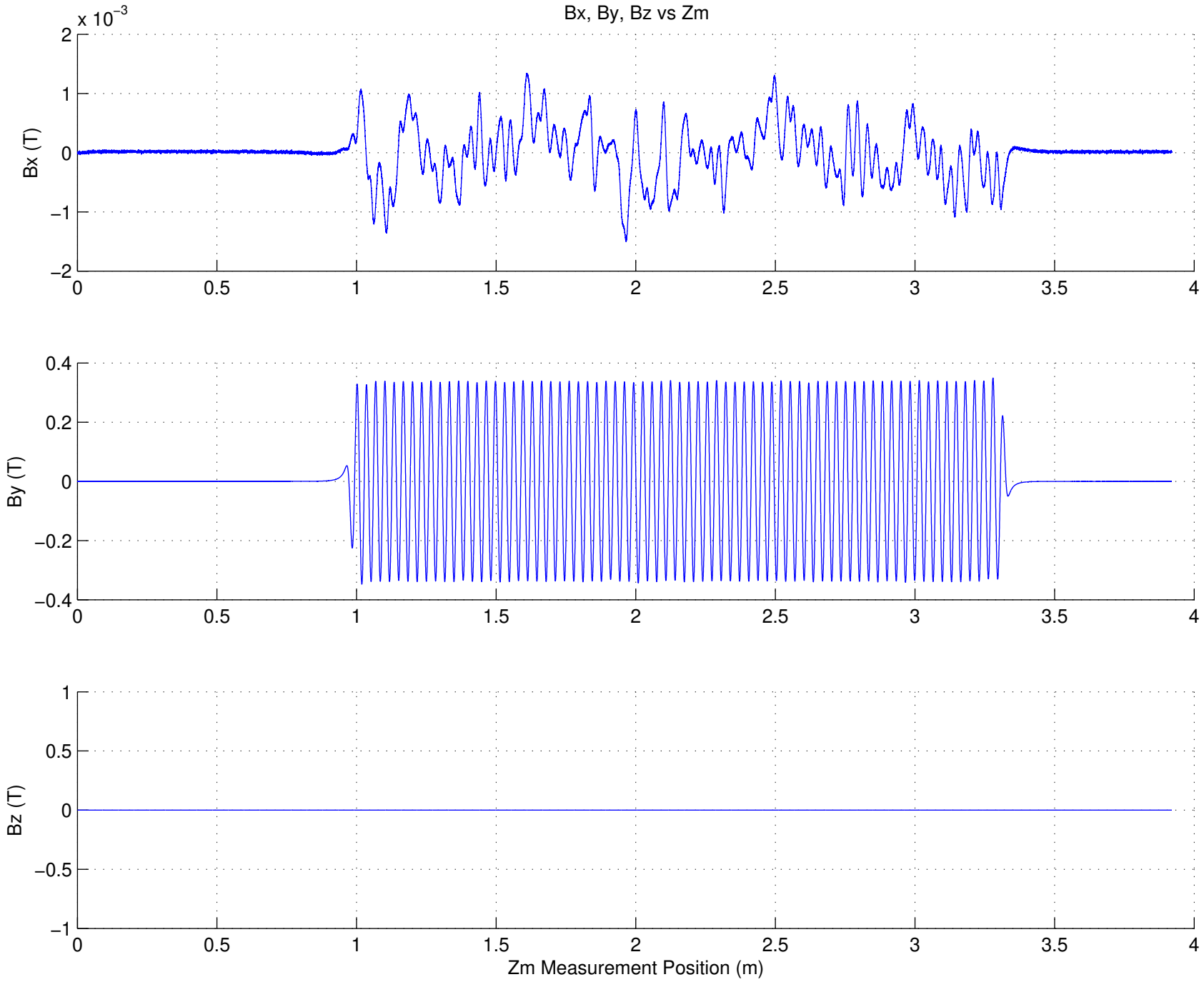
SLAC Magnetic Measurements

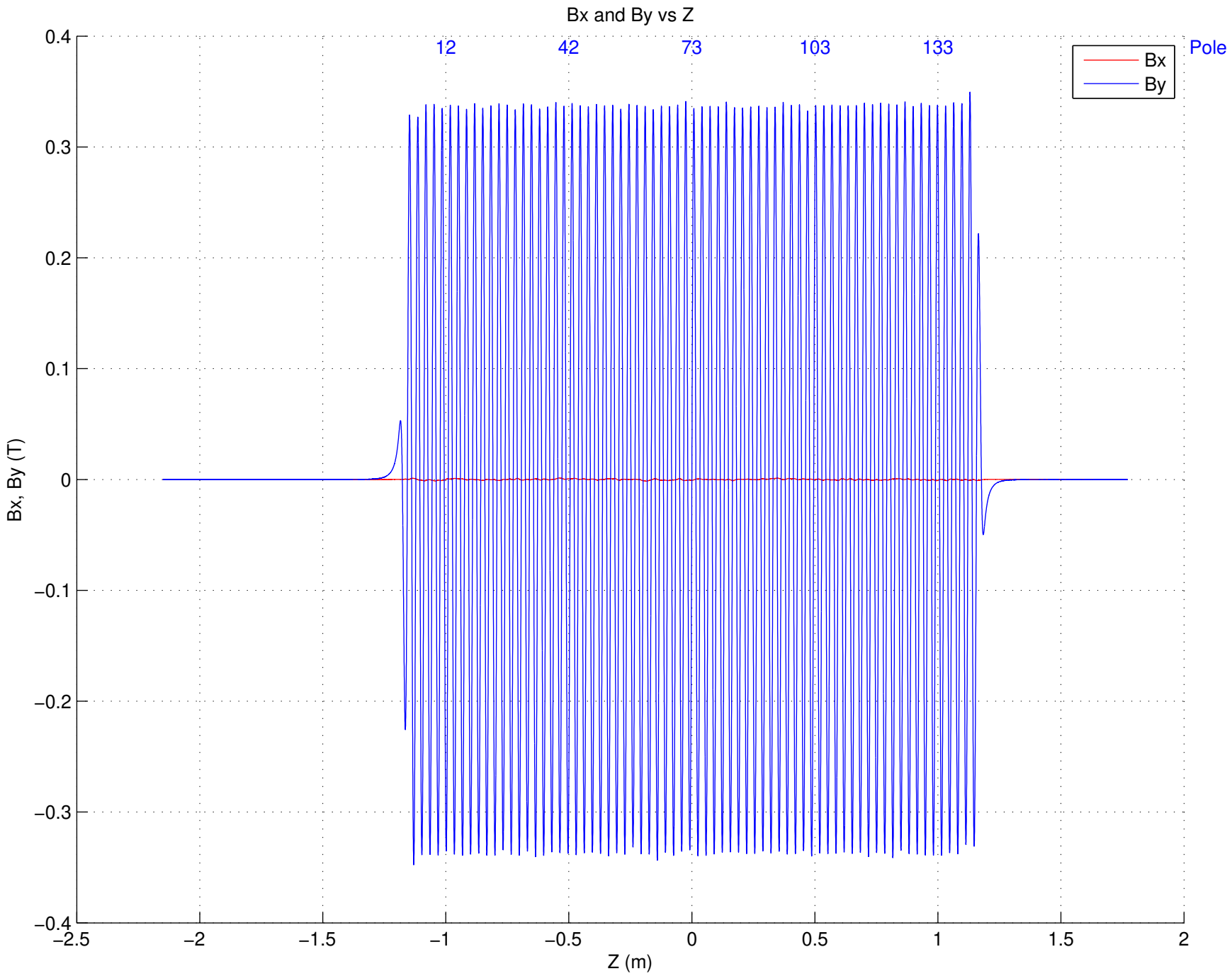
EPU Analysis
−−−−−−−−−−−

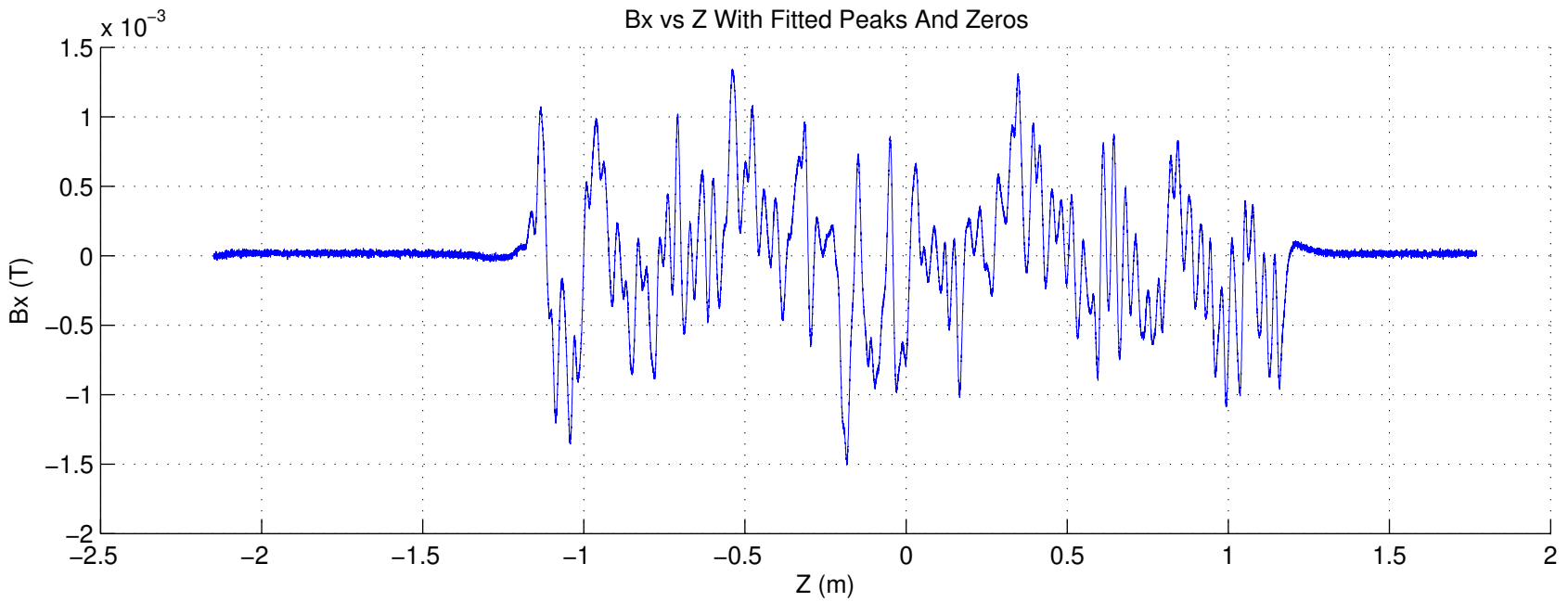
Parameters:
INPUT−FILE−DIR =V:\MET\MagServe\MagData\LCLS\Undulator\A1−ANL\DATASET0002\Rough Tuning\Z Scans\Run 012\
INPUT−FILE−NAME =x+00000−y+000−bscanz.dat
INPUT−FILE−TYPE =ZVXYBXYH
CORR−REQUIRED =1
GAMMA =26627.1
NOM−LAMBDA−U =0
NOM−K−VALUE =0
NOM−LAMBDA−R =0
NUM−POLES =144
NUM−END−POLES =4
CELL−LENGTH =3.126

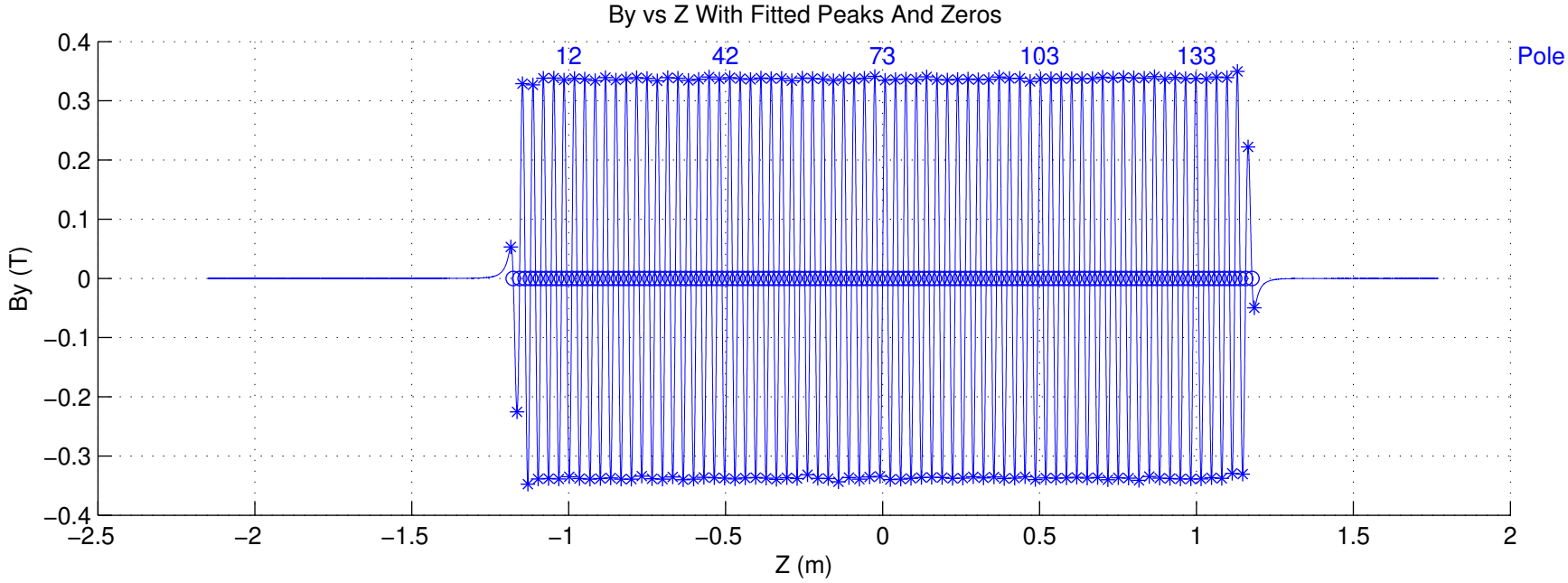

Bx Field Correction vs Zm
Bx Corr (T)
1
0.5
0
−0.5
−1
0
0.5
1
1.5
2
2.5
3
3.5
4

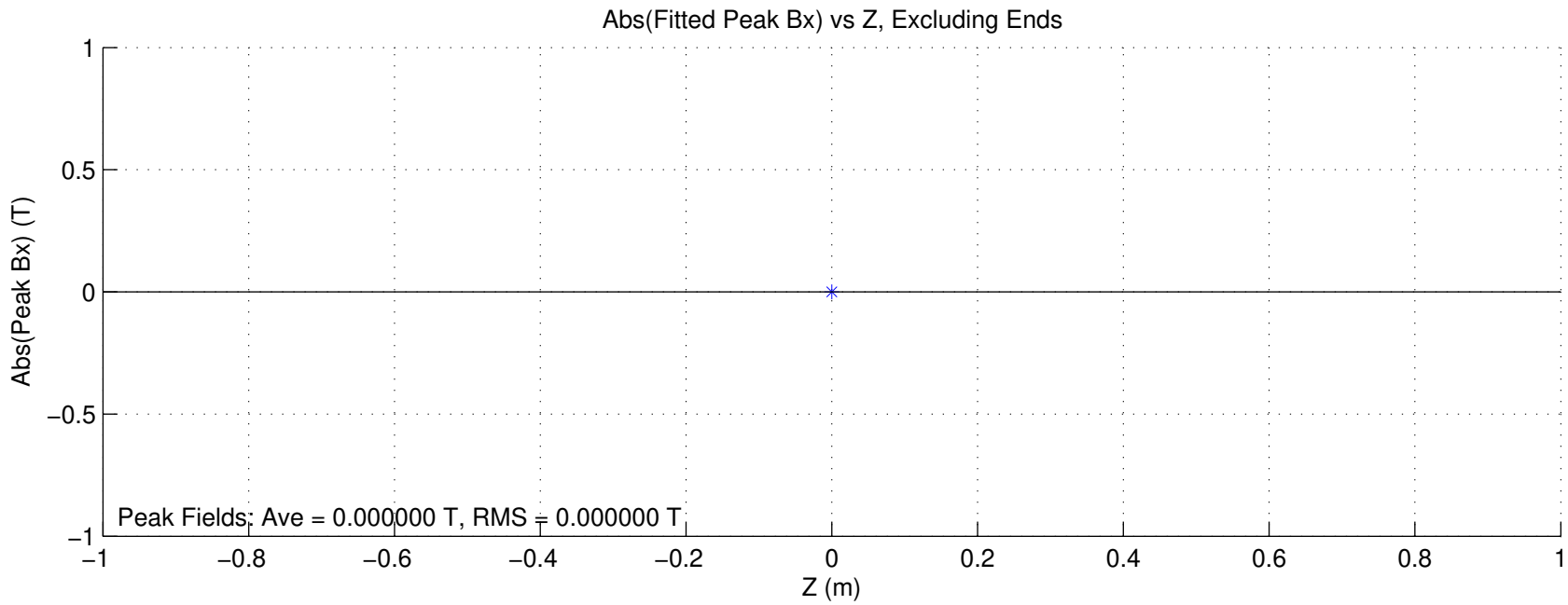

By Field Correction vs Zm
x 10^−6
By Corr (T)
6
6
6
6
6
6
6
6
0
0.5
1
1.5
2
2.5
3
3.5
4
Zm Measurement Position (m)

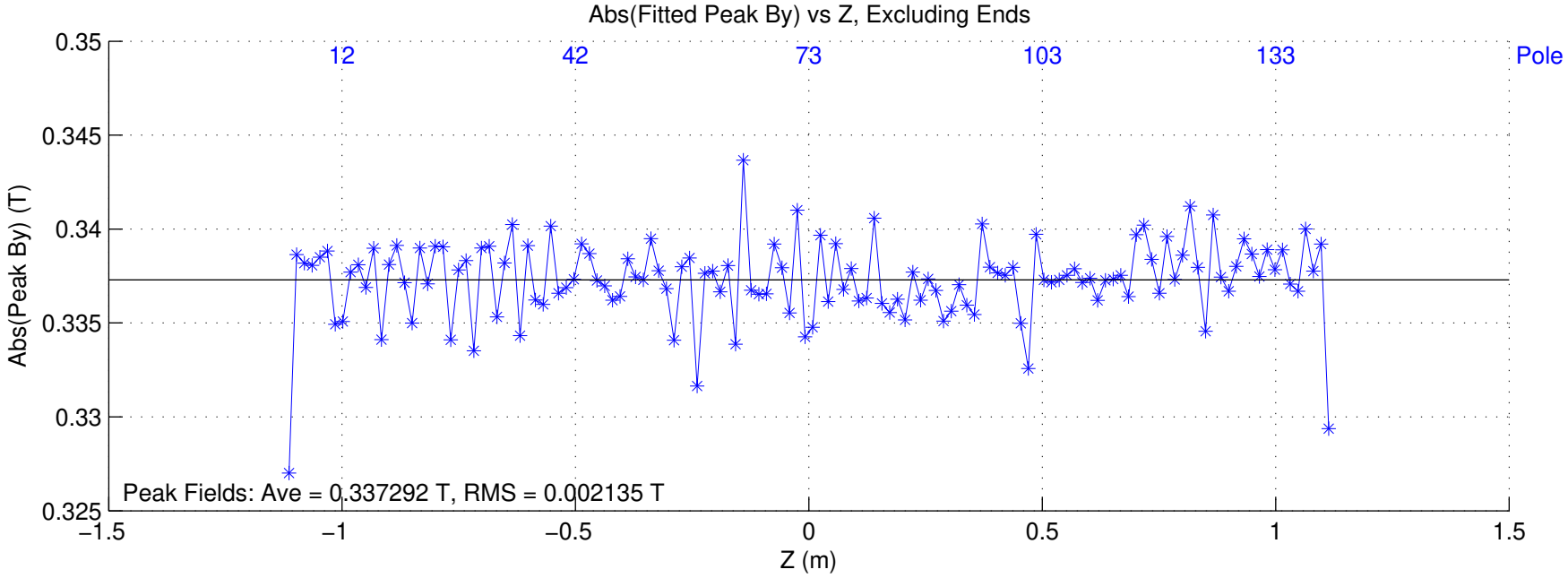

Bx, By, Bz vs Zm
x 10^-3
Bx (T)
By (T)
Bz (T)
Zm Measurement Position (m)

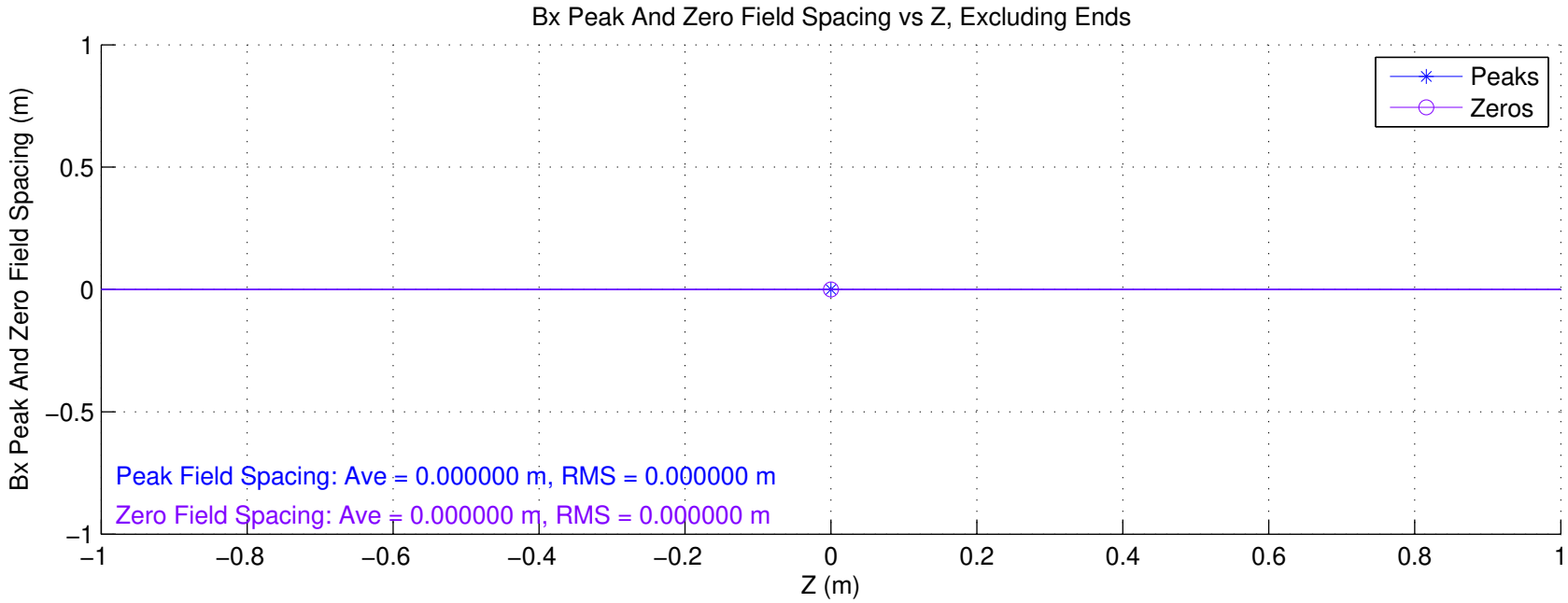

Bx and By vs Z
12
42
73
103
133
Pole
Bx
By
0.4
0.3
0.2
0.1
0
−0.1
−0.2
−0.3
−0.4
Bx, By (T)
−2.5
−2
−1.5
−1
−0.5
0
0.5
1
1.5
2
Z (m)

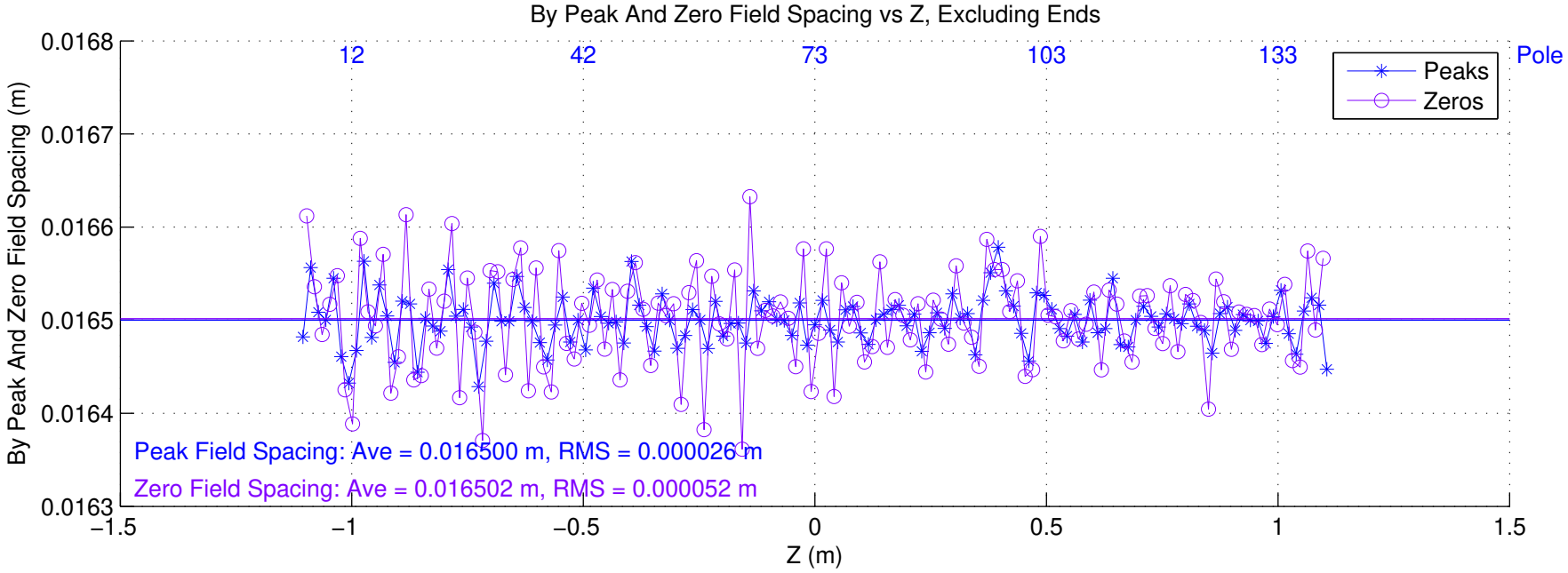

Bx vs Z With Fitted Peaks And Zeros
x 10^-3
Bx (T)
Z (m)
1.5
1
0.5
0
−0.5
−1
−1.5
−2
−2.5
−2
−1.5
−1
−0.5
0
0.5
1
1.5
2

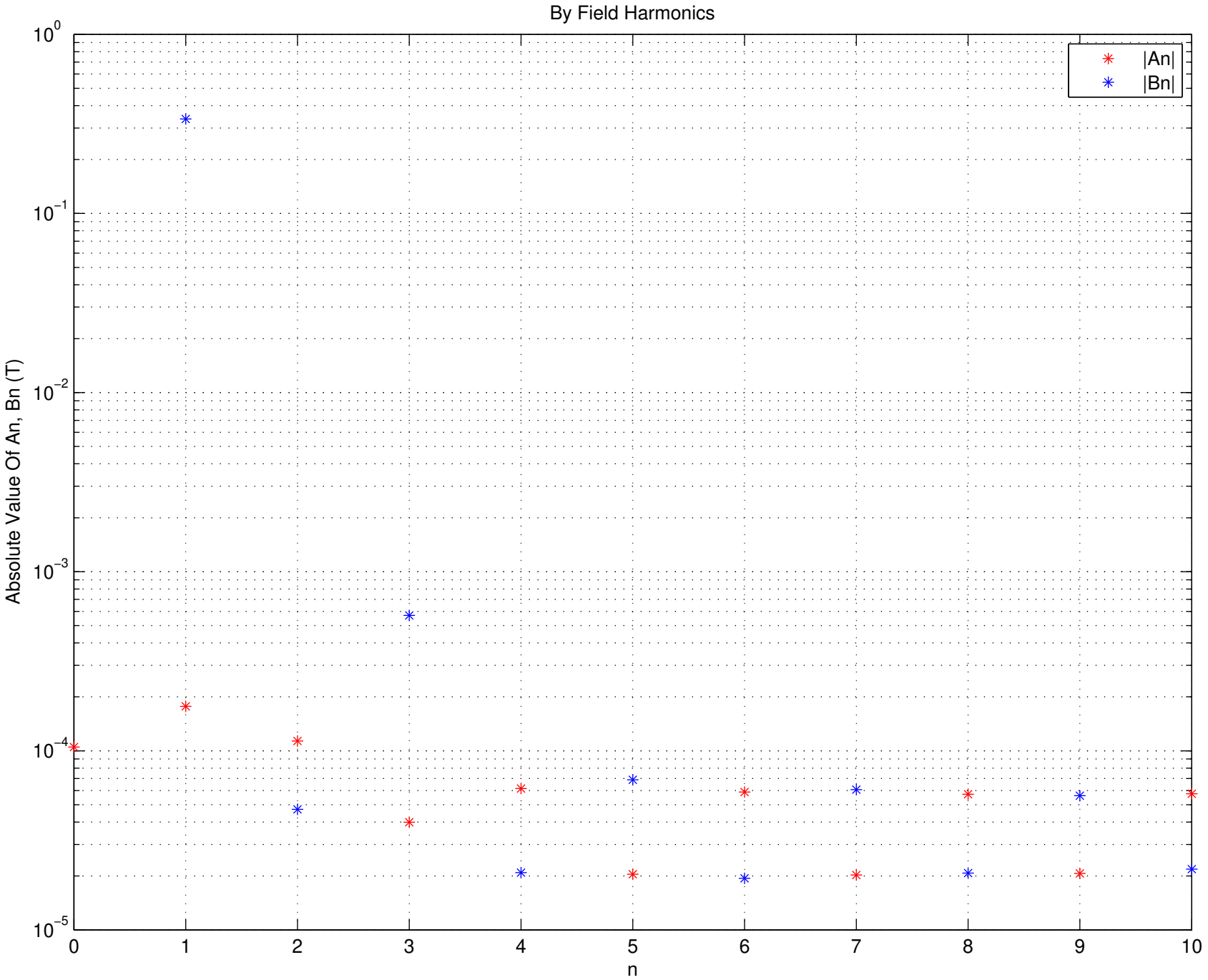

By vs Z With Fitted Peaks And Zeros
By (T)
Z (m)
12
42
73
103
133
Pole
0.4
0.3
0.2
0.1
0
−0.1
−0.2
−0.3
−0.4
−2.5
−2
−1.5
−1
−0.5
0
0.5
1
1.5
2

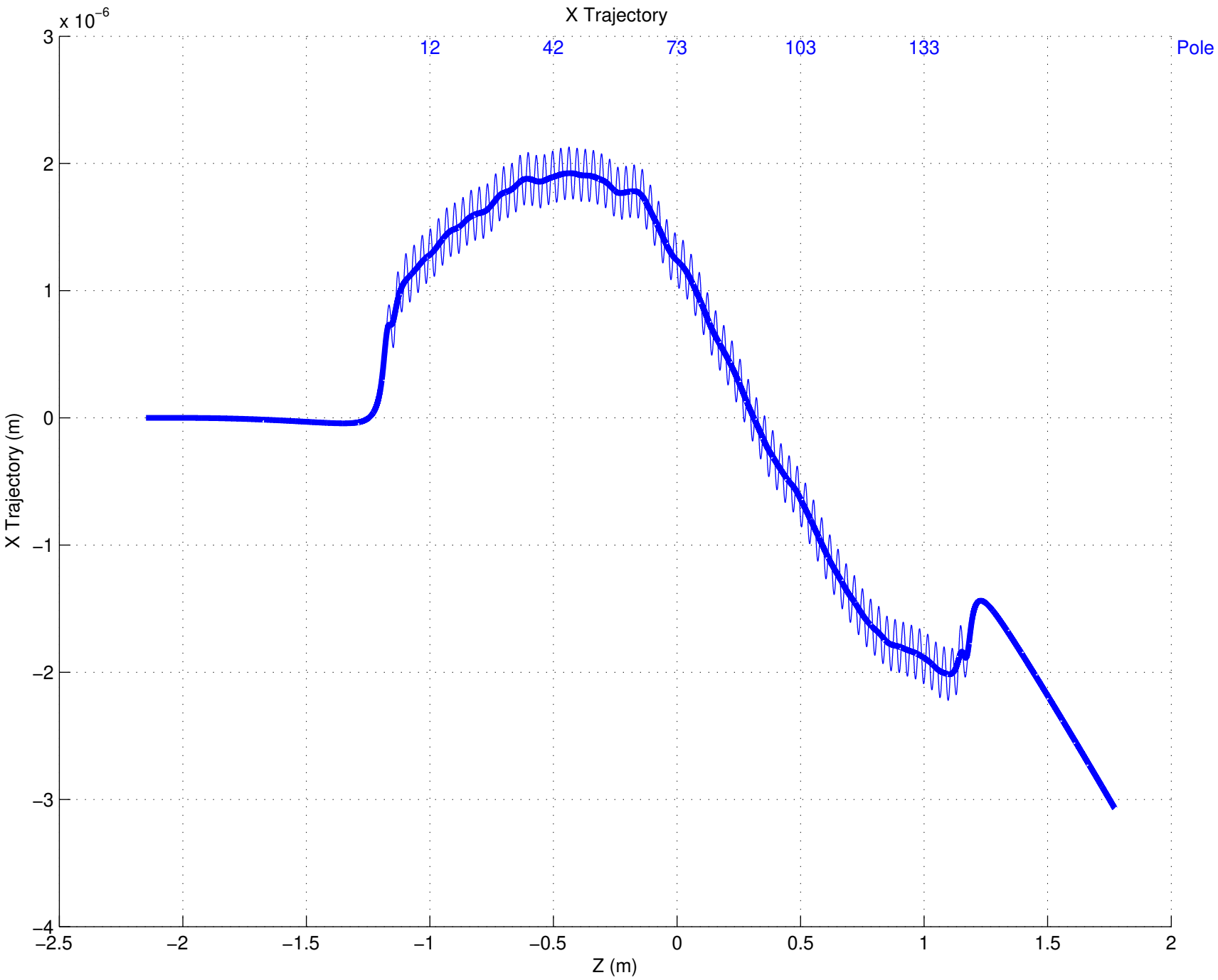

Abs(Fitted Peak Bx) vs Z, Excluding Ends
Abs(Peak Bx) (T)
Z (m)
Peak Fields: Ave = 0.000000 T, RMS = 0.000000 T
1
0.5
0
−0.5
−1
−1
−0.8
−0.6
−0.4
−0.2
0
0.2
0.4
0.6
0.8
1

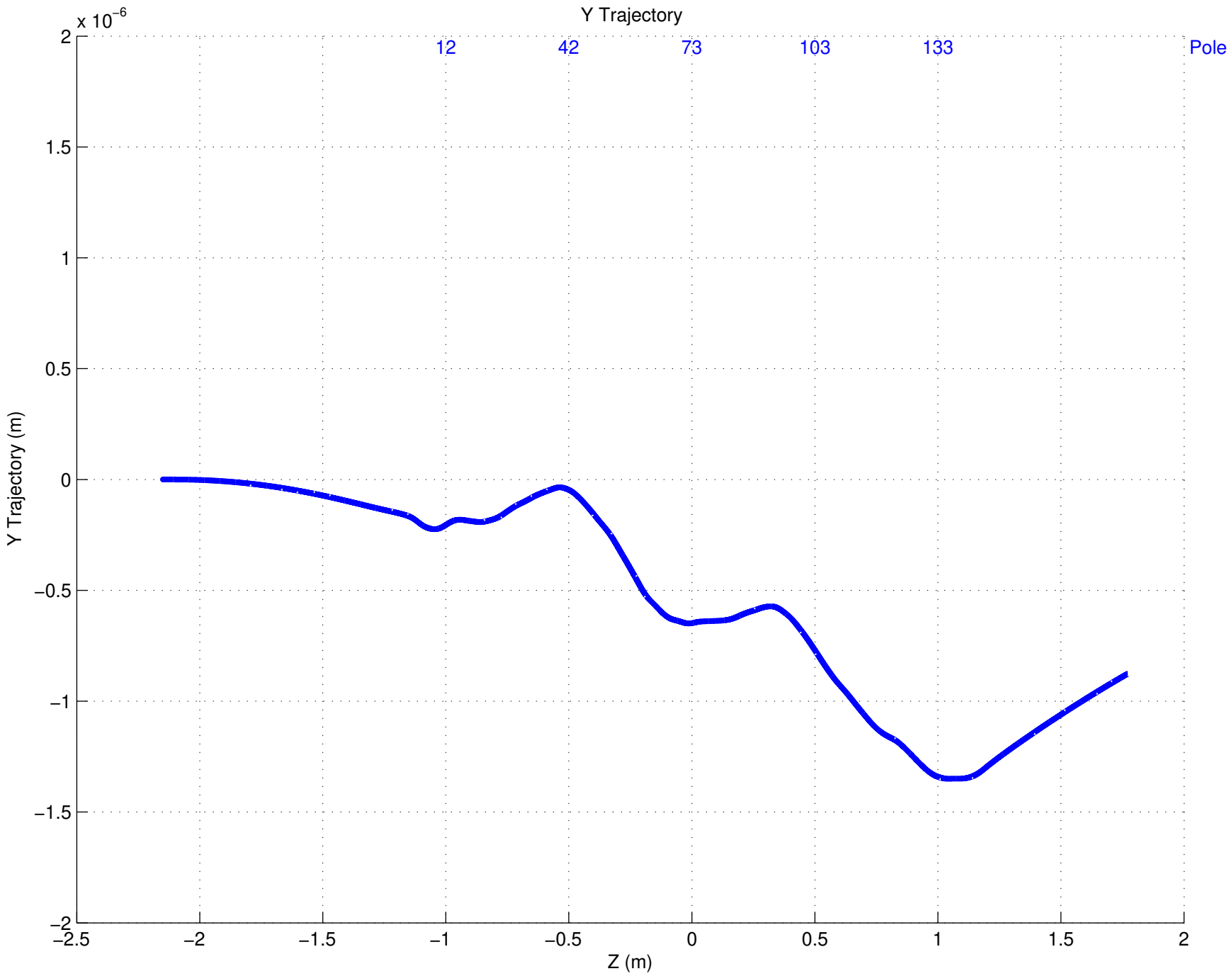

Abs(Fitted Peak By) vs Z, Excluding Ends
Abs(Peak By) (T)
Z (m)
Peak Fields: Ave = 0.337292 T, RMS = 0.002135 T
12
42
73
103
133
Pole
0.35
0.345
0.34
0.335
0.33
0.325
−1.5
−1
−0.5
0
0.5
1
1.5

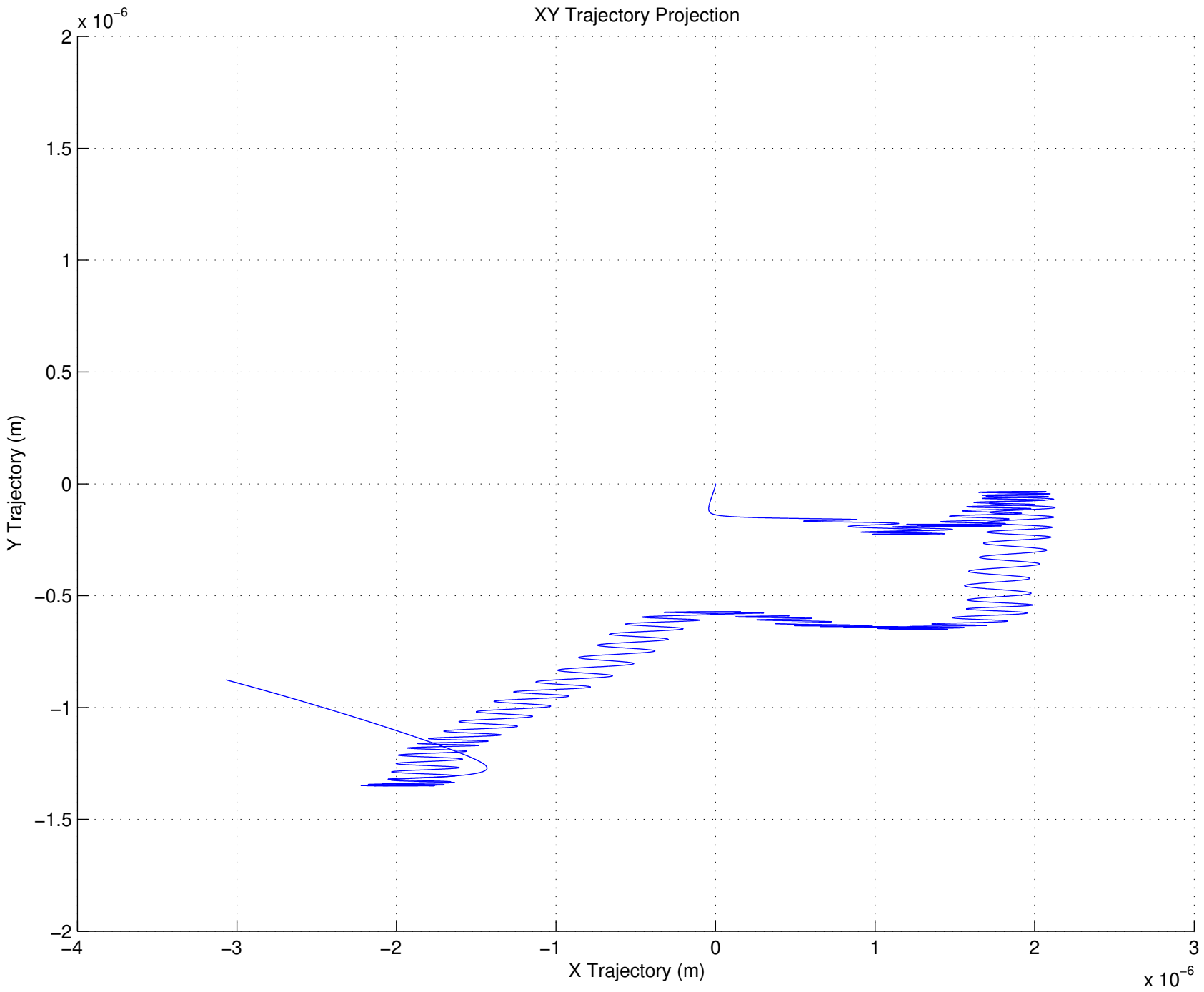

Bx Peak And Zero Field Spacing vs Z, Excluding Ends
Bx Peak And Zero Field Spacing (m)
Z (m)
Peaks
Zeros
Peak Field Spacing: Ave = 0.000000 m, RMS = 0.000000 m
Zero Field Spacing: Ave = 0.000000 m, RMS = 0.000000 m
1
0.5
0
−0.5
−1
−1
−0.8
−0.6
−0.4
−0.2
0
0.2
0.4
0.6
0.8
1

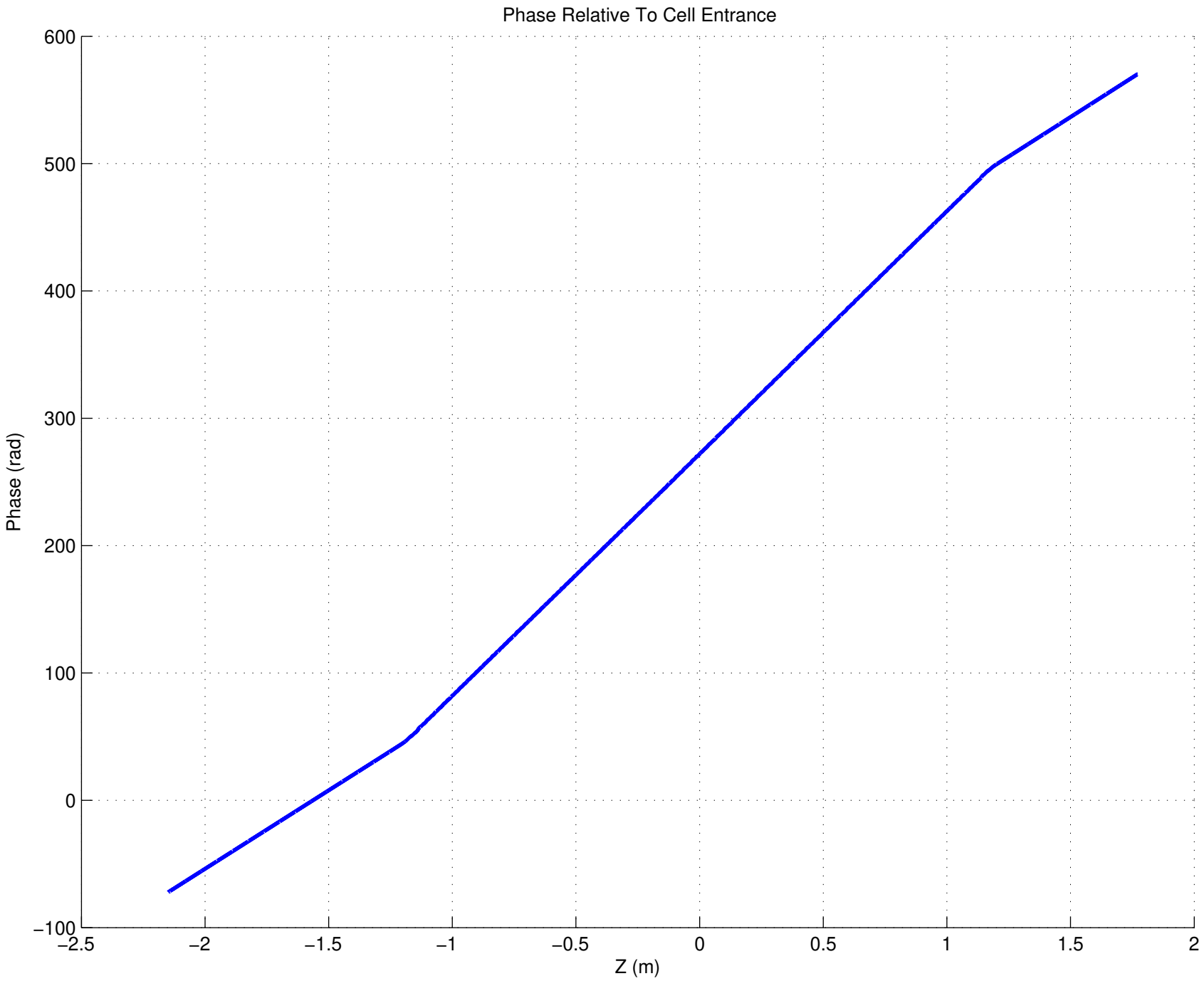

By Peak And Zero Field Spacing vs Z, Excluding Ends
By Peak And Zero Field Spacing (m)
Z (m)
12
42
73
103
133
Pole
Peaks
Zeros
Peak Field Spacing: Ave = 0.016500 m, RMS = 0.000026 m
Zero Field Spacing: Ave = 0.016502 m, RMS = 0.000052 m
0.0168
0.0167
0.0166
0.0165
0.0164
0.0163
−1.5
−1
−0.5
0
0.5
1
1.5

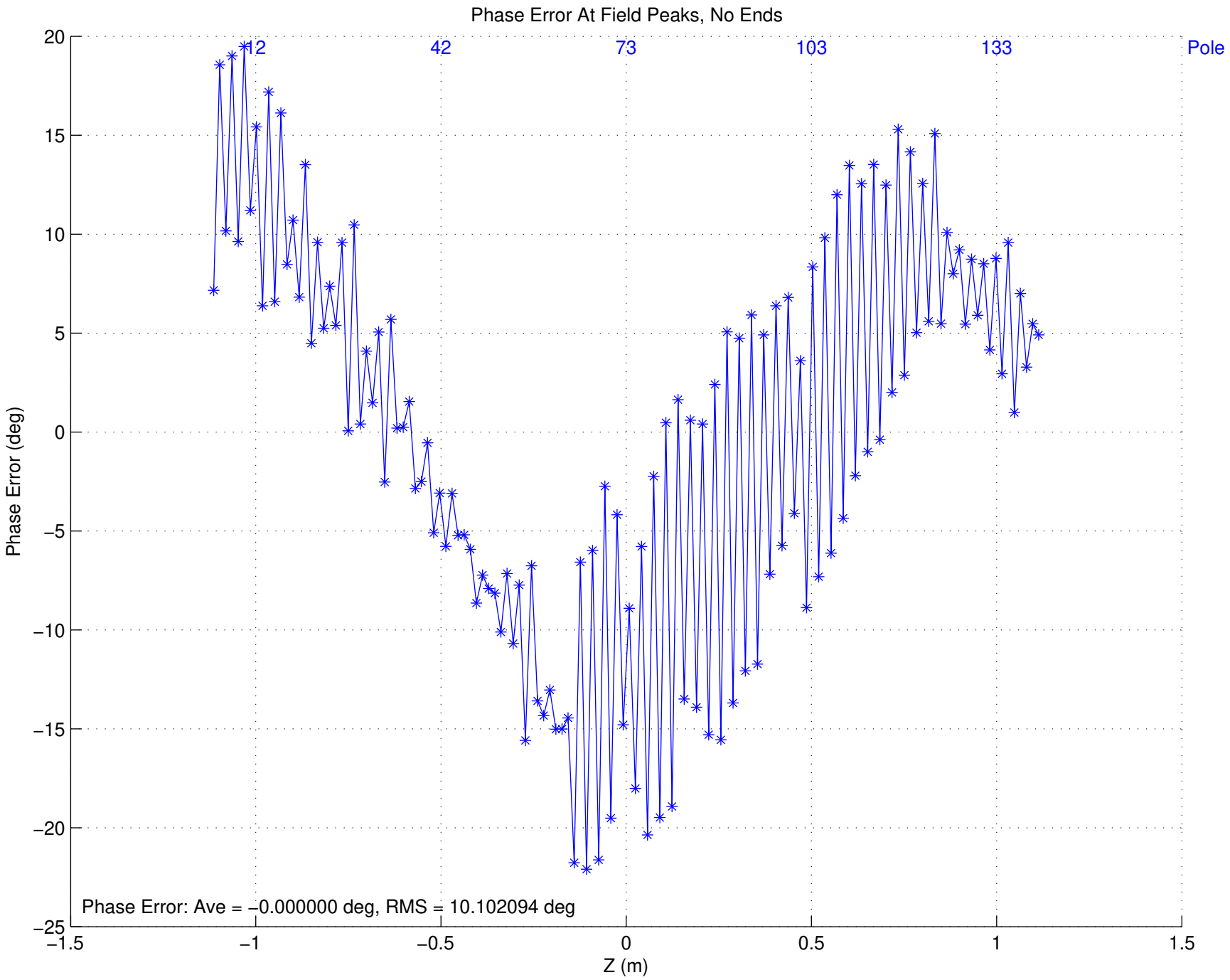

By Field Harmonics
|An|
|Bn|
Absolute Value Of An, Bn (T)
n
10^{0}
10^{-1}
10^{-2}
10^{-3}
10^{-4}
10^{-5}
0
1
2
3
4
5
6
7
8
9
10

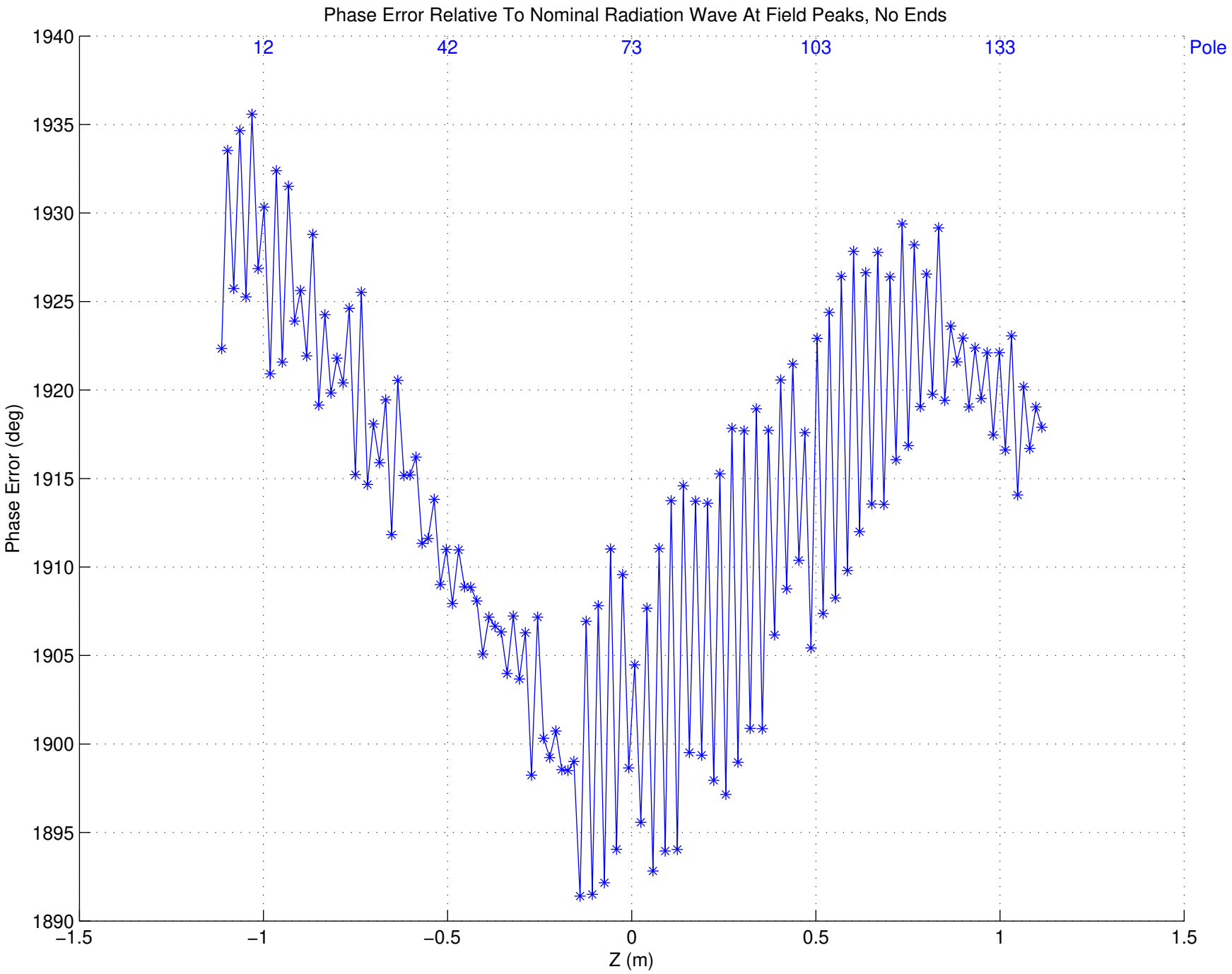

X Trajectory
x 10^-6
12
42
73
103
133
Pole
3
2
1
0
−1
−2
−3
−4
X Trajectory (m)
−2.5
−2
−1.5
−1
−0.5
0
0.5
1
1.5
2
Z (m)

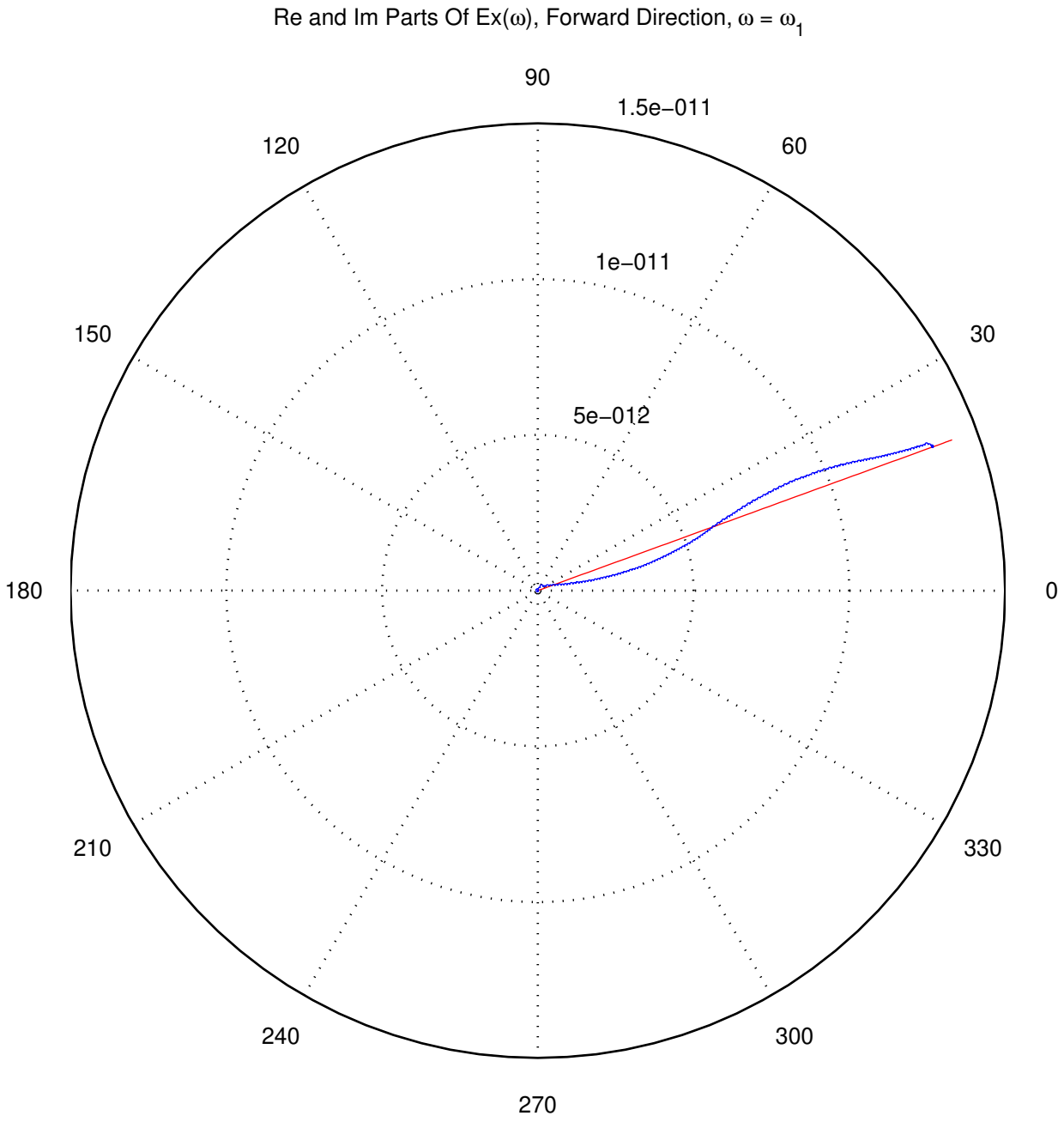

Y Trajectory
x 10^-6
12
42
73
103
133
Pole
2
1.5
1
0.5
0
−0.5
−1
−1.5
−2
Y Trajectory (m)
−2.5
−2
−1.5
−1
−0.5
0
0.5
1
1.5
2
Z (m)

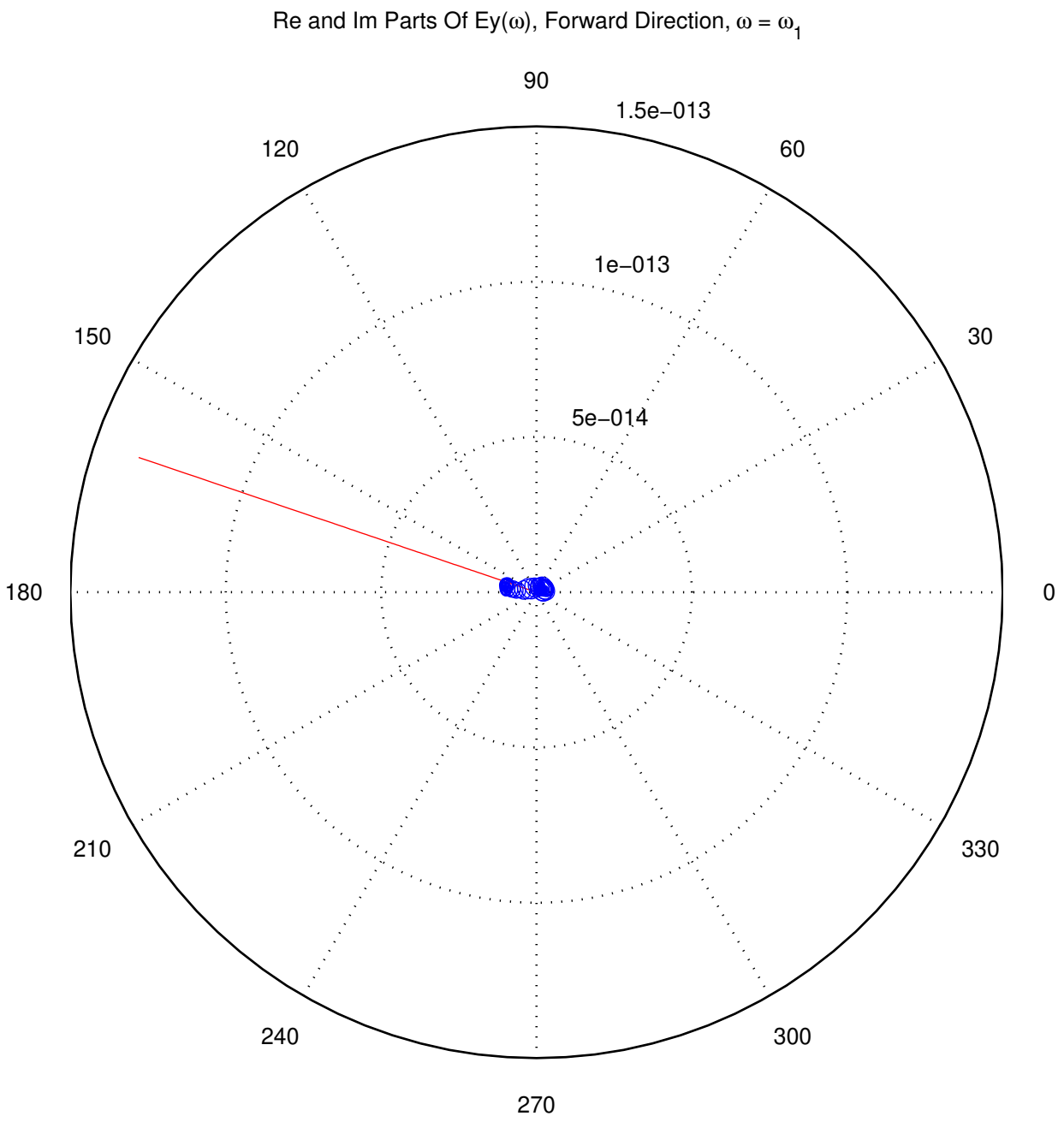

XY Trajectory Projection
x 10^-6
2
1.5
1
0.5
0
−0.5
−1
−1.5
−2
Y Trajectory (m)
−4
−3
−2
−1
0
1
2
3
X Trajectory (m)
x 10^-6

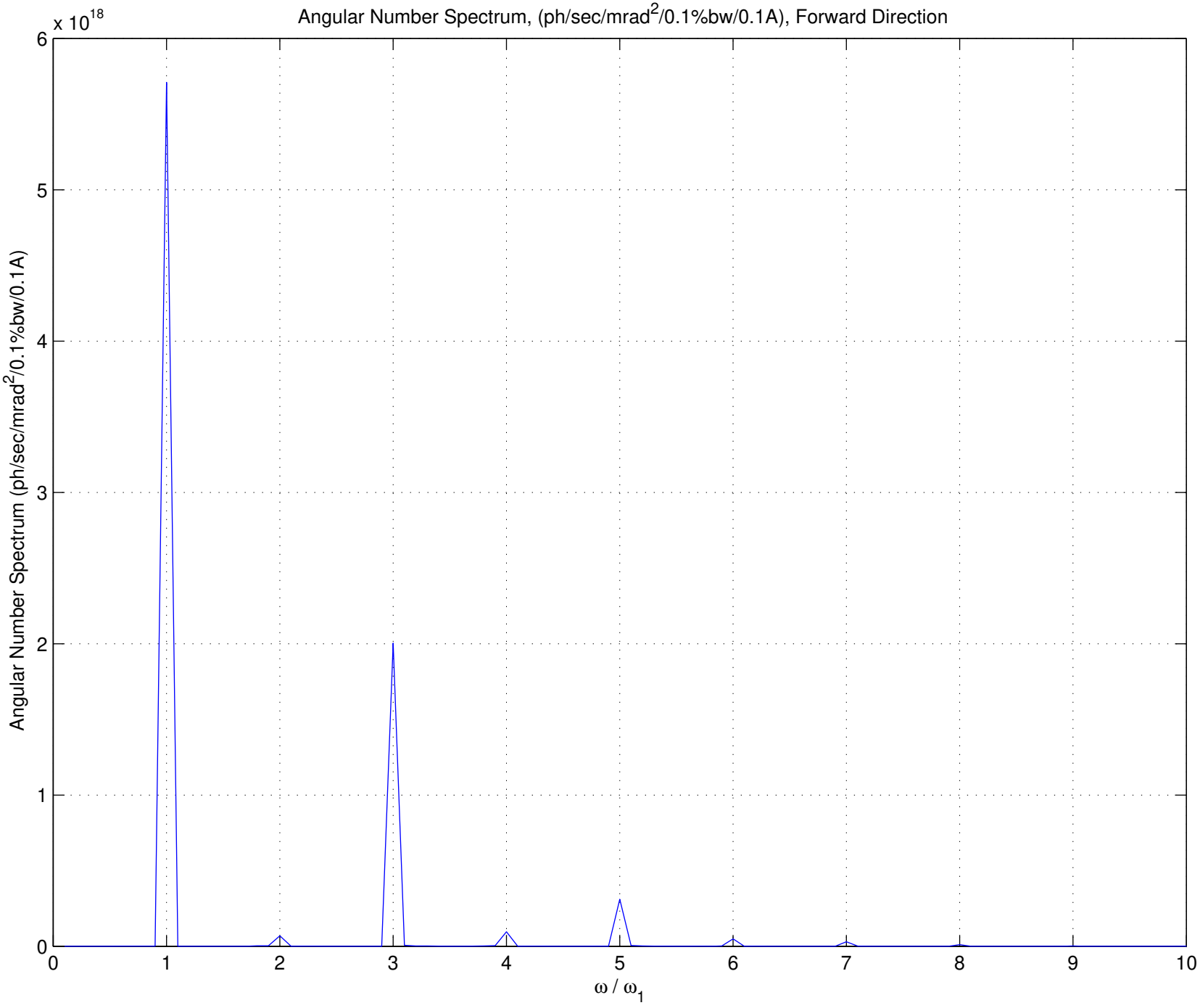

Phase Relative To Cell Entrance
600
500
400
300
200
100
0
−100
Phase (rad)
−2.5
−2
−1.5
−1
−0.5
0
0.5
1
1.5
2
Z (m)

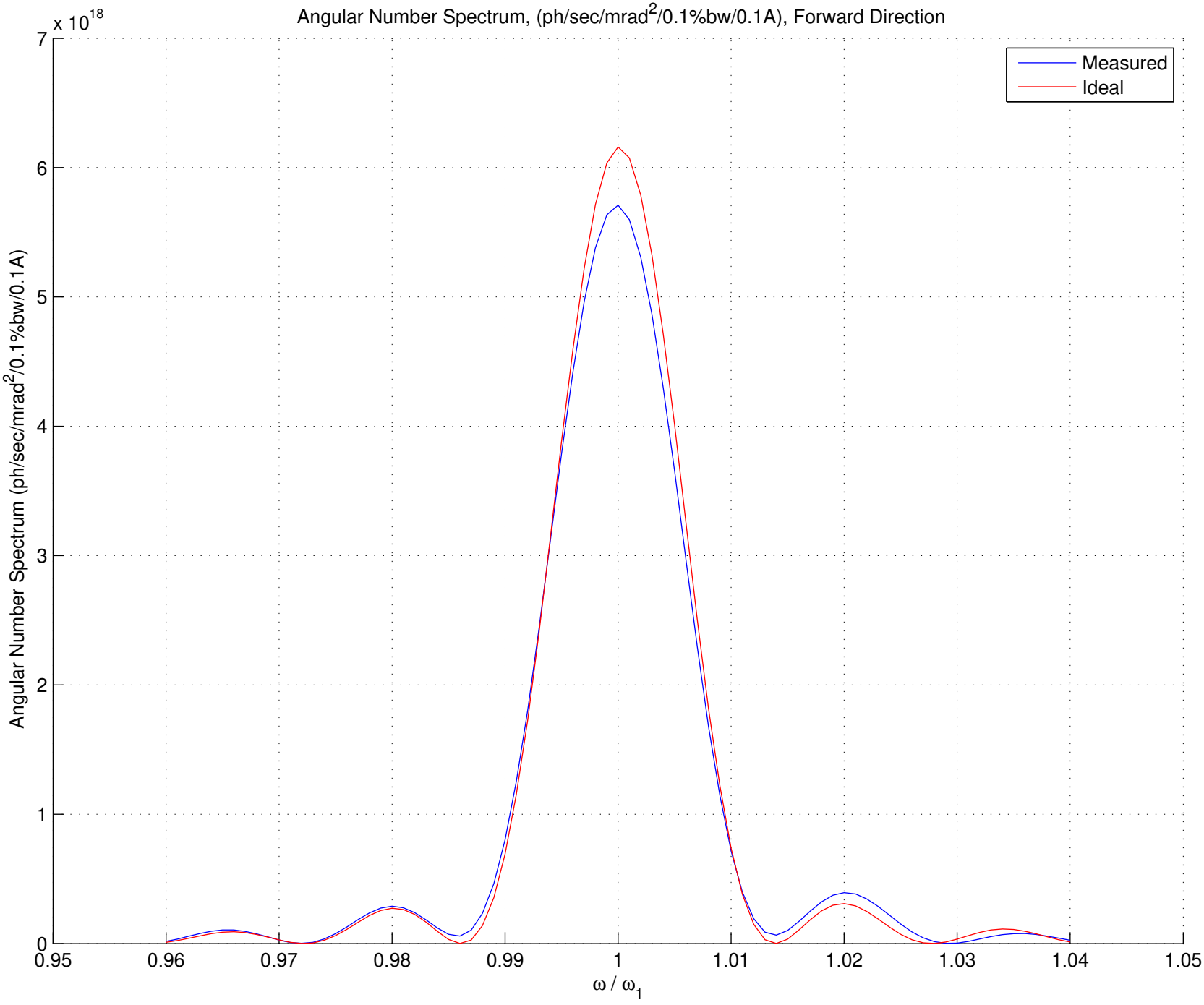

Phase Error At Field Peaks, No Ends
12
42
73
103
133
Pole
20
15
10
5
0
−5
−10
−15
−20
−25
Phase Error (deg)
−1.5
−1
−0.5
0
0.5
1
1.5
Z (m)
Phase Error: Ave = −0.000000 deg, RMS = 10.102094 deg

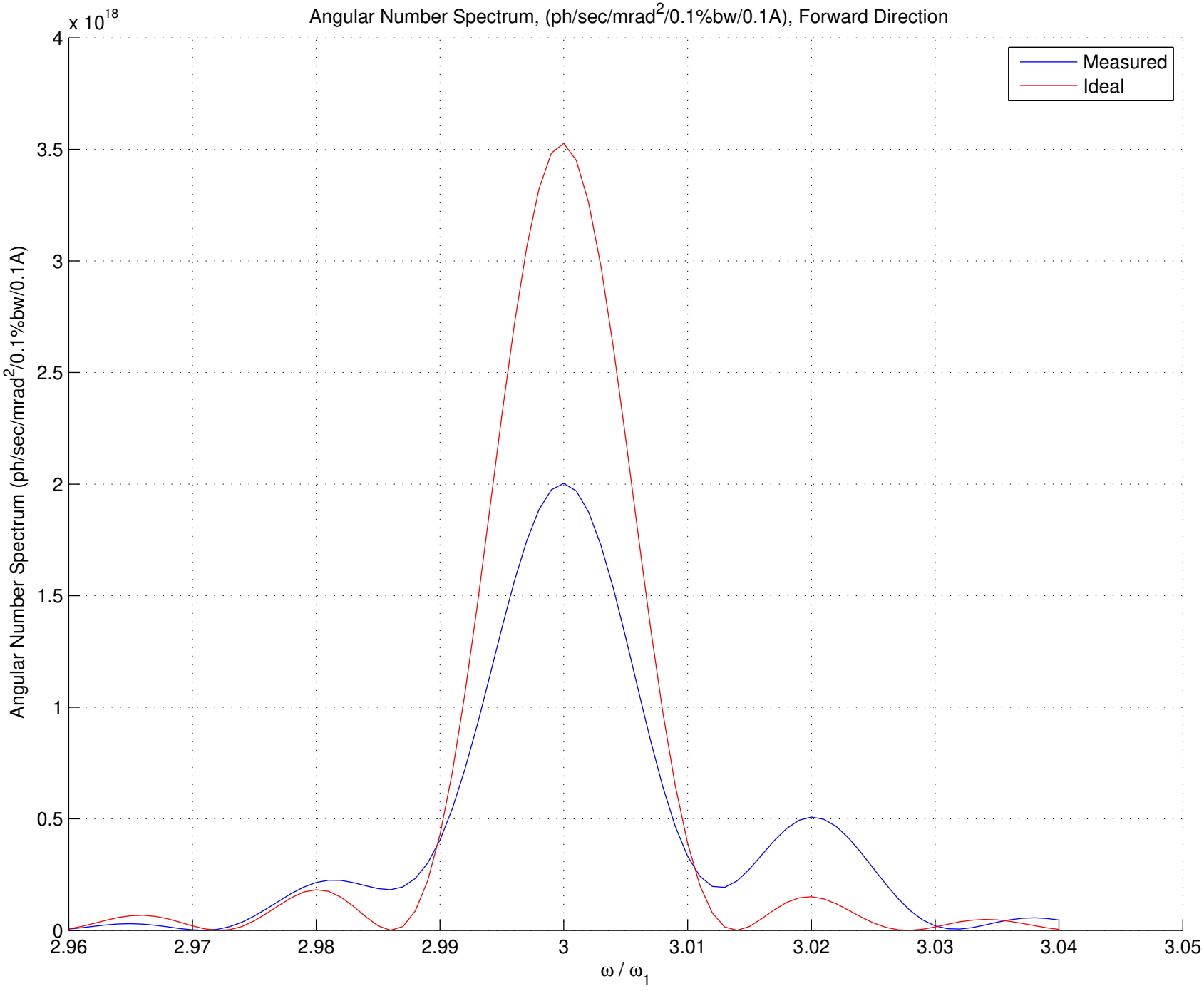

Phase Error Relative To Nominal Radiation Wave At Field Peaks, No Ends
12
42
73
103
133
Pole
1940
1935
1930
1925
1920
1915
1910
1905
1900
1895
1890
Phase Error (deg)
−1.5
−1
−0.5
0
0.5
1
1.5
Z (m)

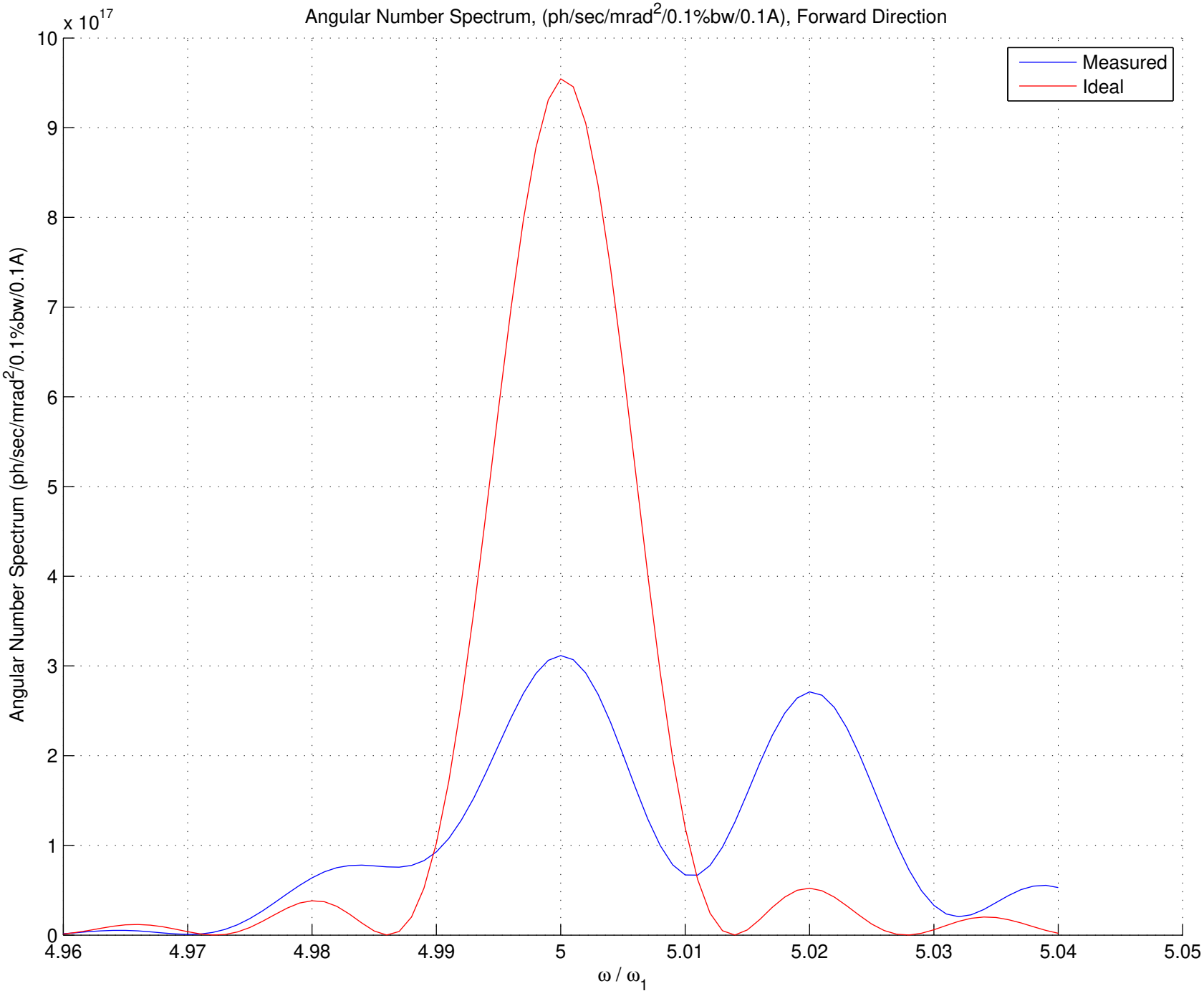

Re and Im Parts Of Ex(ω), Forward Direction, ω = ω1
90
1.5e−011
120
60
1e−011
150
30
5e−012
180
0
210
330
240
300
270


Re and Im Parts Of Ey(ω), Forward Direction, ω = ω1
90
1.5e−013
120
60
1e−013
150
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)
0
1
2
3
4
5
6
7
0.95
0.96
0.97
0.98
0.99
1
1.01
1.02
1.03
1.04
1.05
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
0.5
1
1.5
2
2.5
3
3.5
4
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/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
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