SLAC Magnetic Measurements

EPU Analysis
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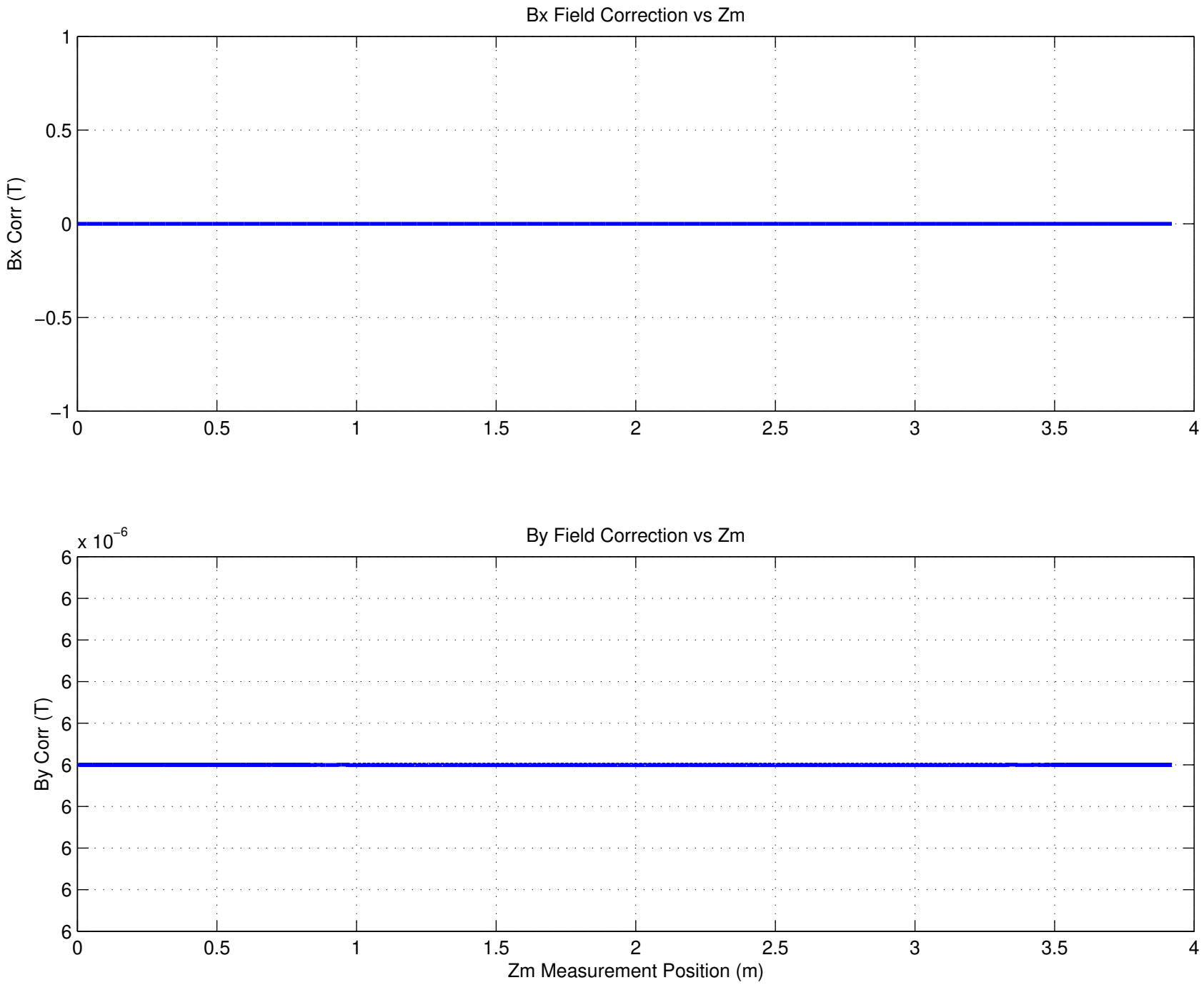
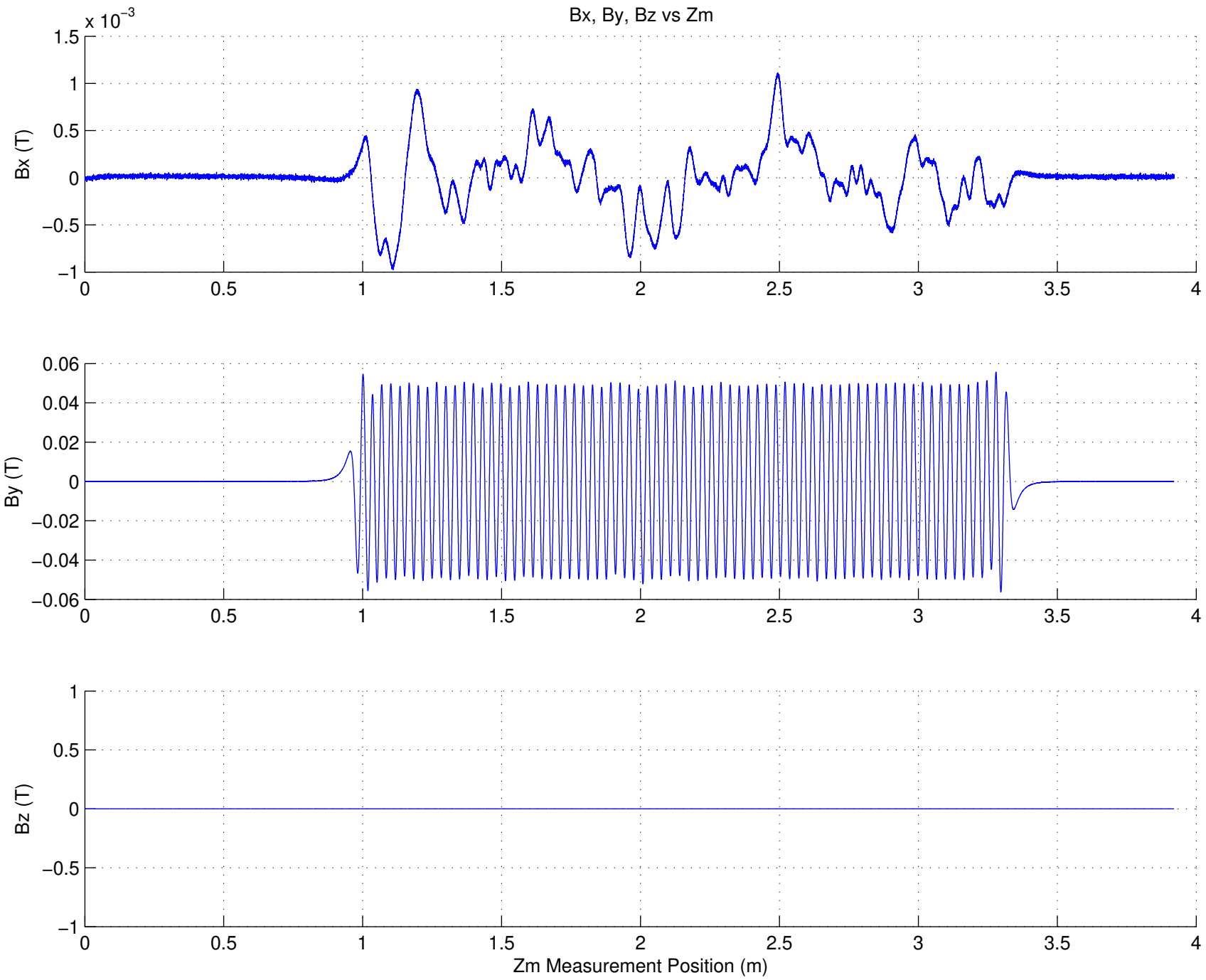
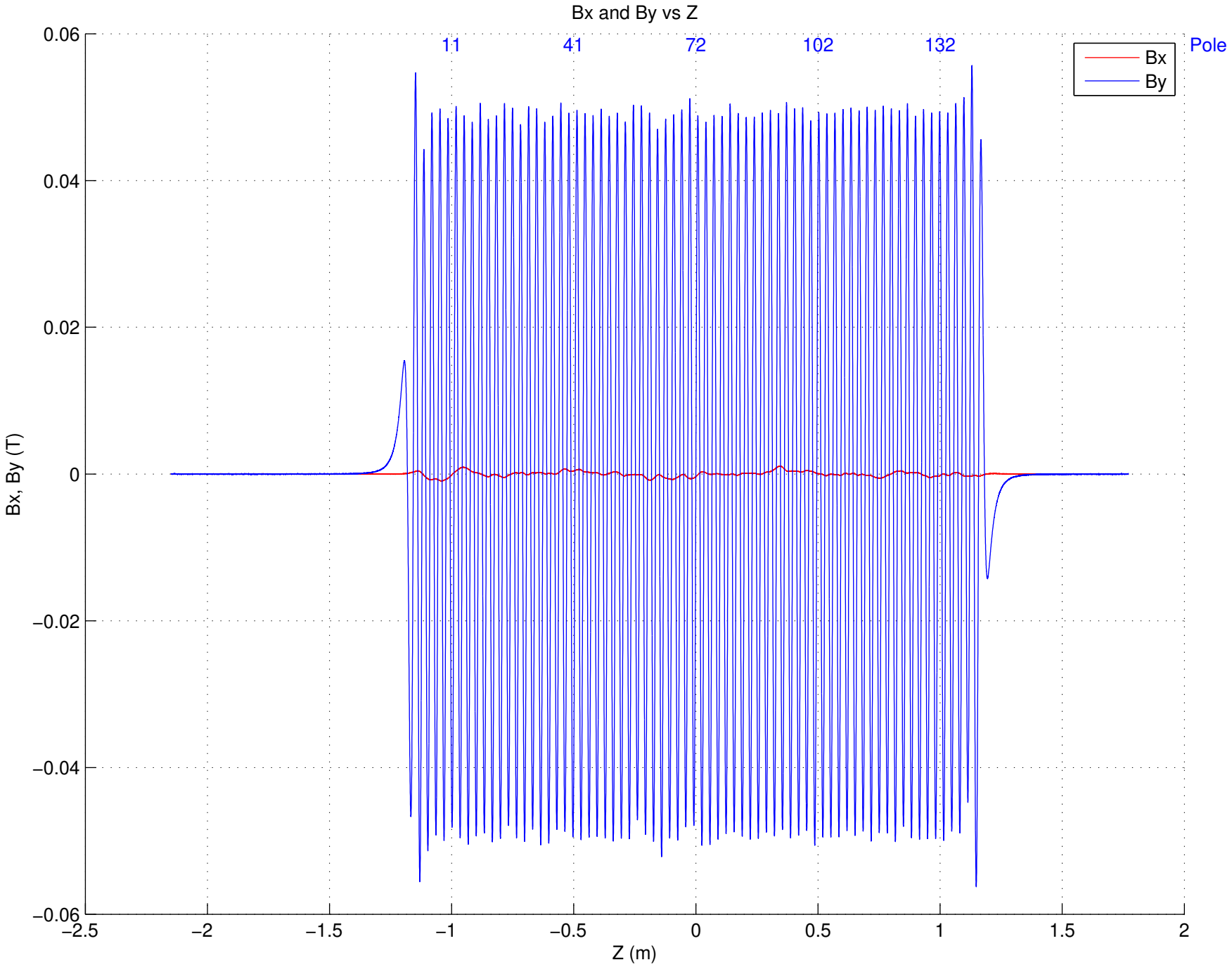
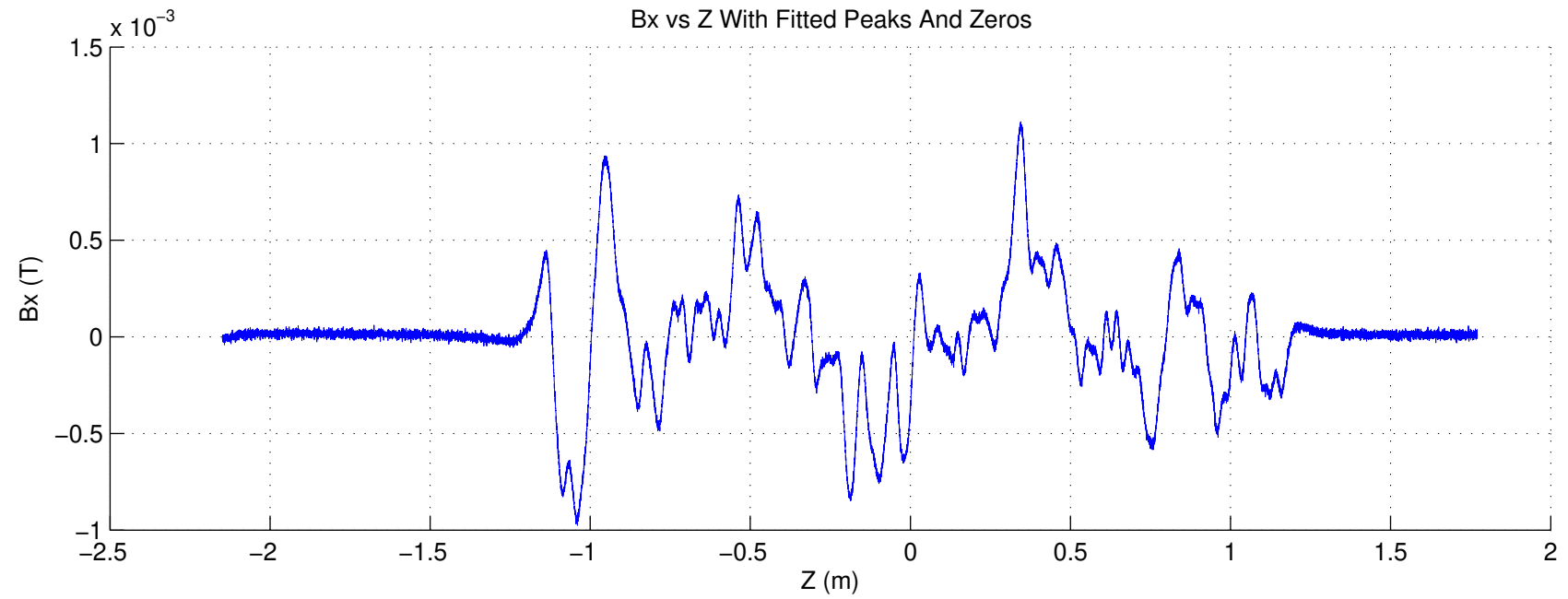
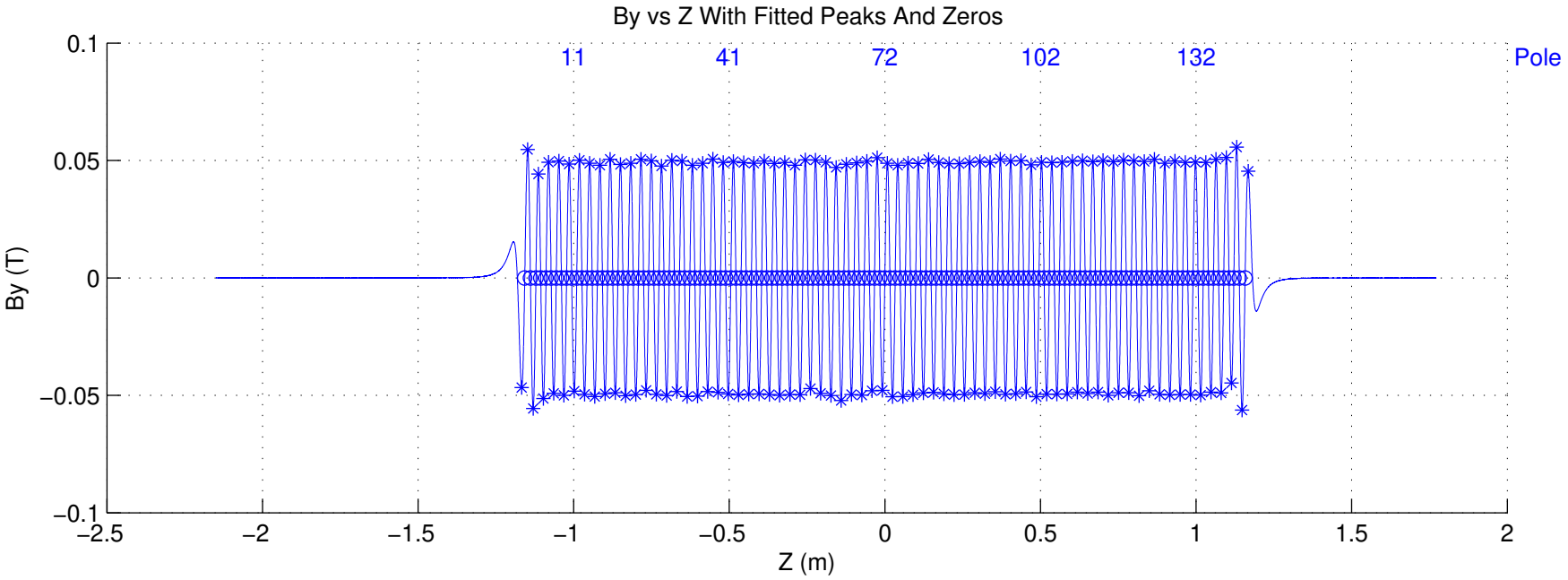
Parameters:
INPUT−FILE−DIR =V:\MET\MagServe\MagData\LCLS\Undulator\A1−ANL\DATASET0002\Rough Tuning\Z Scans\Run 021\
INPUT−FILE−NAME =x+00000−y+000−bscanz.dat
INPUT−FILE−TYPE =ZVXYBXYH
CORR−REQUIRED =1
GAMMA =26627.1
NOM−LAMBDA−U =0
NOM−K−VALUE =0
NOM−LAMBDA−R =0
NUM−POLES =144
NUM−END−POLES =4
CELL−LENGTH =3.126

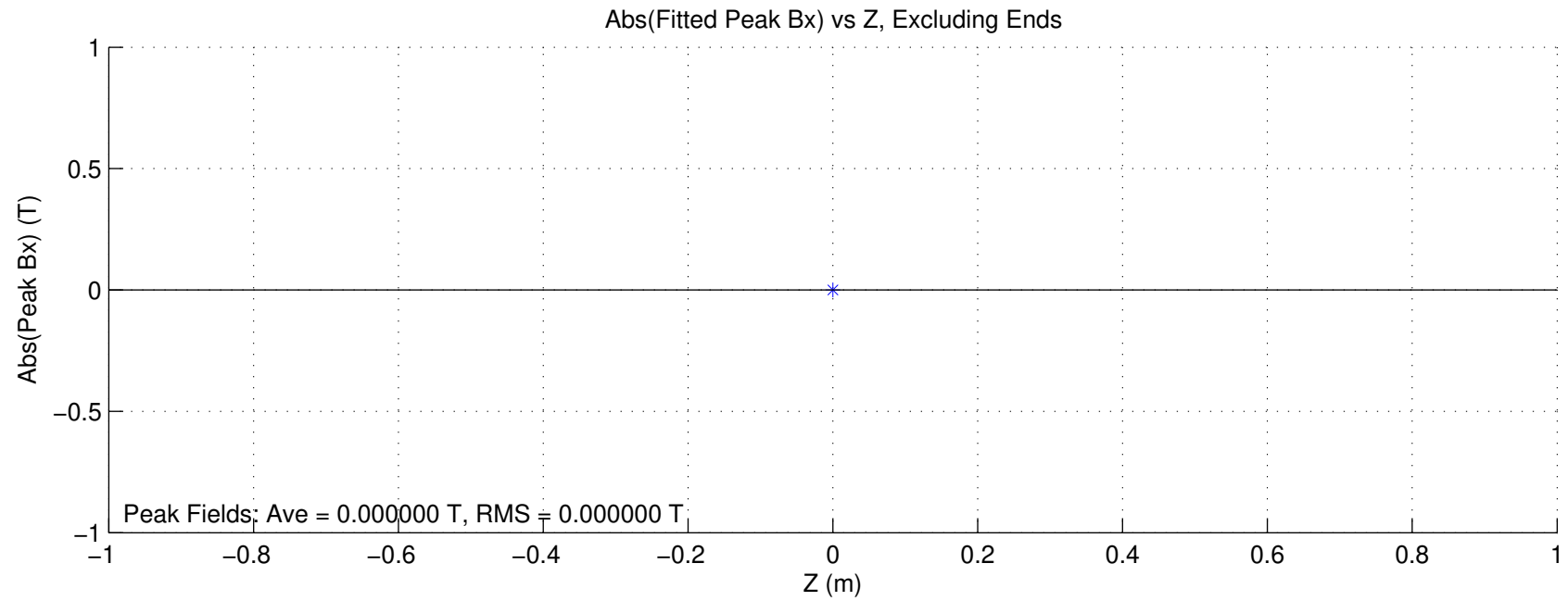

Bx Field Correction vs Zm
Bx Corr (T)
1
0.5
0
−0.5
−1
0
0.5
1
1.5
2
2.5
3
3.5
4
By Field Correction vs Zm
x 10^−6
By Corr (T)
6
6
6
6
6
6
6
6
6
0
0.5
1
1.5
2
2.5
3
3.5
4
Zm Measurement Position (m)

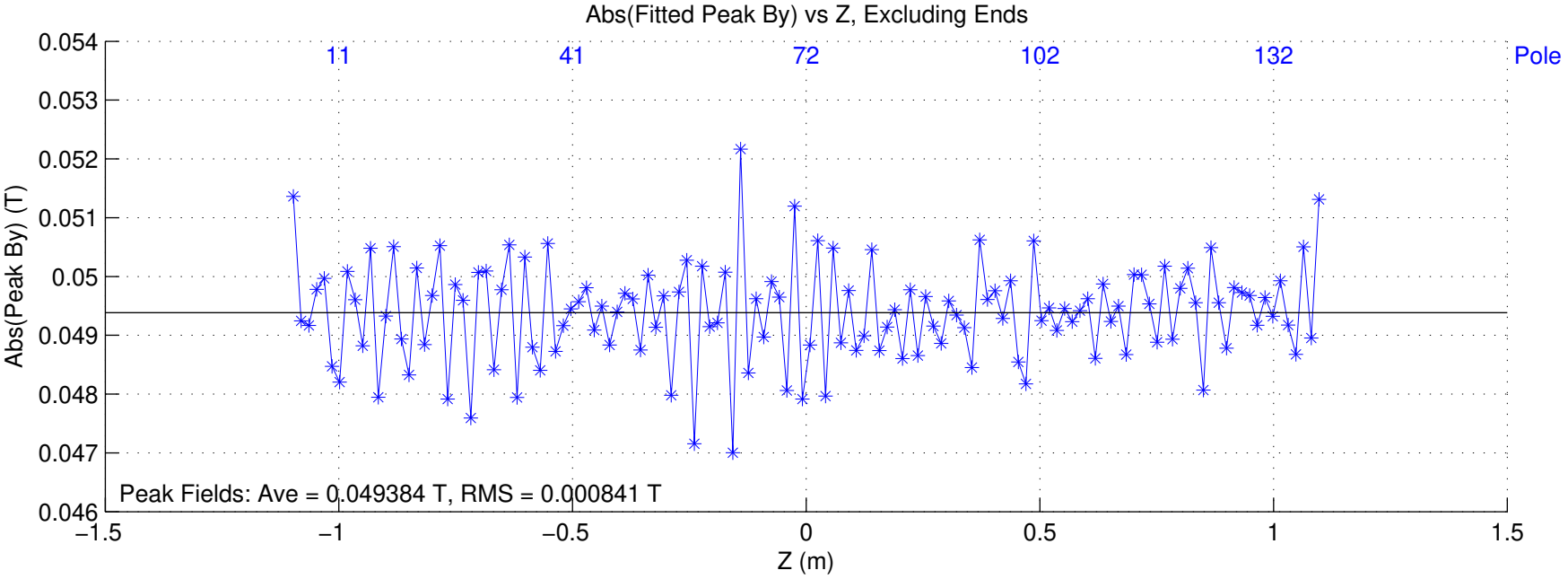

Bx, By, Bz vs Zm
x 10^-3
Bx (T)
By (T)
Bz (T)
Zm Measurement Position (m)

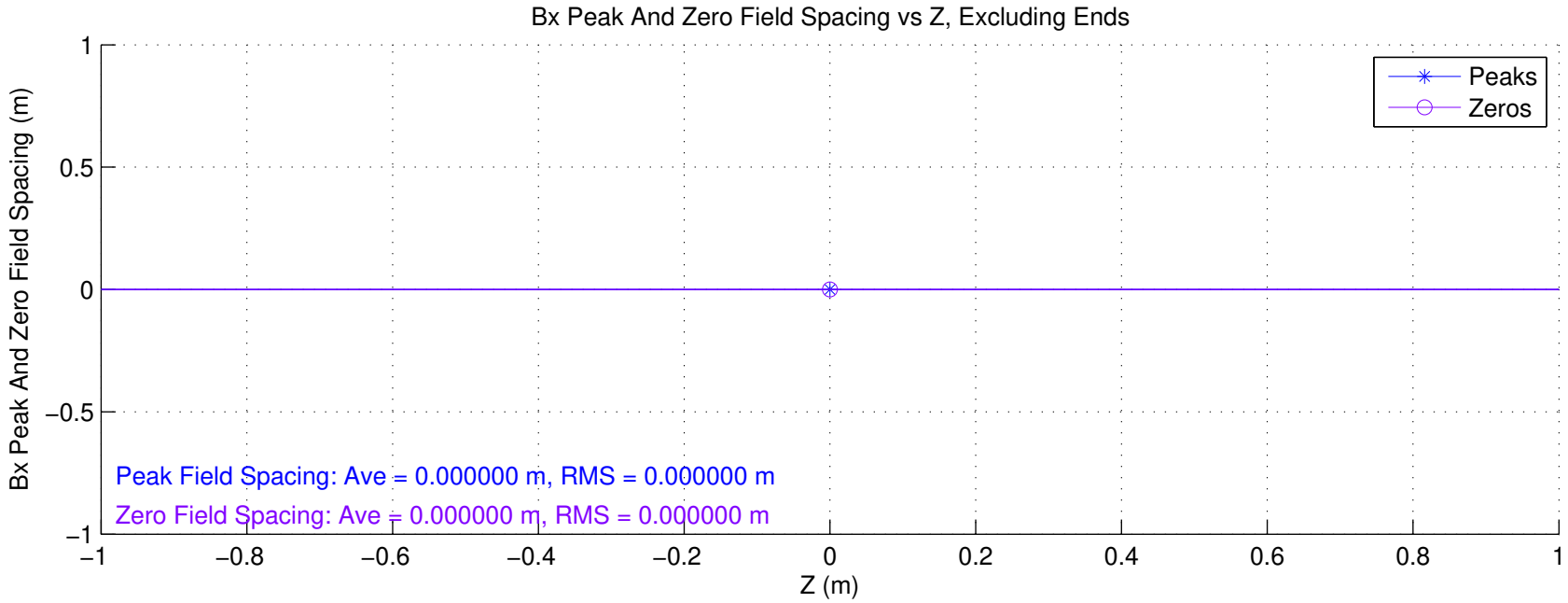

Bx and By vs Z
11
41
72
102
132
Pole
Bx
By
0.06
0.04
0.02
0
−0.02
−0.04
−0.06
Bx, By (T)
−2.5
−2
−1.5
−1
−0.5
0
0.5
1
1.5
2
Z (m)

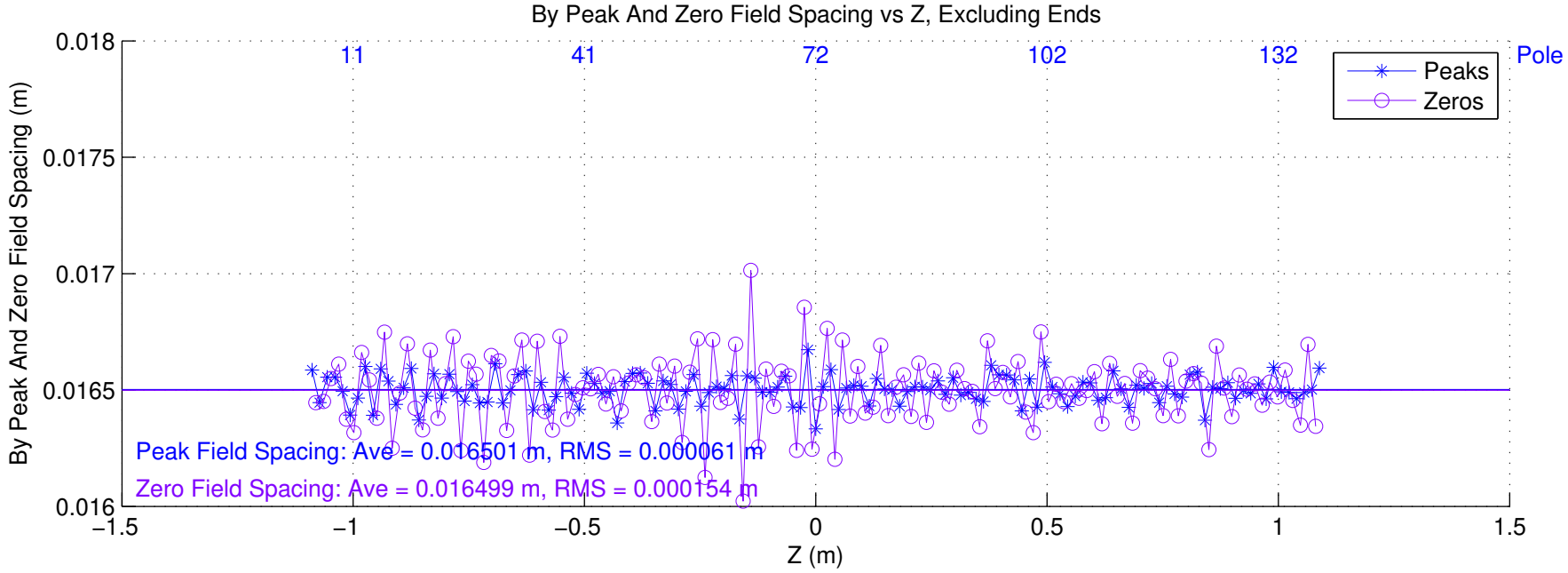

Bx vs Z With Fitted Peaks And Zeros
x 10^-3
1.5
1
0.5
0
−0.5
−1
Bx (T)
−2.5
−2
−1.5
−1
−0.5
0
0.5
1
1.5
2
Z (m)

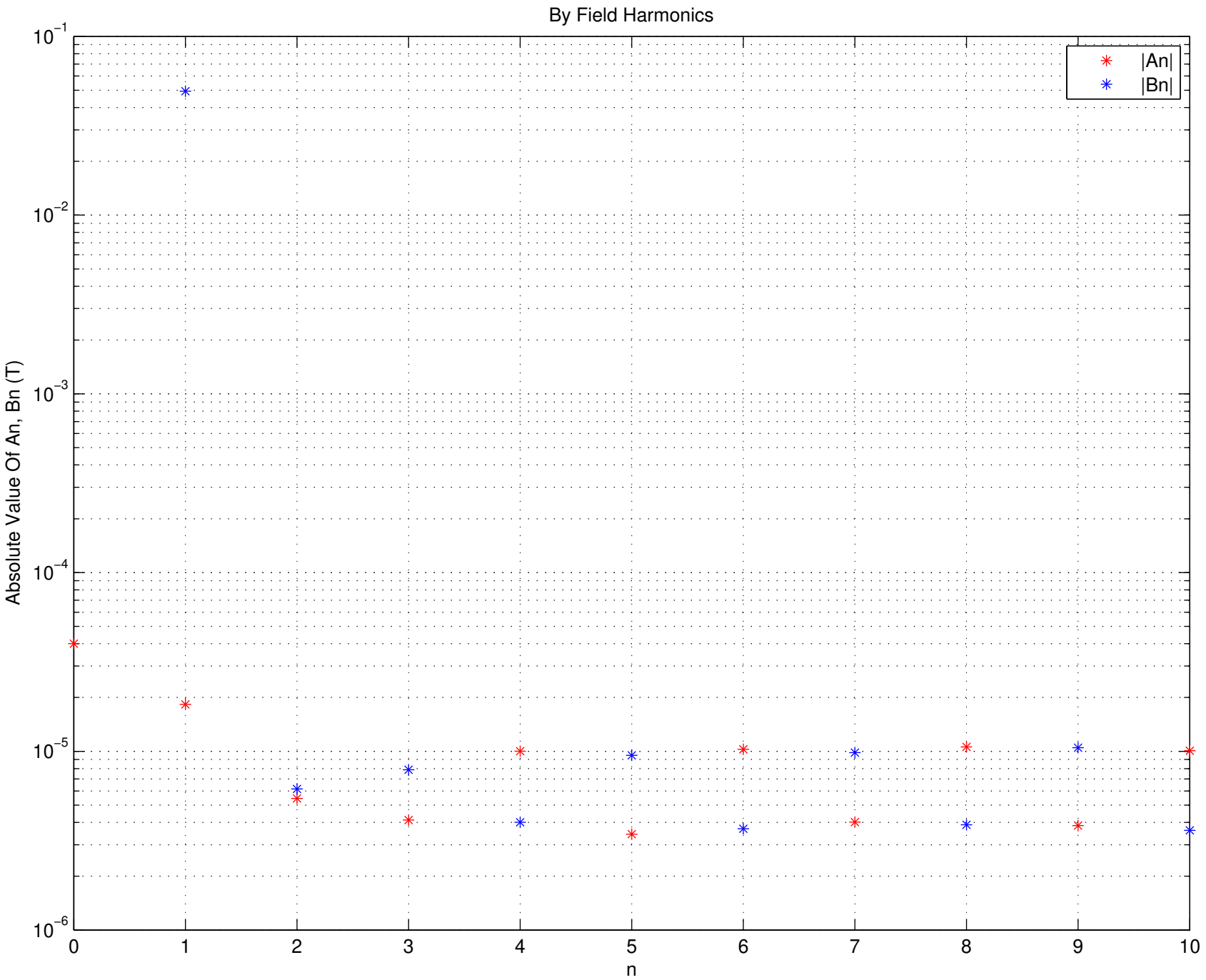

By vs Z With Fitted Peaks And Zeros
11
41
72
102
132
Pole
0.1
0.05
0
−0.05
−0.1
By (T)
−2.5
−2
−1.5
−1
−0.5
0
0.5
1
1.5
2
Z (m)

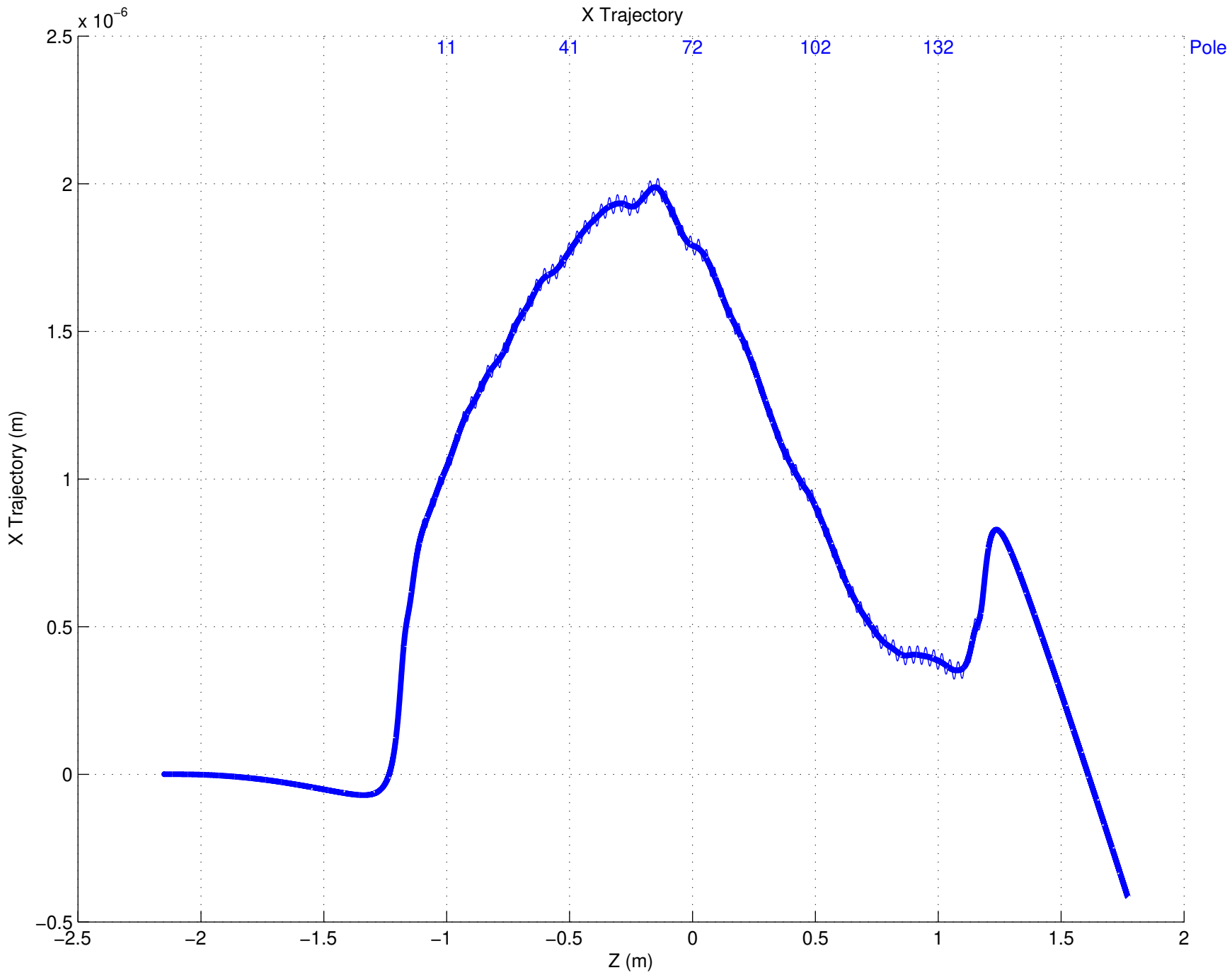

Abs(Fitted Peak Bx) vs Z, Excluding Ends
Abs(Peak Bx) (T)
Z (m)
Peak Fields: Ave = 0.000000 T, RMS = 0.000000 T
1
0.5
0
−0.5
−1
−1
−0.8
−0.6
−0.4
−0.2
0
0.2
0.4
0.6
0.8
1

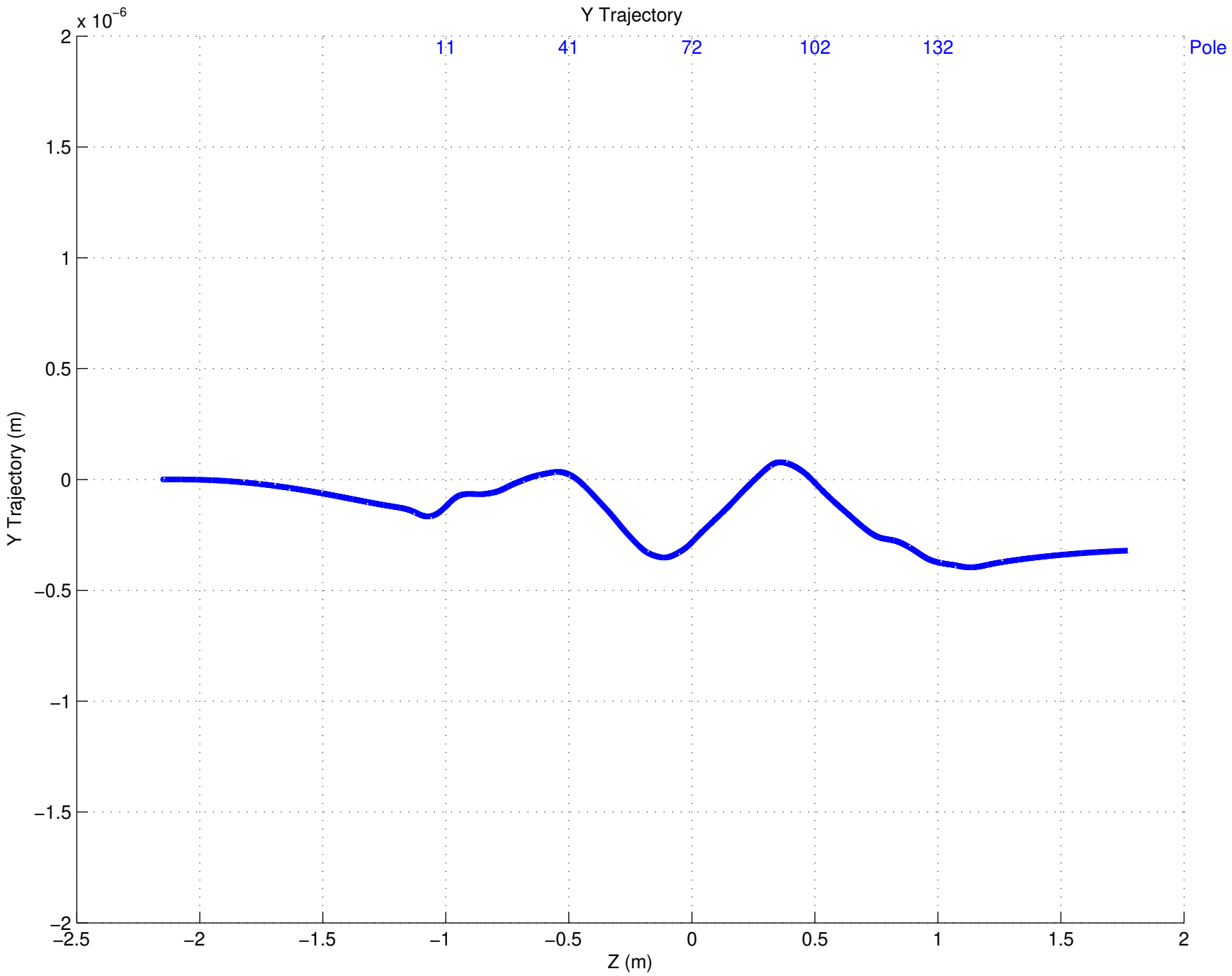

Abs(Fitted Peak By) vs Z, Excluding Ends
Abs(Peak By) (T)
Z (m)
Peak Fields: Ave = 0.049384 T, RMS = 0.000841 T
11
41
72
102
132
Pole
0.054
0.053
0.052
0.051
0.05
0.049
0.048
0.047
0.046
−1.5
−1
−0.5
0
0.5
1
1.5

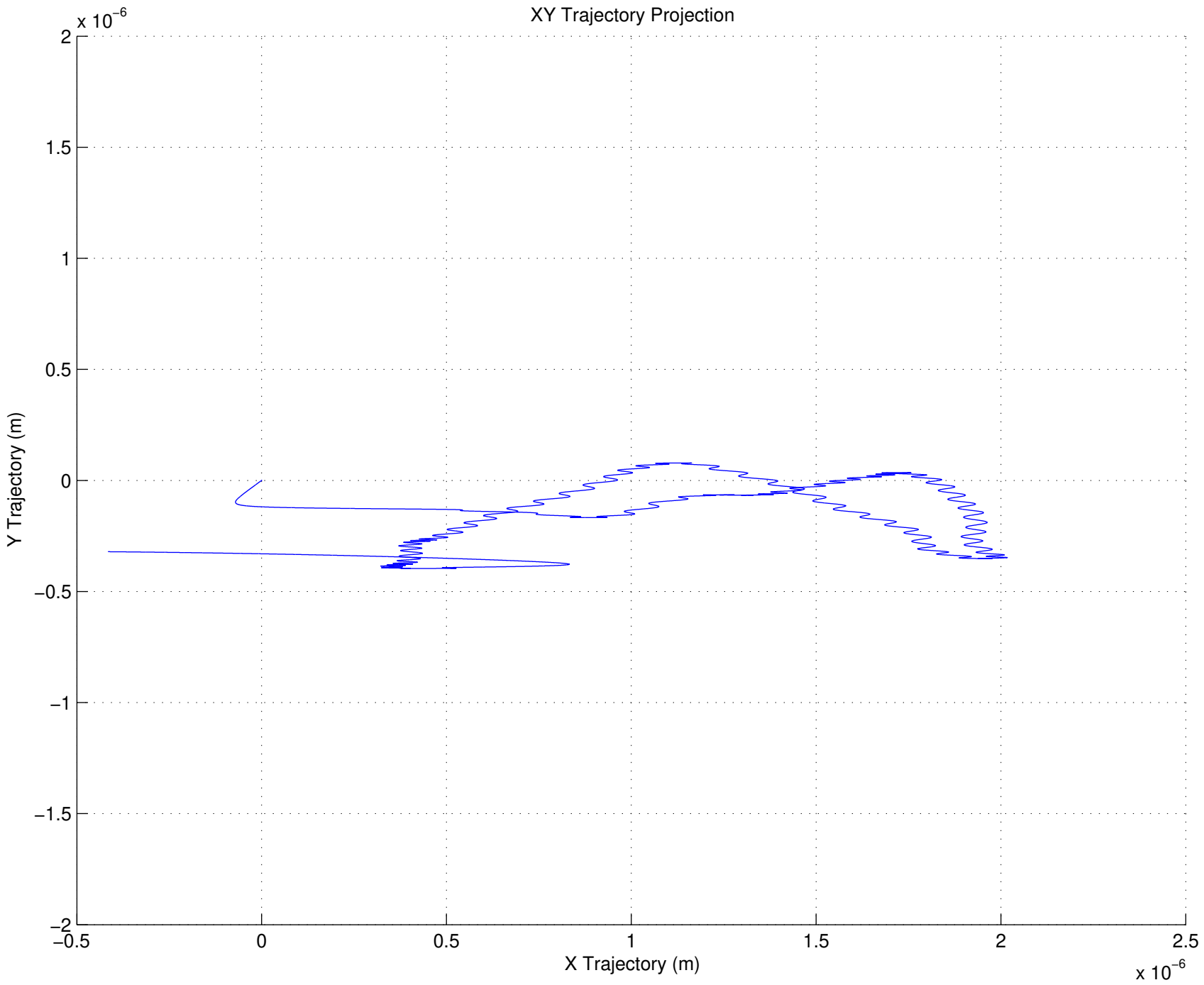

Bx Peak And Zero Field Spacing vs Z, Excluding Ends
Bx Peak And Zero Field Spacing (m)
Z (m)
Peaks
Zeros
Peak Field Spacing: Ave = 0.000000 m, RMS = 0.000000 m
Zero Field Spacing: Ave = 0.000000 m, RMS = 0.000000 m
1
0.5
0
−0.5
−1
−1
−0.8
−0.6
−0.4
−0.2
0
0.2
0.4
0.6
0.8
1

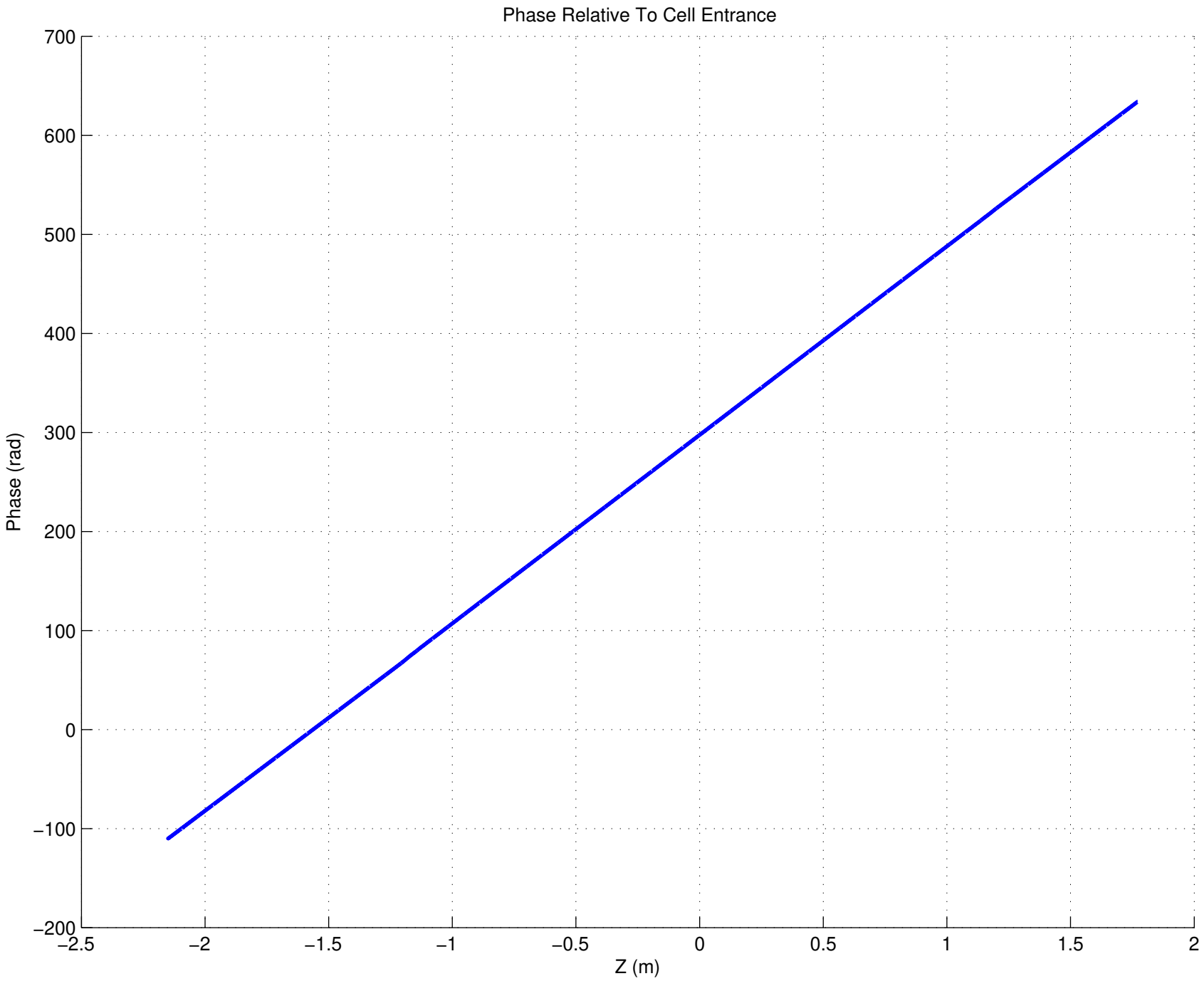

By Peak And Zero Field Spacing vs Z, Excluding Ends
By Peak And Zero Field Spacing (m)
Z (m)
11
41
72
102
132
Pole
Peaks
Zeros
Peak Field Spacing: Ave = 0.016501 m, RMS = 0.000061 m
Zero Field Spacing: Ave = 0.016499 m, RMS = 0.000154 m
0.018
0.0175
0.017
0.0165
0.016
−1.5
−1
−0.5
0
0.5
1
1.5

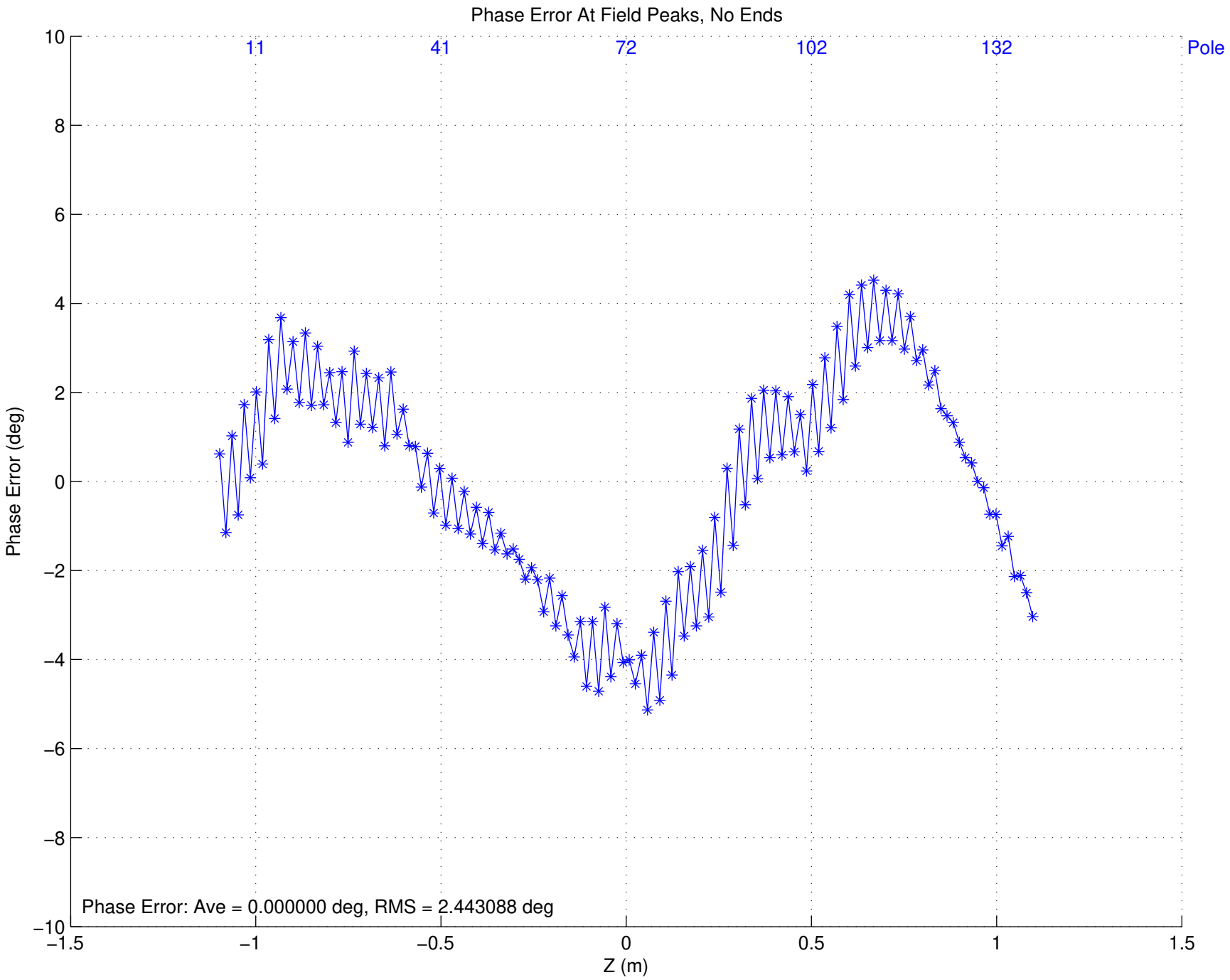

By Field Harmonics
|An|
|Bn|
Absolute Value Of An, Bn (T)
n
10^{-1}
10^{-2}
10^{-3}
10^{-4}
10^{-5}
10^{-6}
0
1
2
3
4
5
6
7
8
9
10

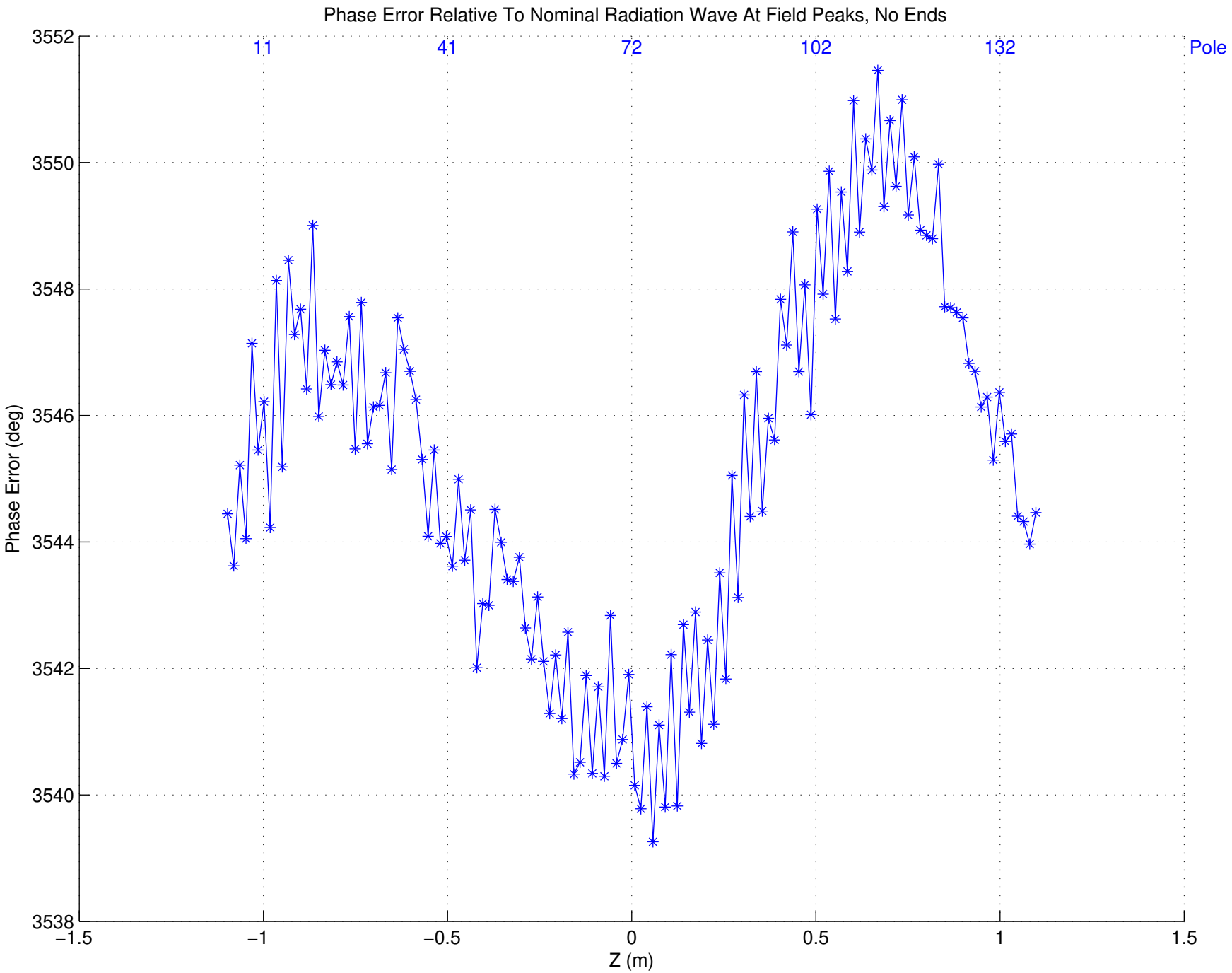

X Trajectory
x 10^-6
11
41
72
102
132
Pole
2.5
2
1.5
1
0.5
0
−0.5
X Trajectory (m)
−2.5
−2
−1.5
−1
−0.5
0
0.5
1
1.5
2
Z (m)

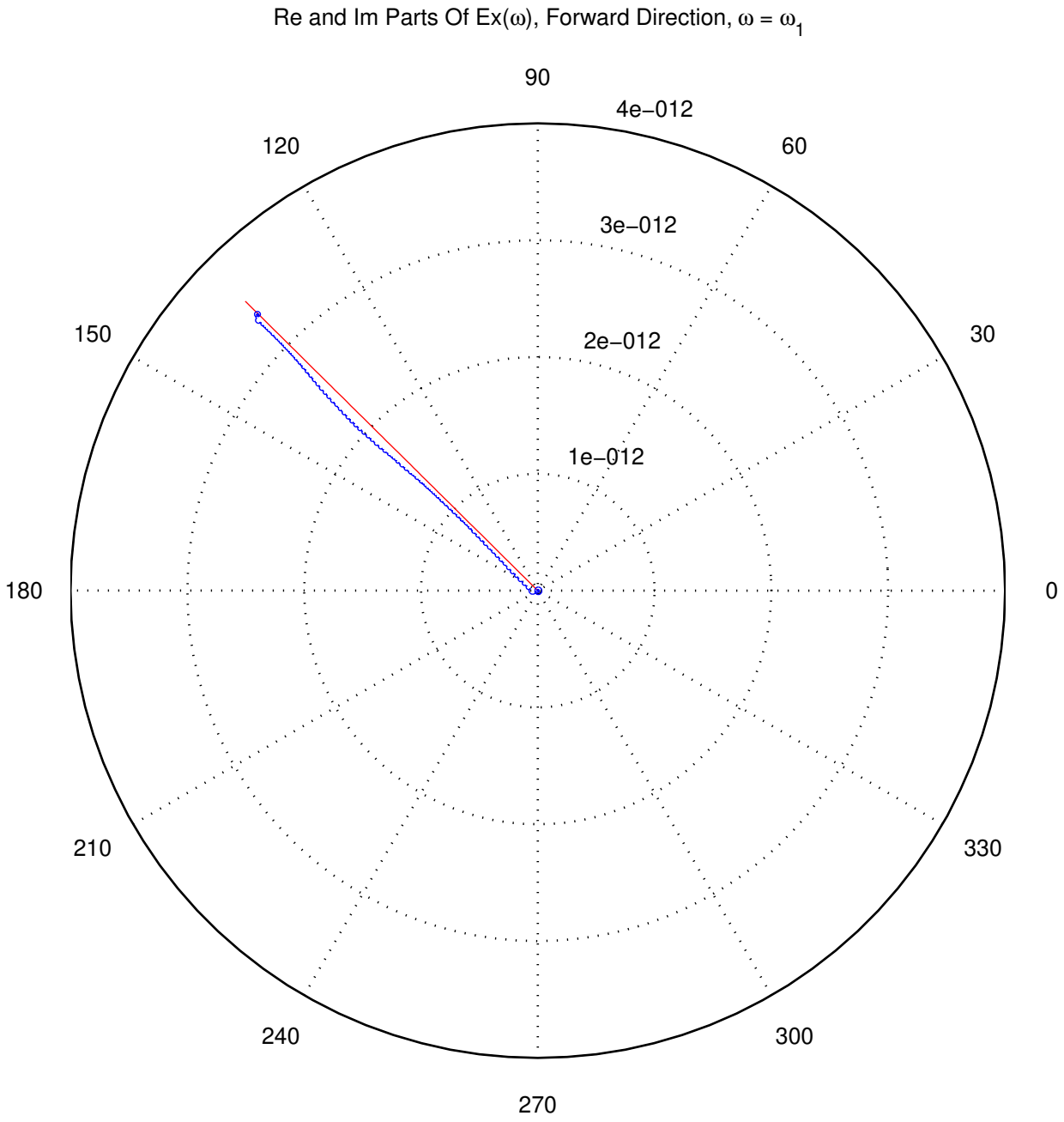

Y Trajectory
x 10^-6
11
41
72
102
132
Pole
Y Trajectory (m)
Z (m)
2
1.5
1
0.5
0
−0.5
−1
−1.5
−2
−2.5
−2
−1.5
−1
−0.5
0
0.5
1
1.5
2

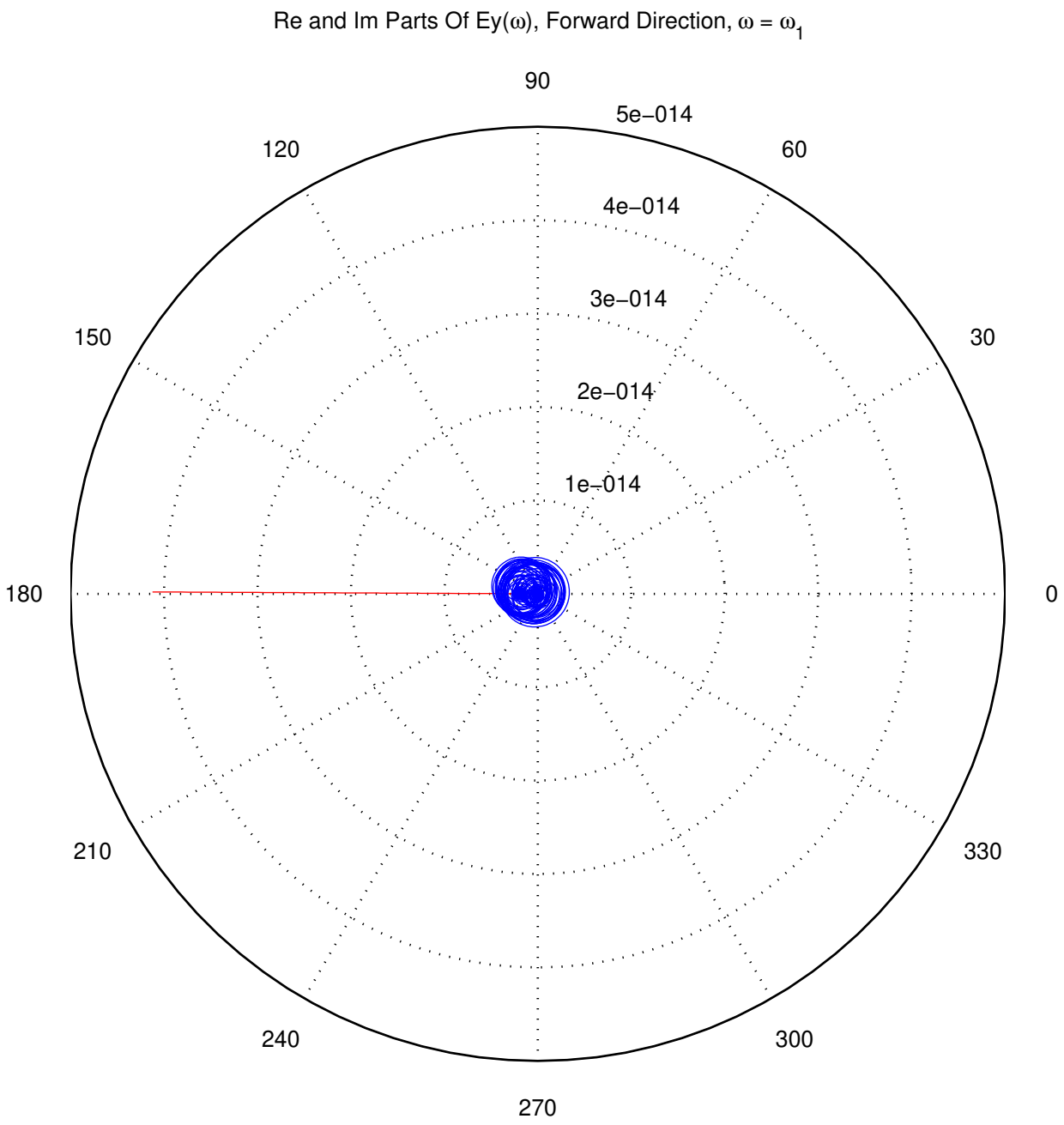

XY Trajectory Projection
x 10^-6
2
1.5
1
0.5
0
−0.5
−1
−1.5
−2
Y Trajectory (m)
−0.5
0
0.5
1
1.5
2
2.5
X Trajectory (m)
x 10^-6

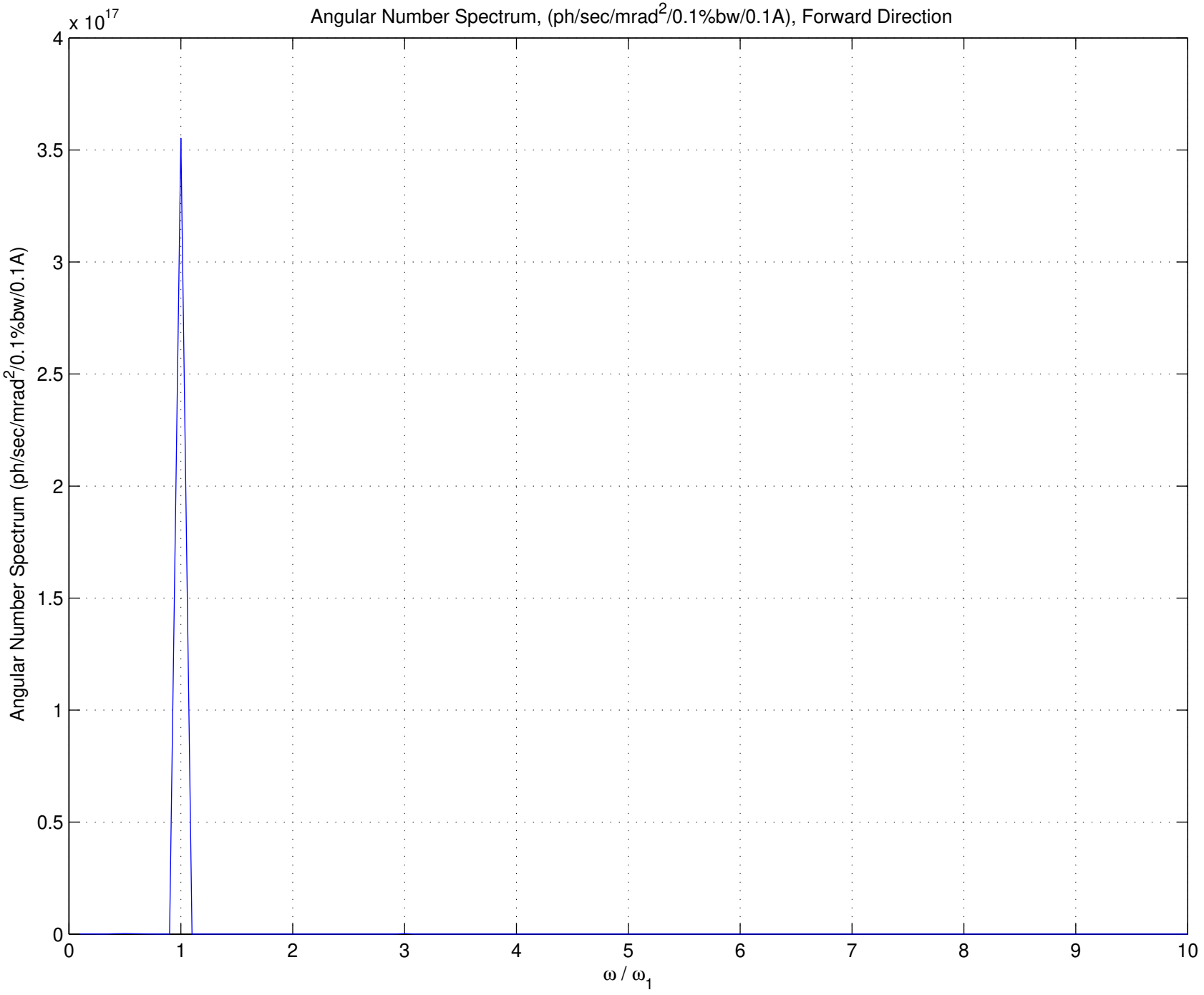

Phase Relative To Cell Entrance
Phase (rad)
Z (m)
700
600
500
400
300
200
100
0
−100
−200
−2.5
−2
−1.5
−1
−0.5
0
0.5
1
1.5
2

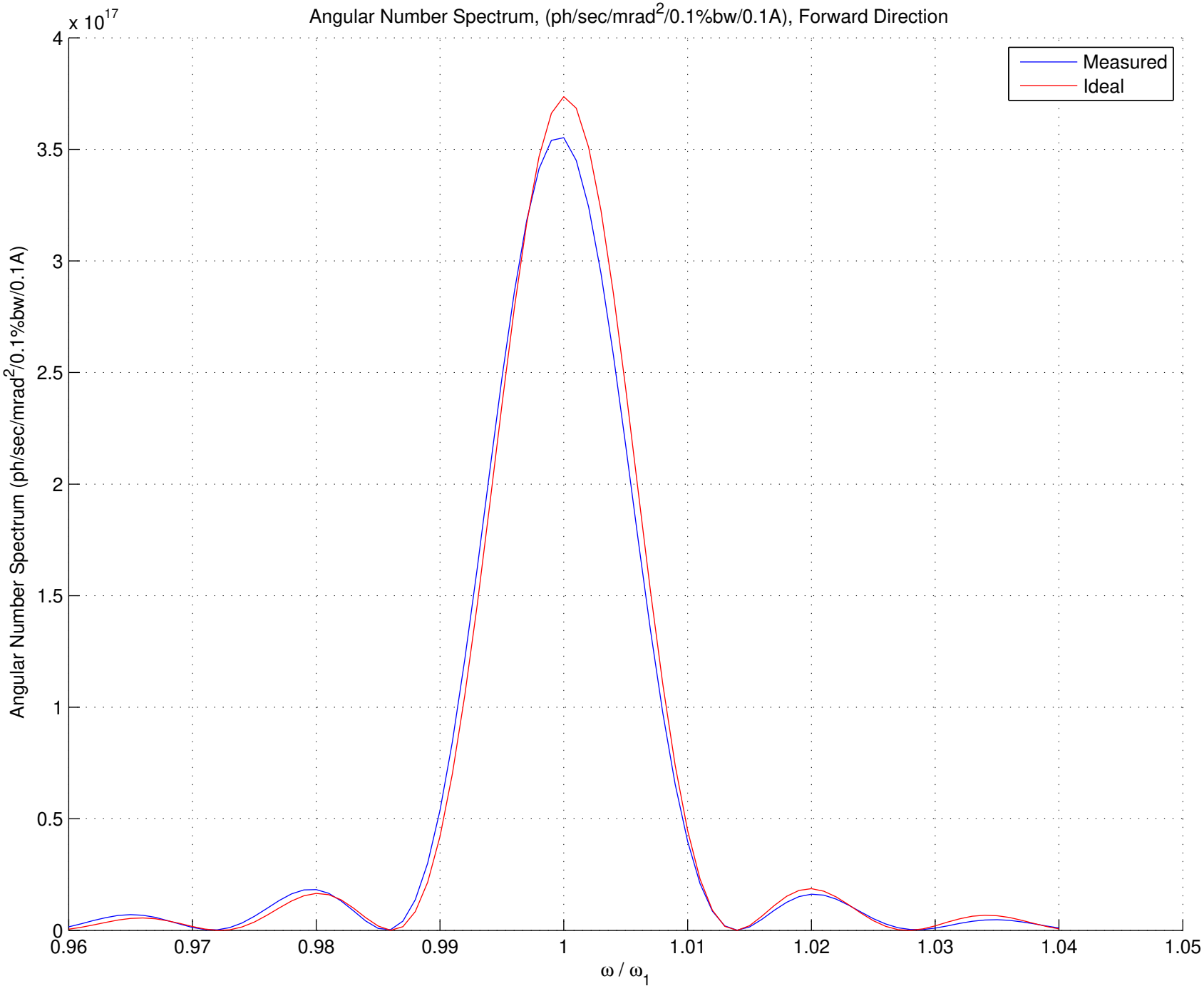

Phase Error At Field Peaks, No Ends
11
41
72
102
132
Pole
10
8
6
4
2
0
−2
−4
−6
−8
−10
Phase Error (deg)
−1.5
−1
−0.5
0
0.5
1
1.5
Z (m)
Phase Error: Ave = 0.000000 deg, RMS = 2.443088 deg

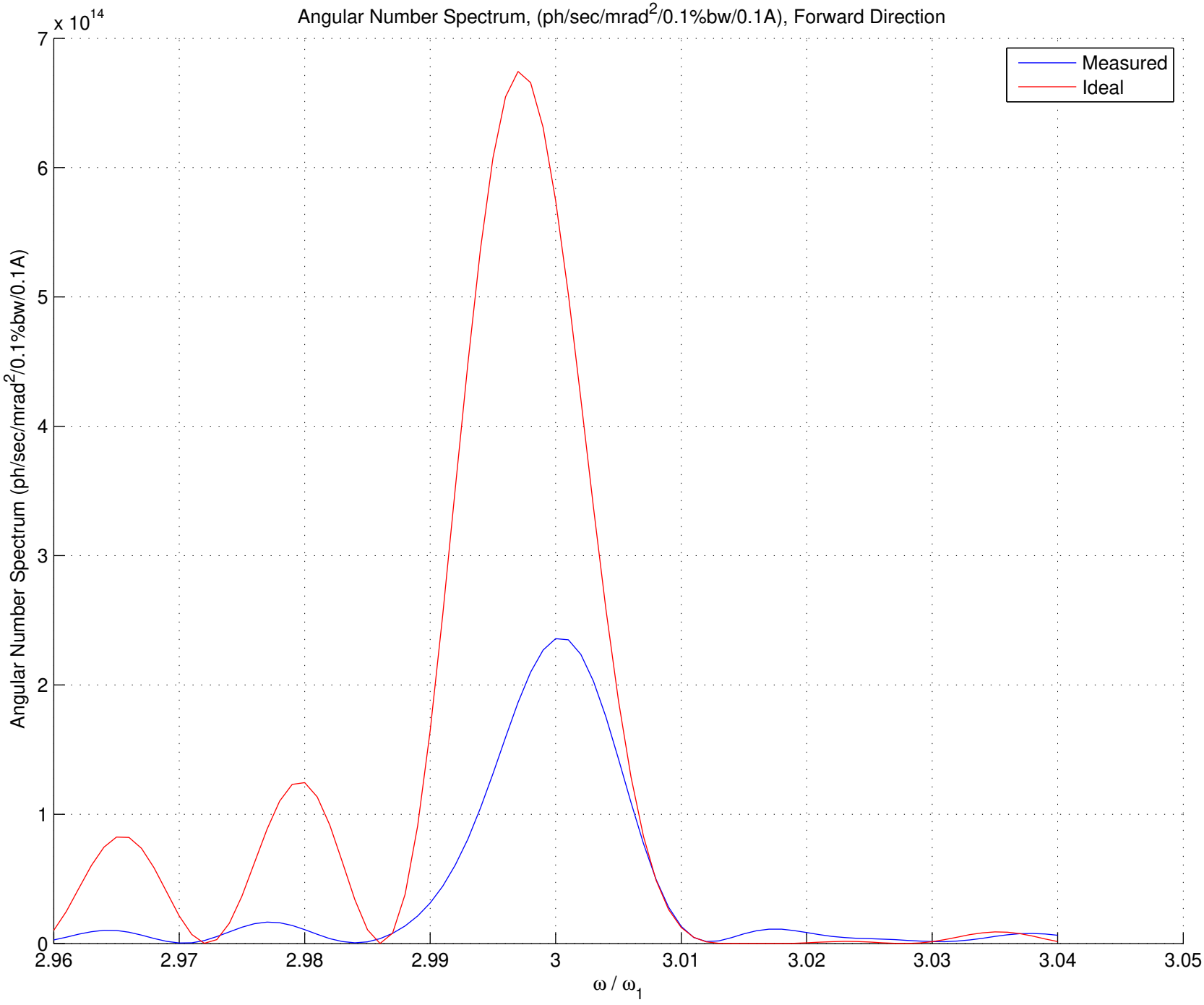

Phase Error Relative To Nominal Radiation Wave At Field Peaks, No Ends
11
41
72
102
132
Pole
3552
3550
3548
3546
3544
3542
3540
3538
Phase Error (deg)
−1.5
−1
−0.5
0
0.5
1
1.5
Z (m)

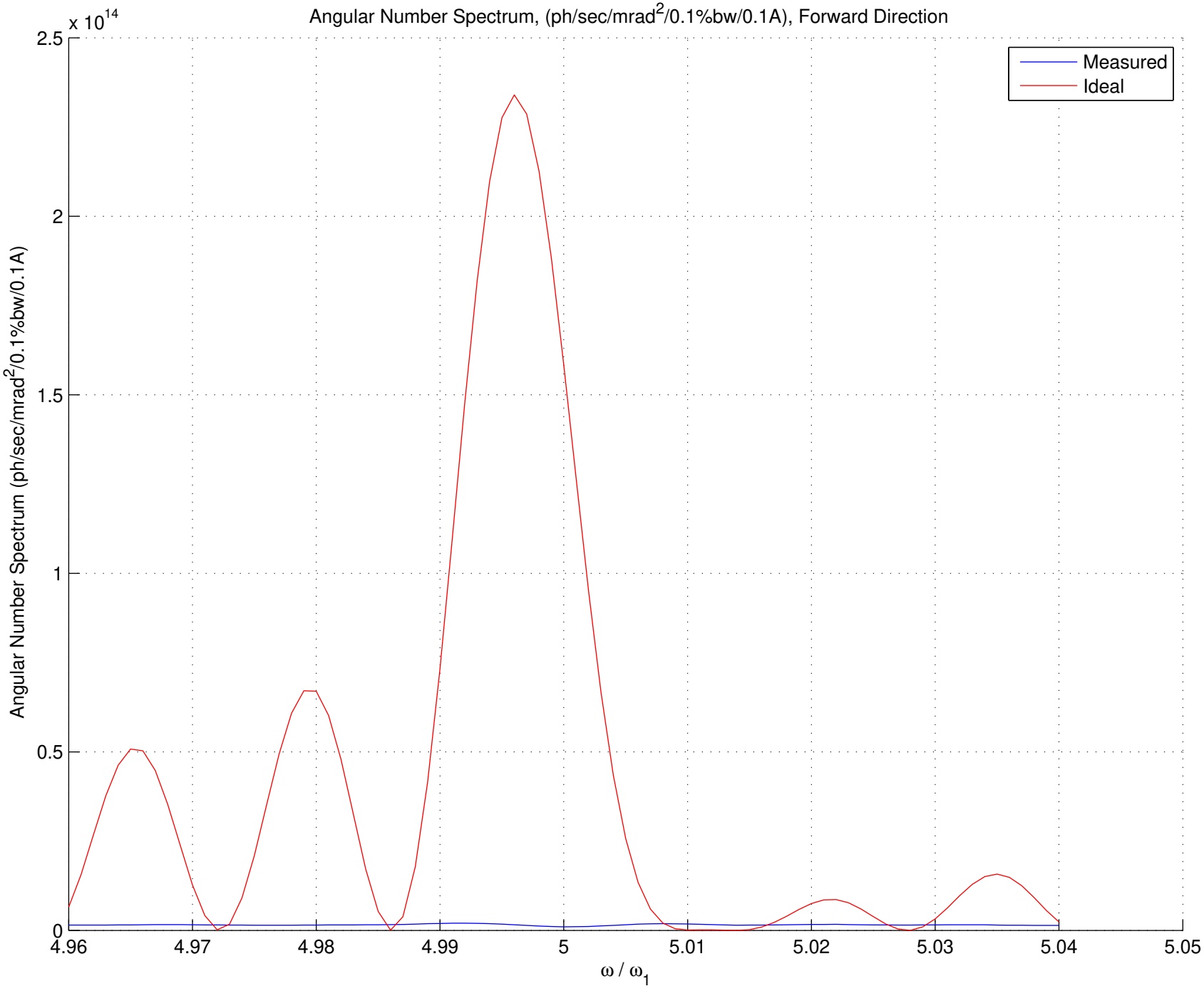

Re and Im Parts Of Ex(ω), Forward Direction, ω = ω1
90
4e−012
120
60
3e−012
150
30
2e−012
1e−012
180
0
210
330
240
300
270


Re and Im Parts Of Ey(ω), Forward Direction, ω = ω1
90
5e−014
120
60
4e−014
3e−014
150
30
2e−014
1e−014
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
0.5
1
1.5
2
2.5
3
3.5
4
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/mrad^2/0.1%bw/0.1A), Forward Direction
x 10^{14}
Measured
Ideal
Angular Number Spectrum (ph/sec/mrad^2/0.1%bw/0.1A)
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
ω / ω_1


Angular Number Spectrum, (ph/sec/mrad^2/0.1%bw/0.1A), Forward Direction
x 10^{14}
Measured
Ideal
Angular Number Spectrum (ph/sec/mrad^2/0.1%bw/0.1A)
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
ω / $ω_1$