SLAC Magnetic Measurements

EPU Analysis
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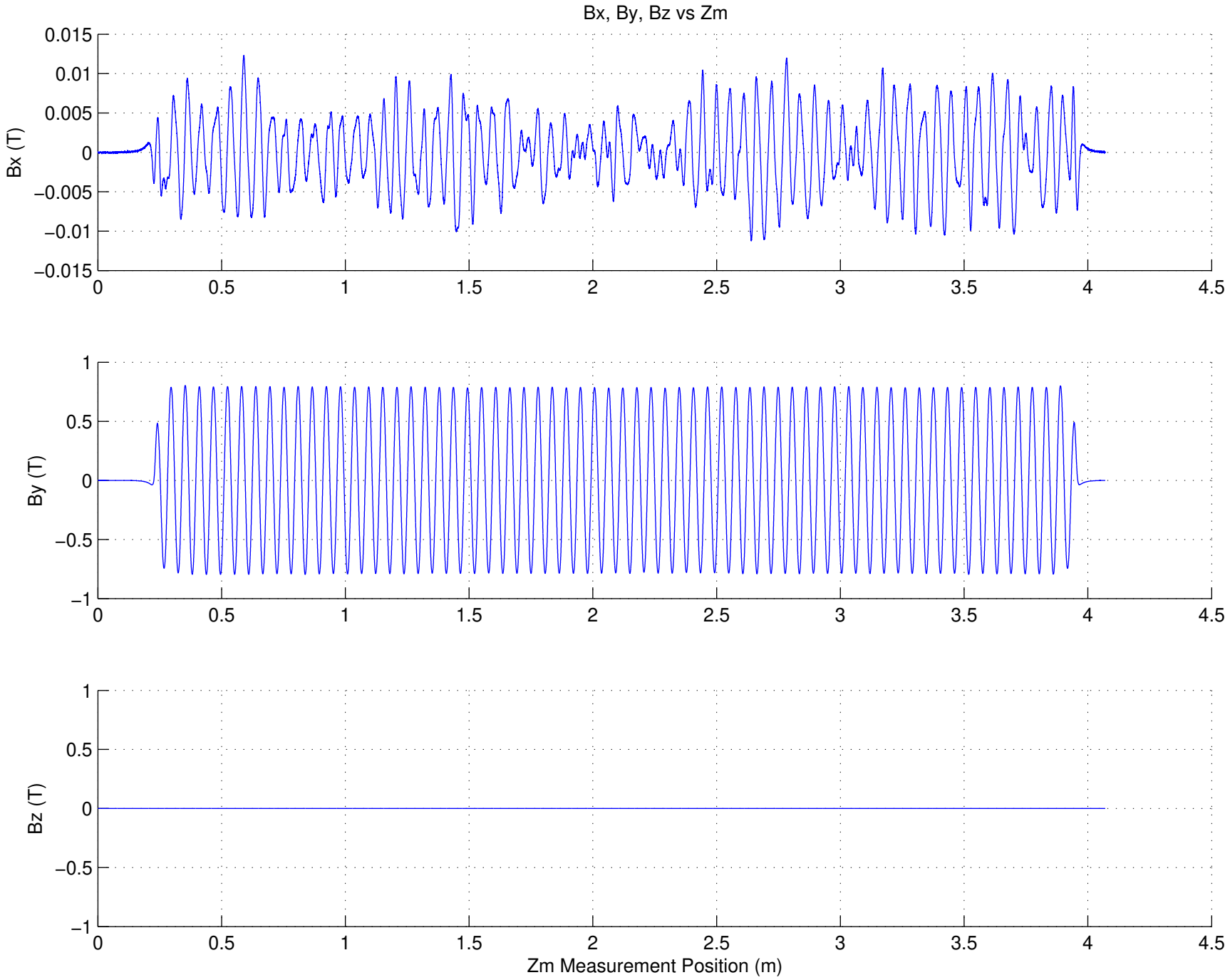
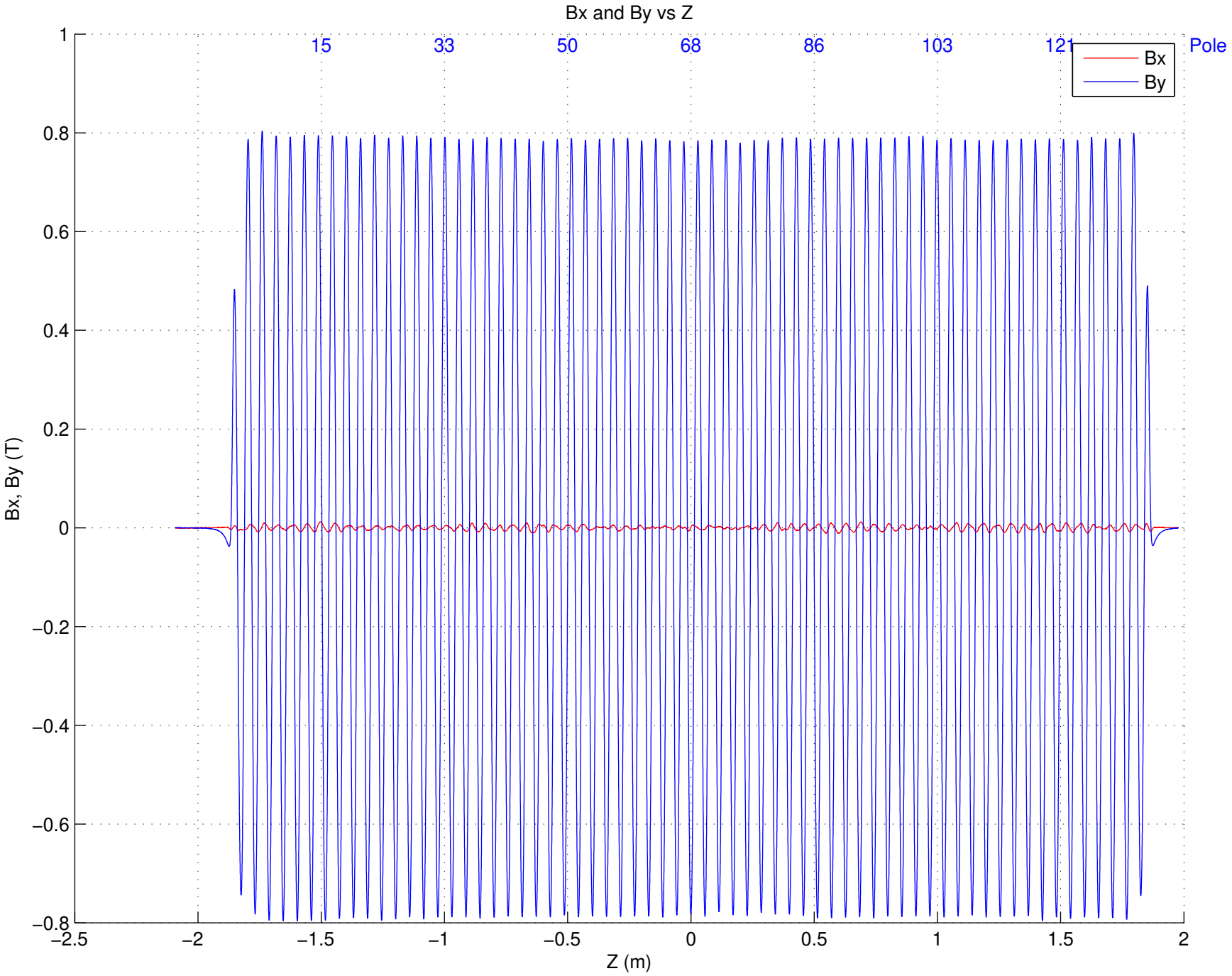
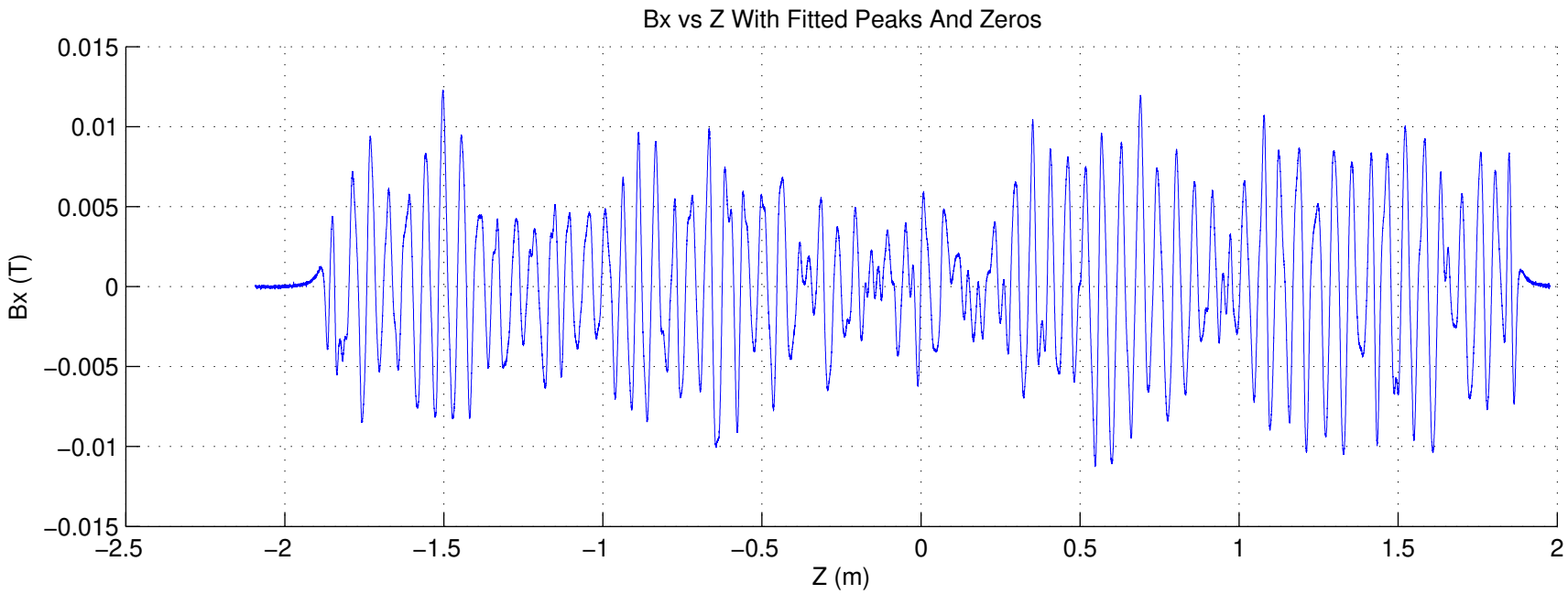
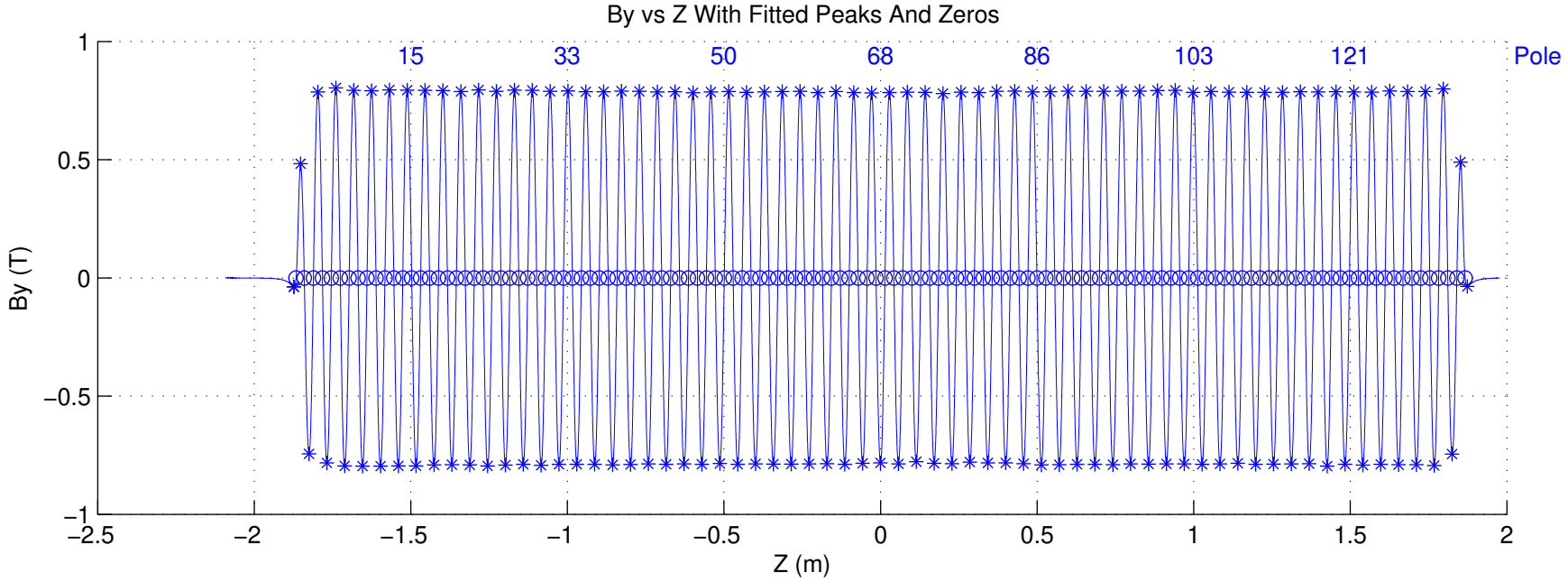
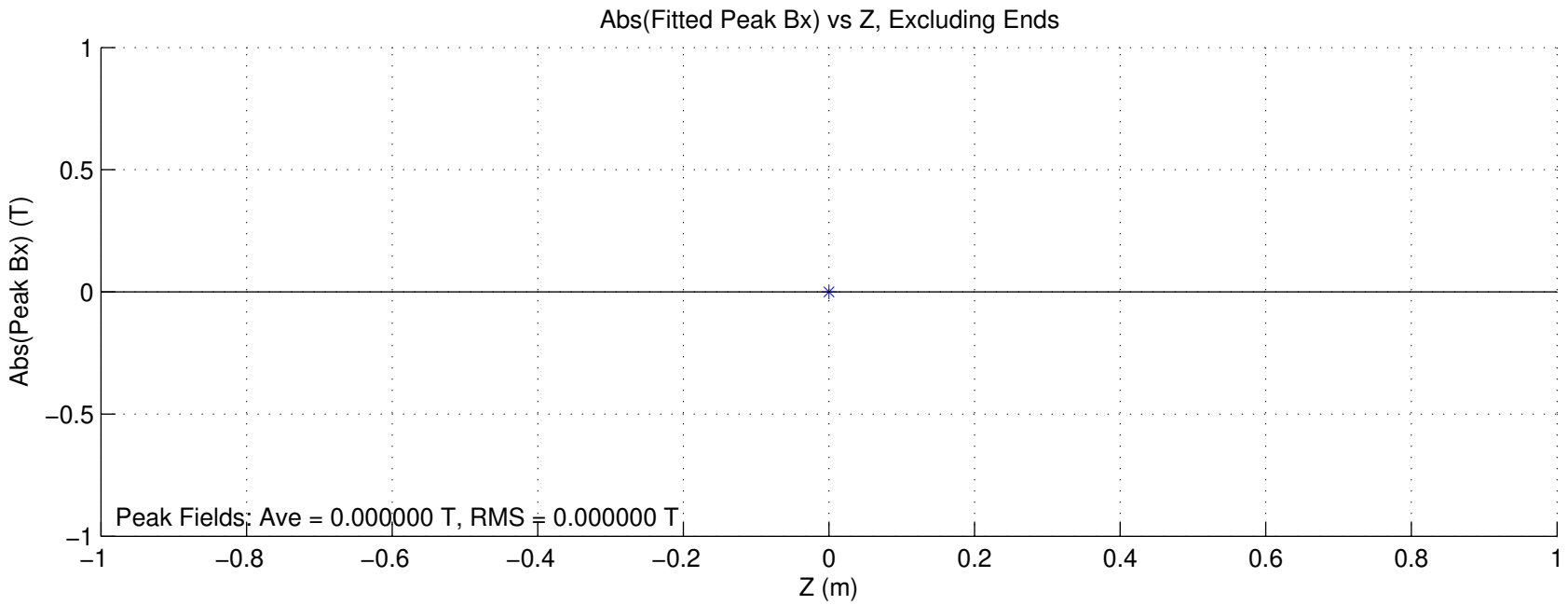
Parameters:
INPUT−FILE−DIR =S:\MagData\LCLS\Undulator\EPU\DATASET0001\Rough Tuning\Z Scans\Run 010\
INPUT−FILE−NAME =x+00000−y+000−bscanz.dat
INPUT−FILE−TYPE =ZVXYBXYH
CORR−REQUIRED =0
GAMMA =26627.1
NOM−LAMBDA−U =0.05708
NOM−K−VALUE =3.4858
NOM−LAMBDA−R =2.8481e−010
NUM−POLES =133
NUM−END−POLES =4
CELL−LENGTH =4

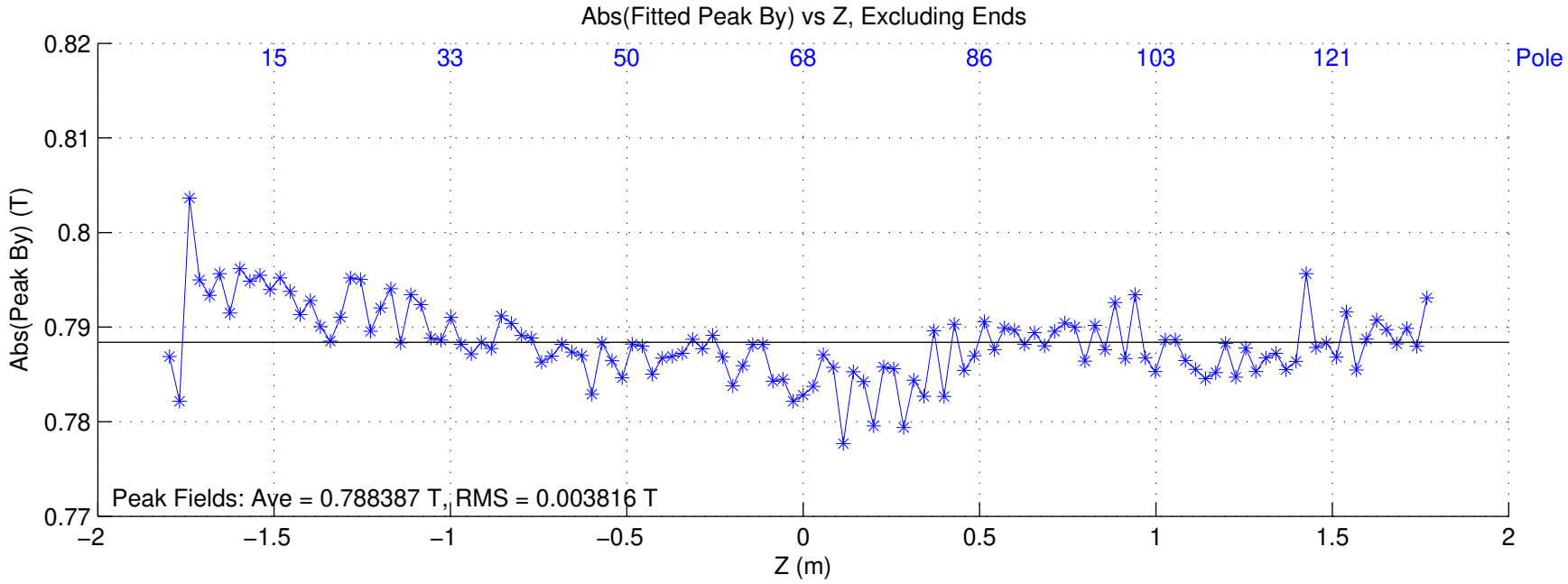

Bx, By, Bz vs Zm
Bx (T)
0.015
0.01
0.005
0
−0.005
−0.01
−0.015
By (T)
1
0.5
0
−0.5
−1
Bz (T)
1
0.5
0
−0.5
−1
0
0.5
1
1.5
2
2.5
3
3.5
4
4.5
Zm Measurement Position (m)

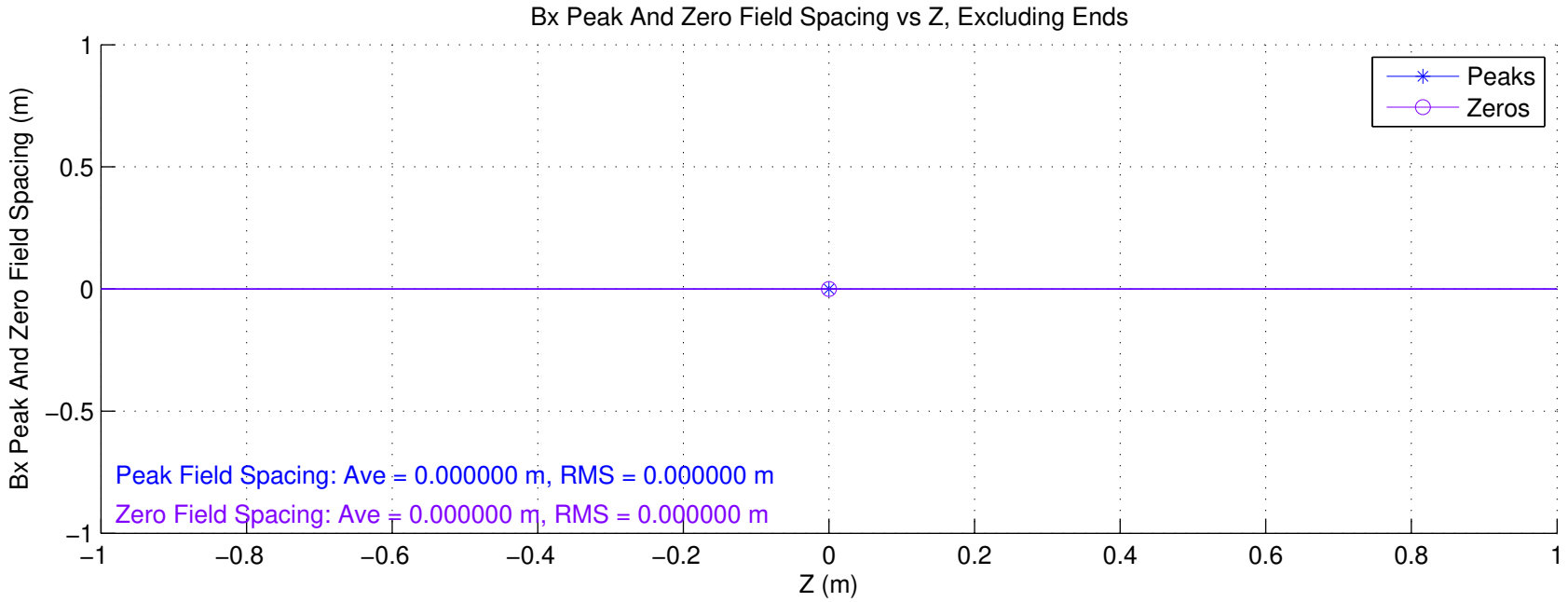

Bx and By vs Z
15
33
50
68
86
103
121
Pole
Bx
By
Bx, By (T)
Z (m)
1
0.8
0.6
0.4
0.2
0
−0.2
−0.4
−0.6
−0.8
−2.5
−2
−1.5
−1
−0.5
0
0.5
1
1.5
2

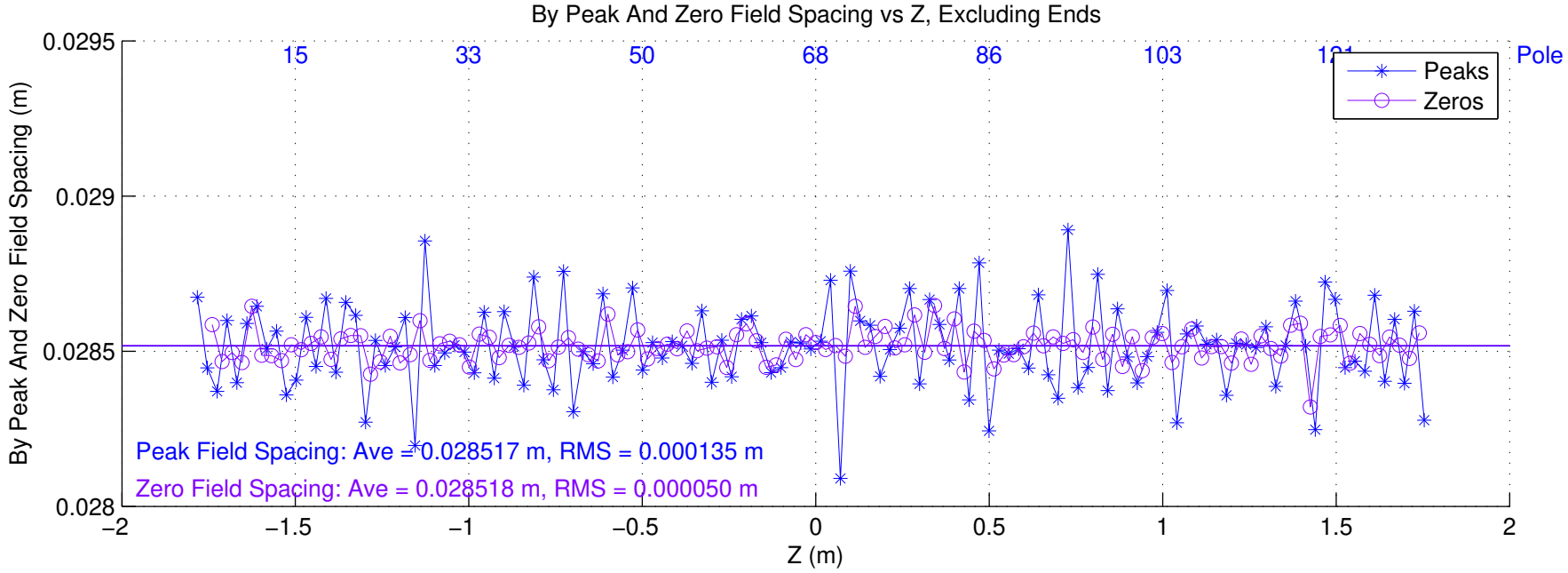

Bx vs Z With Fitted Peaks And Zeros
Bx (T)
Z (m)
0.015
0.01
0.005
0
−0.005
−0.01
−0.015
−2.5
−2
−1.5
−1
−0.5
0
0.5
1
1.5
2

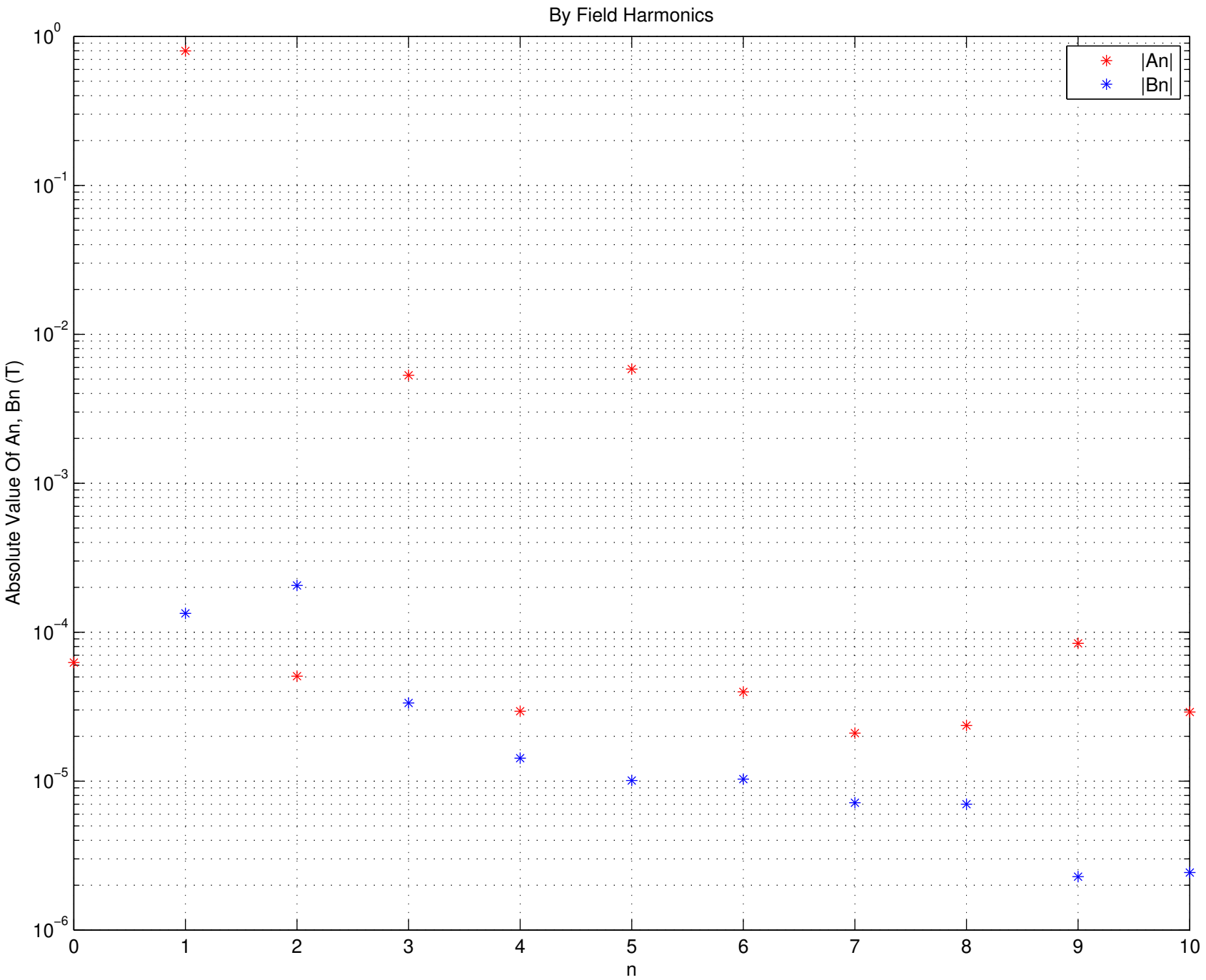

By vs Z With Fitted Peaks And Zeros
By (T)
Z (m)
Pole
15
33
50
68
86
103
121
1
0.5
0
−0.5
−1
−2.5
−2
−1.5
−1
−0.5
0
0.5
1
1.5
2

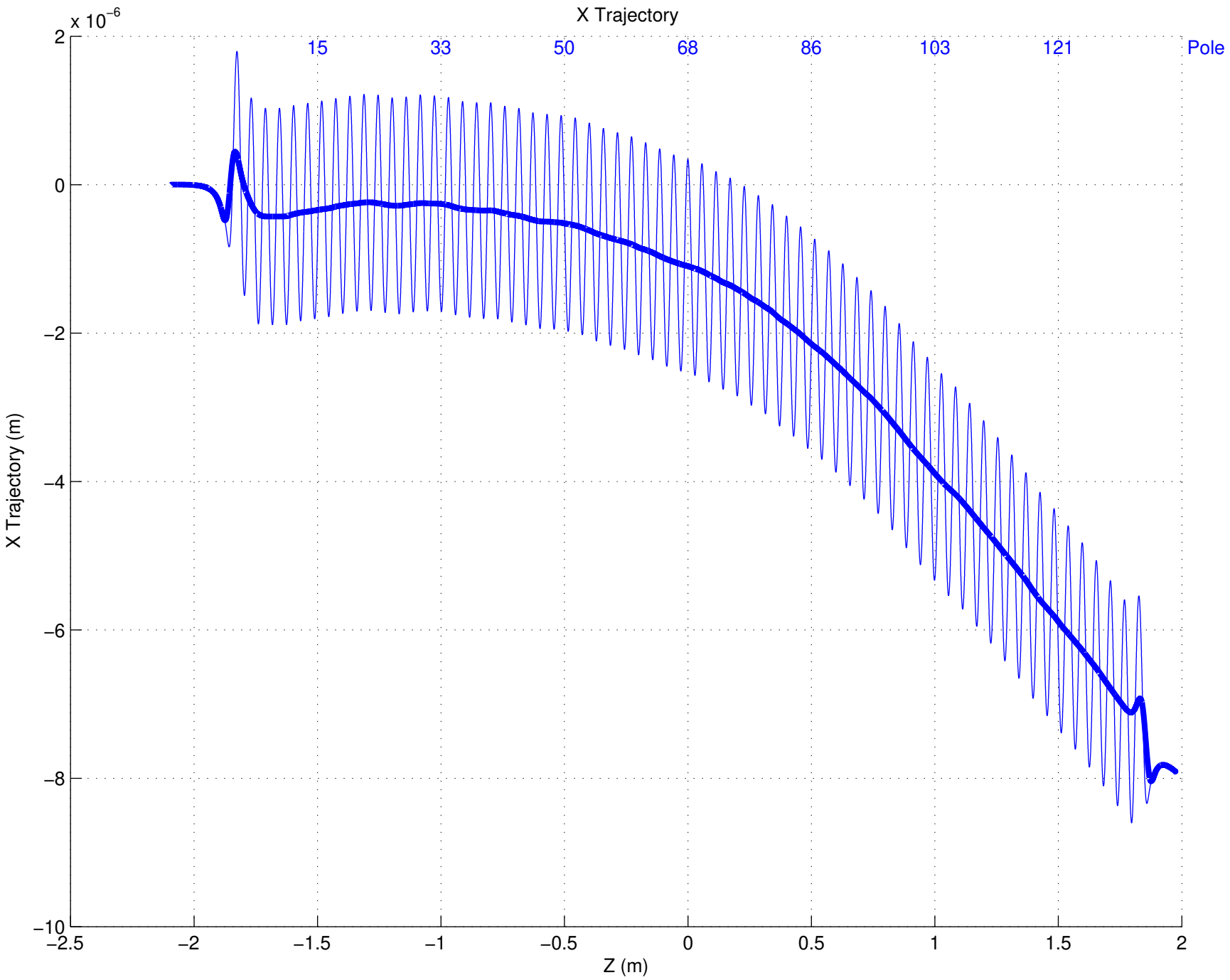

Abs(Fitted Peak Bx) vs Z, Excluding Ends
Abs(Peak Bx) (T)
Z (m)
Peak Fields: Ave = 0.000000 T, RMS = 0.000000 T
1
0.5
0
−0.5
−1
−1
−0.8
−0.6
−0.4
−0.2
0
0.2
0.4
0.6
0.8
1

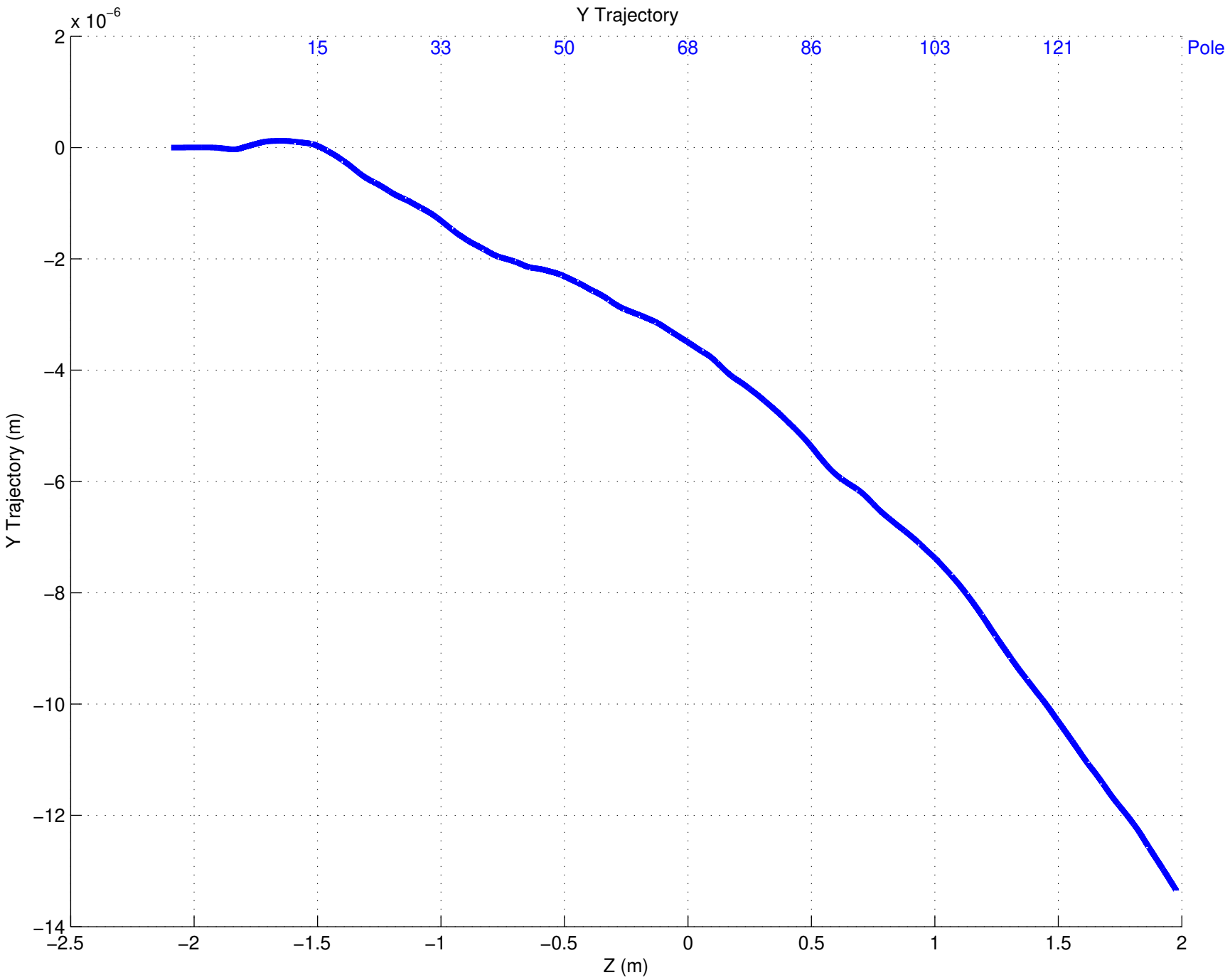

Abs(Fitted Peak By) vs Z, Excluding Ends
15
33
50
68
86
103
121
Pole
Abs(Peak By) (T)
Z (m)
Peak Fields: Ave = 0.788387 T, RMS = 0.003816 T
0.82
0.81
0.8
0.79
0.78
0.77
−2
−1.5
−1
−0.5
0
0.5
1
1.5
2

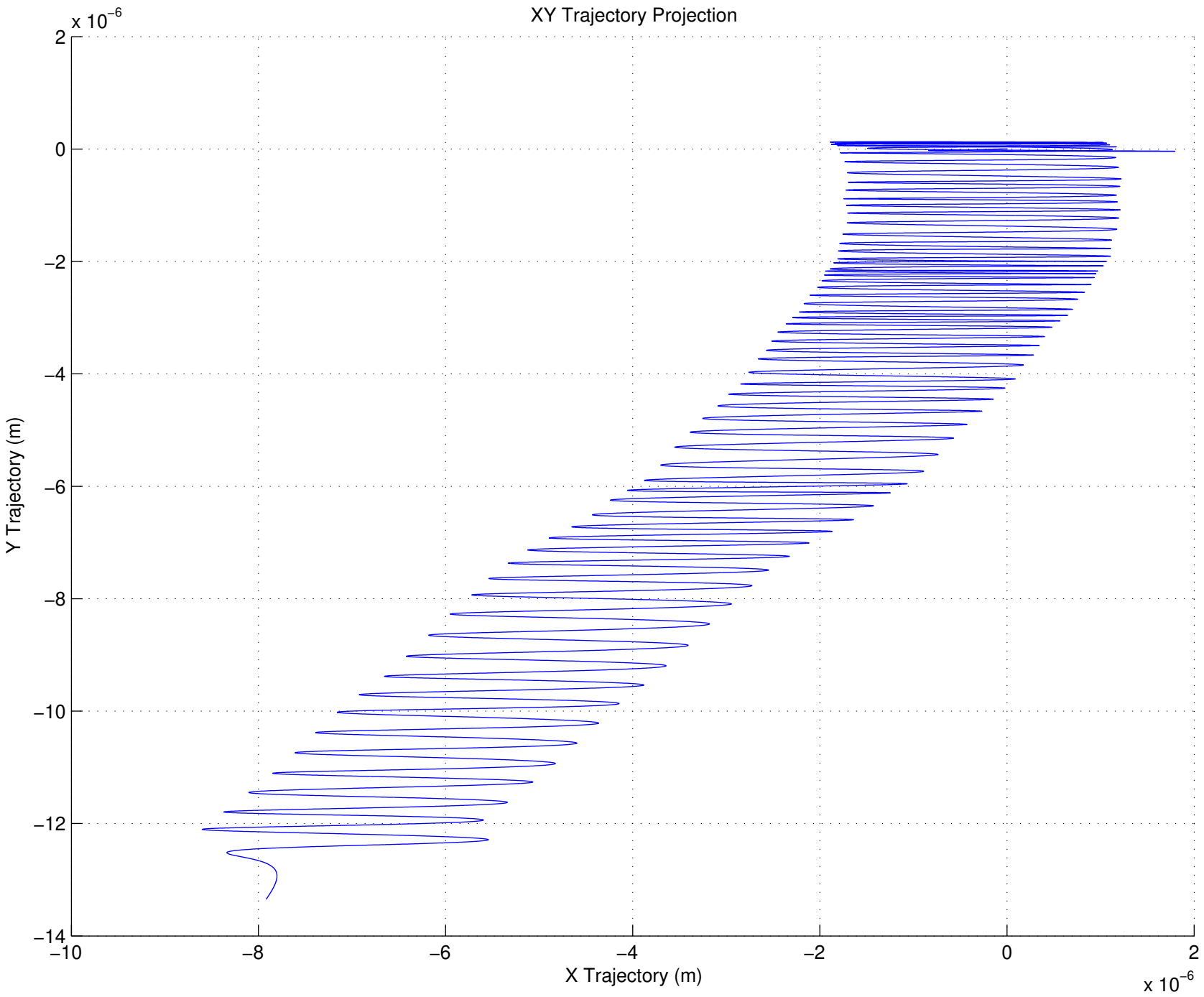

Bx Peak And Zero Field Spacing vs Z, Excluding Ends
Bx Peak And Zero Field Spacing (m)
Z (m)
Peaks
Zeros
Peak Field Spacing: Ave = 0.000000 m, RMS = 0.000000 m
Zero Field Spacing: Ave = 0.000000 m, RMS = 0.000000 m
1
0.5
0
−0.5
−1
−1
−0.8
−0.6
−0.4
−0.2
0
0.2
0.4
0.6
0.8
1

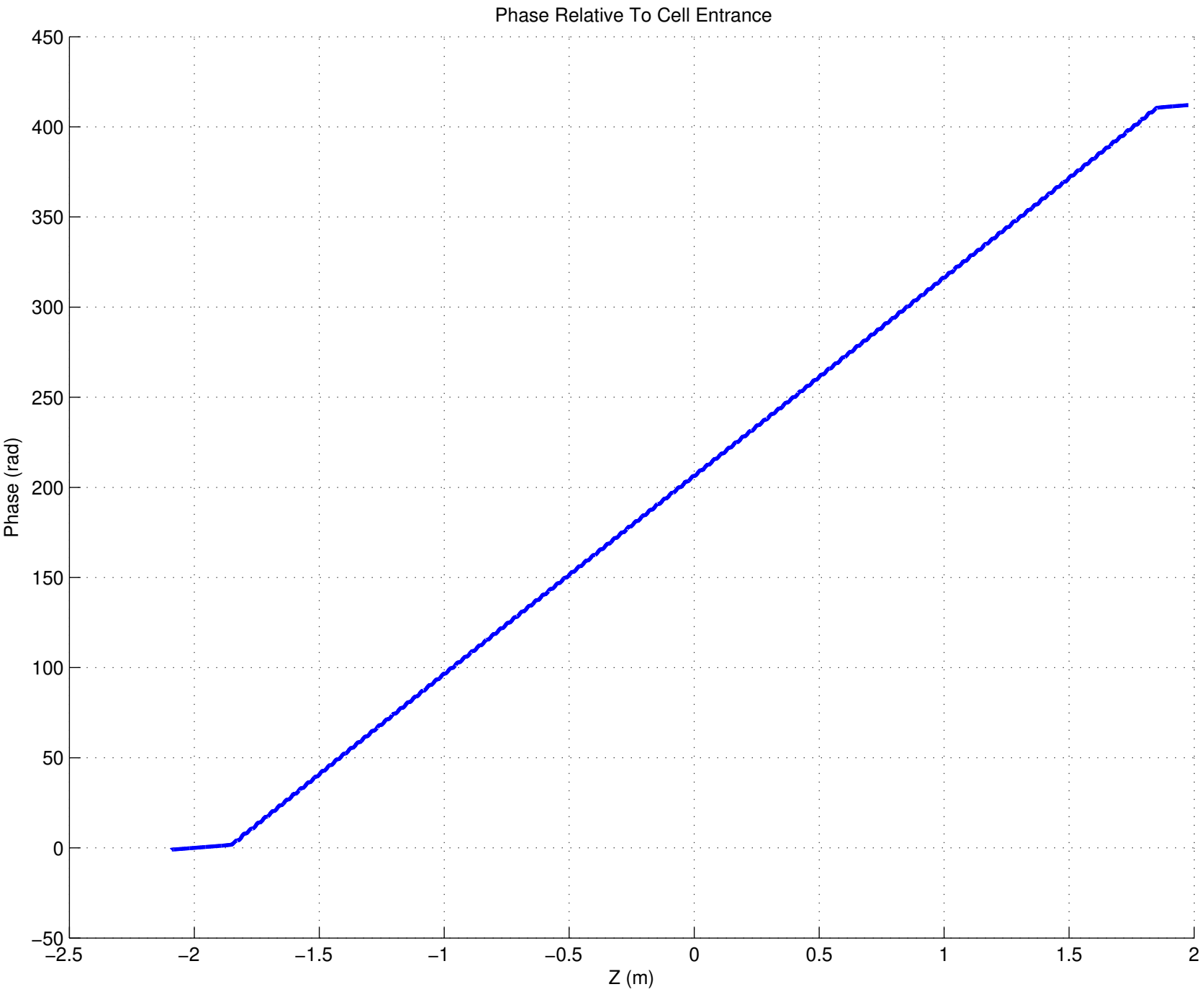

By Peak And Zero Field Spacing vs Z, Excluding Ends
By Peak And Zero Field Spacing (m)
Z (m)
15
33
50
68
86
103
Pole
Peaks
Zeros
Peak Field Spacing: Ave = 0.028517 m, RMS = 0.000135 m
Zero Field Spacing: Ave = 0.028518 m, RMS = 0.000050 m
0.0295
0.029
0.0285
0.028
−2
−1.5
−1
−0.5
0
0.5
1
1.5
2

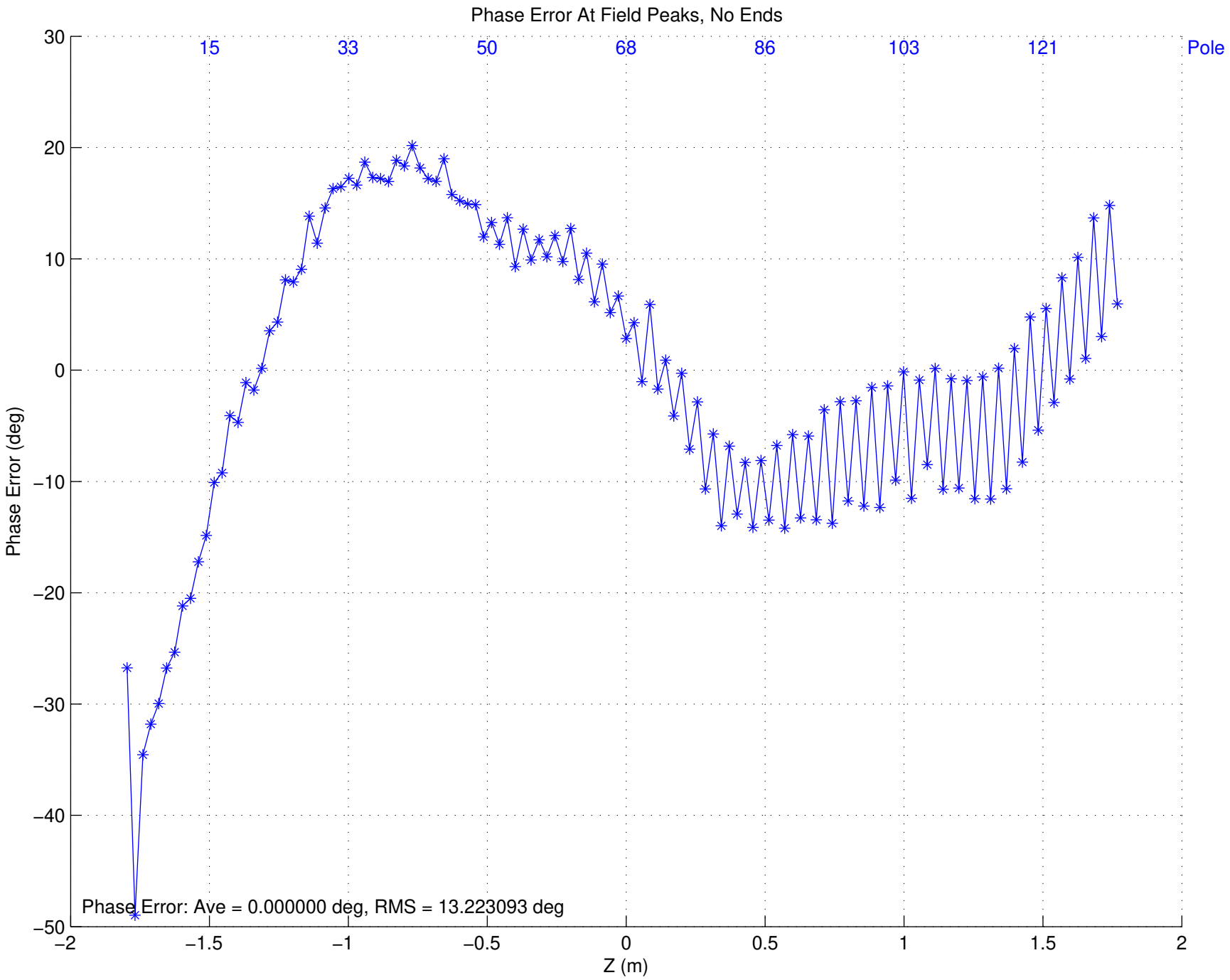

By Field Harmonics
|An|
|Bn|
Absolute Value Of An, Bn (T)
n
10^{0}
10^{-1}
10^{-2}
10^{-3}
10^{-4}
10^{-5}
10^{-6}
0
1
2
3
4
5
6
7
8
9
10

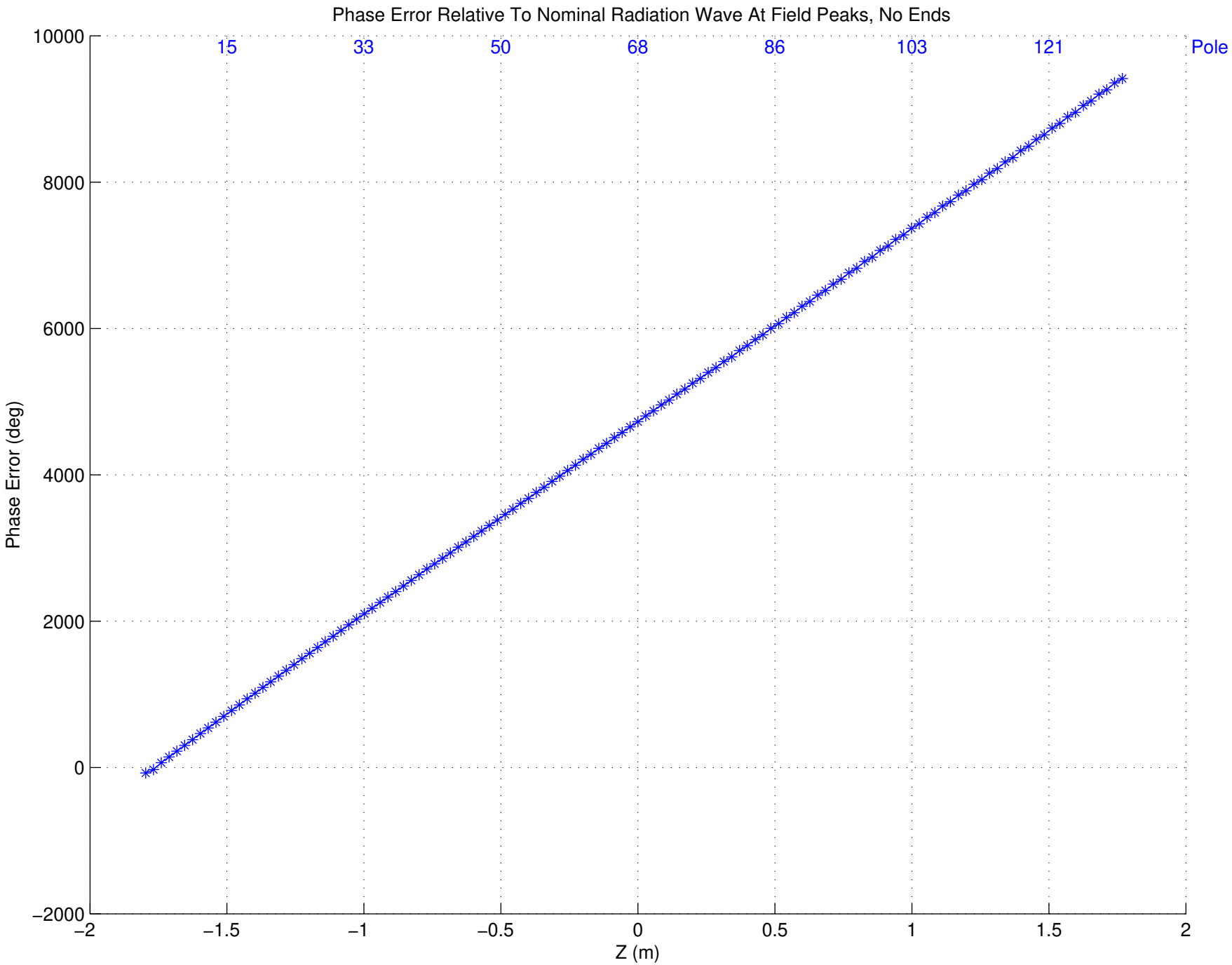

X Trajectory
x 10^-6
15
33
50
68
86
103
121
Pole
2
0
−2
−4
−6
−8
−10
X Trajectory (m)
−2.5
−2
−1.5
−1
−0.5
0
0.5
1
1.5
2
Z (m)

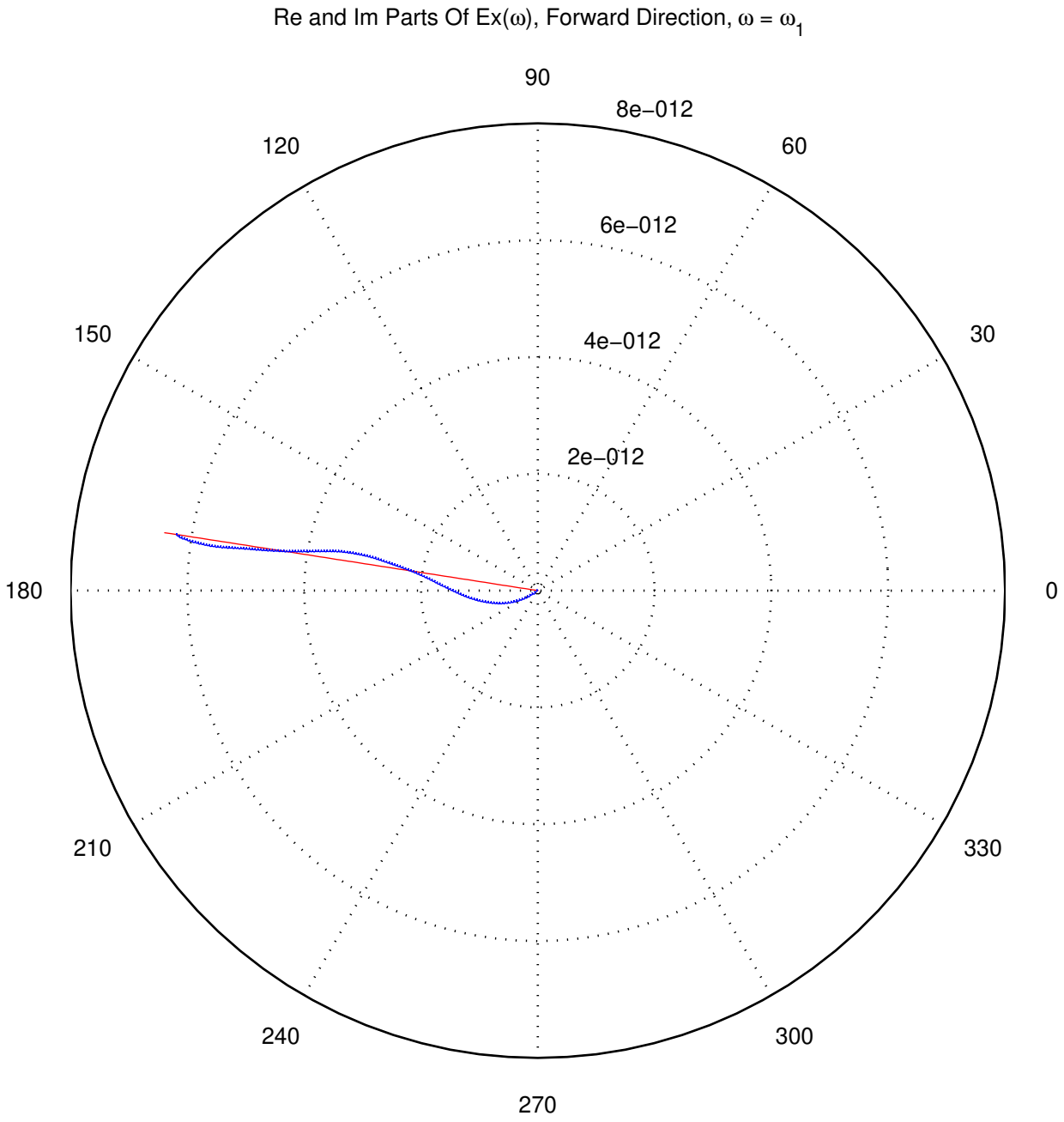

Y Trajectory
x 10^-6
15
33
50
68
86
103
121
Pole
2
0
−2
−4
−6
−8
−10
−12
−14
Y Trajectory (m)
−2.5
−2
−1.5
−1
−0.5
0
0.5
1
1.5
2
Z (m)

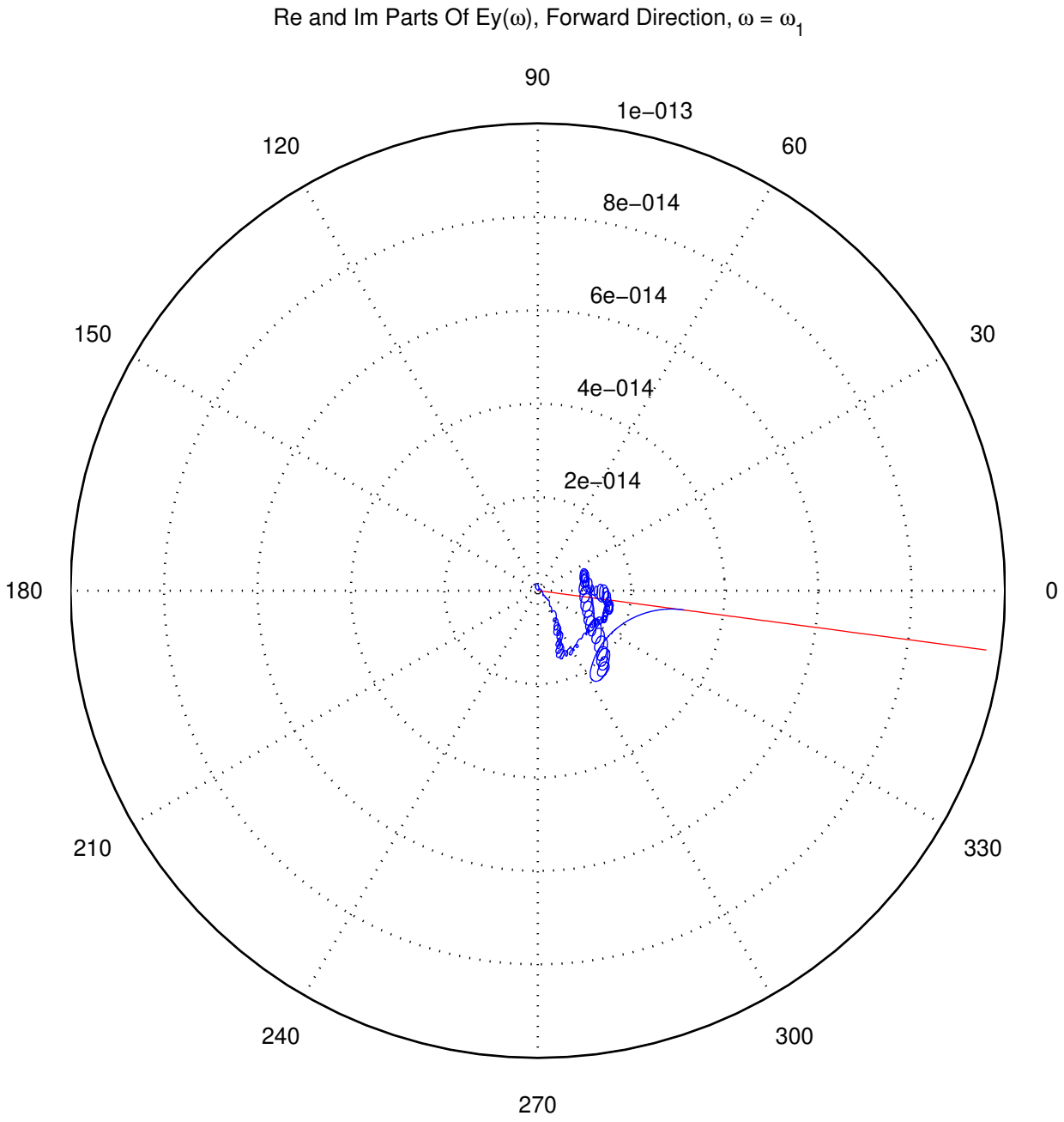

XY Trajectory Projection
x 10^-6
2
0
−2
−4
−6
−8
−10
−12
−14
Y Trajectory (m)
−10
−8
−6
−4
−2
0
2
X Trajectory (m)
x 10^-6

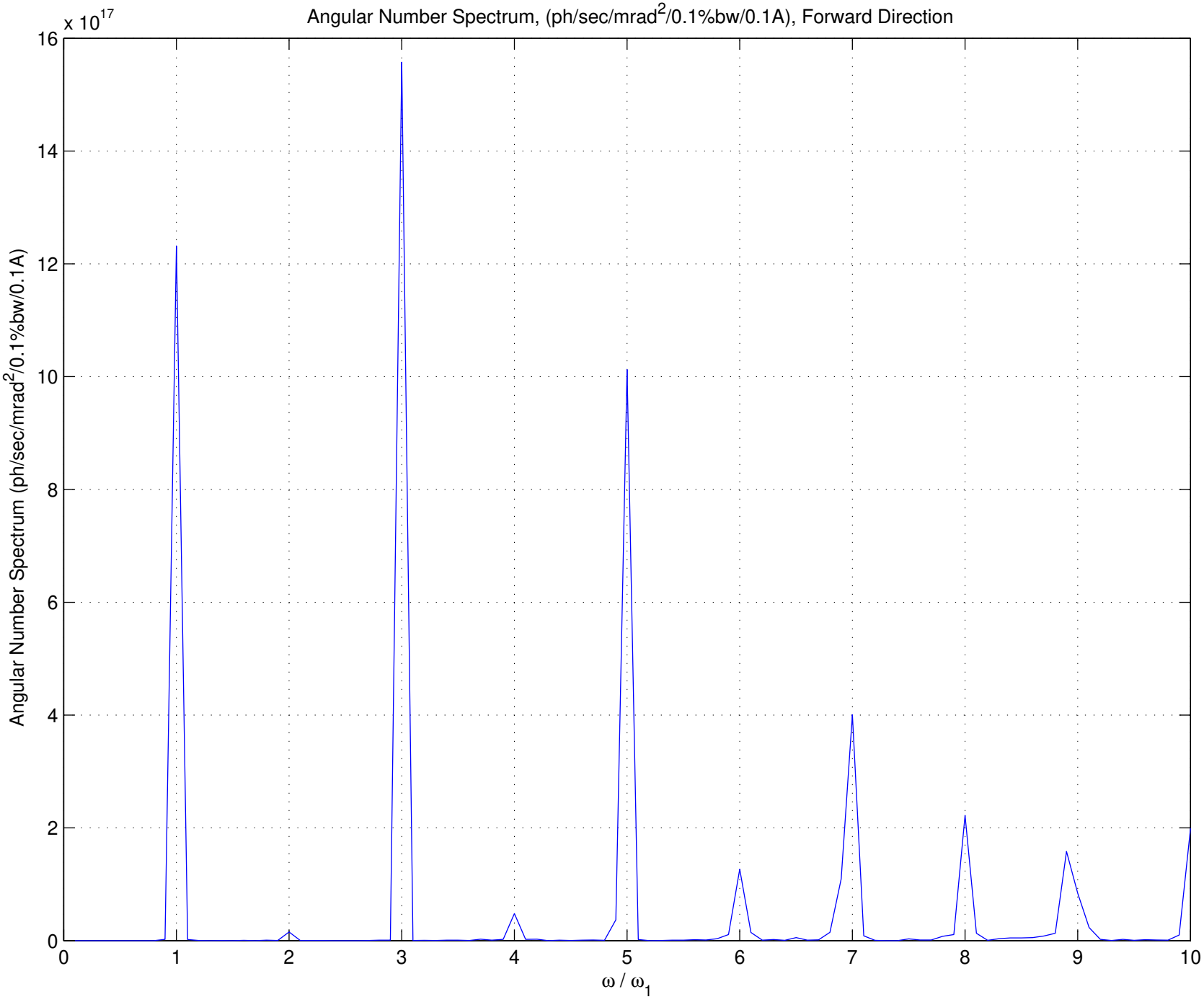

Phase Relative To Cell Entrance
Phase (rad)
Z (m)
450
400
350
300
250
200
150
100
50
0
−50
−2.5
−2
−1.5
−1
−0.5
0
0.5
1
1.5
2

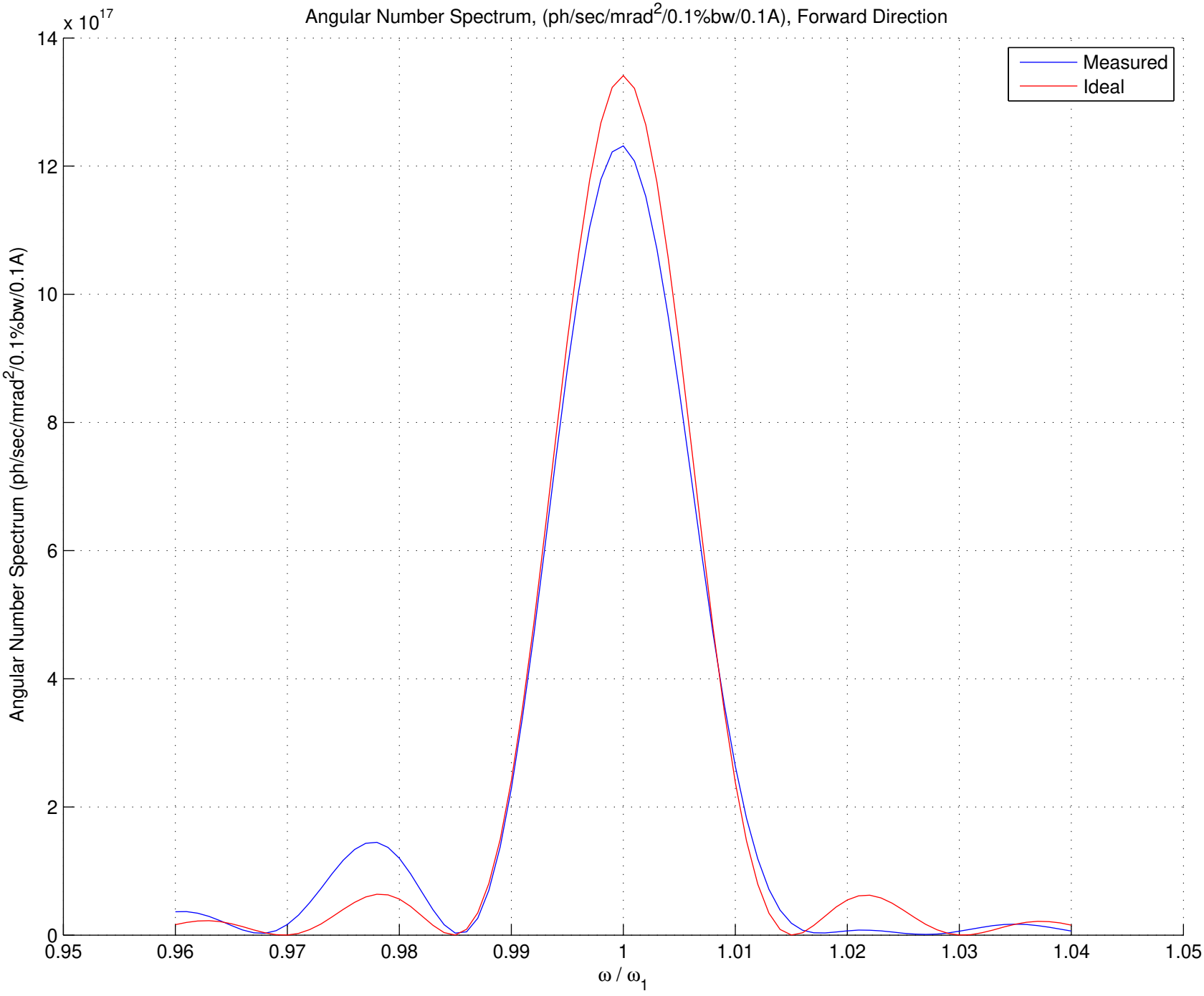

Phase Error At Field Peaks, No Ends
15
33
50
68
86
103
121
Pole
30
20
10
0
−10
−20
−30
−40
−50
Phase Error (deg)
−2
−1.5
−1
−0.5
0
0.5
1
1.5
2
Z (m)
Phase Error: Ave = 0.000000 deg, RMS = 13.223093 deg

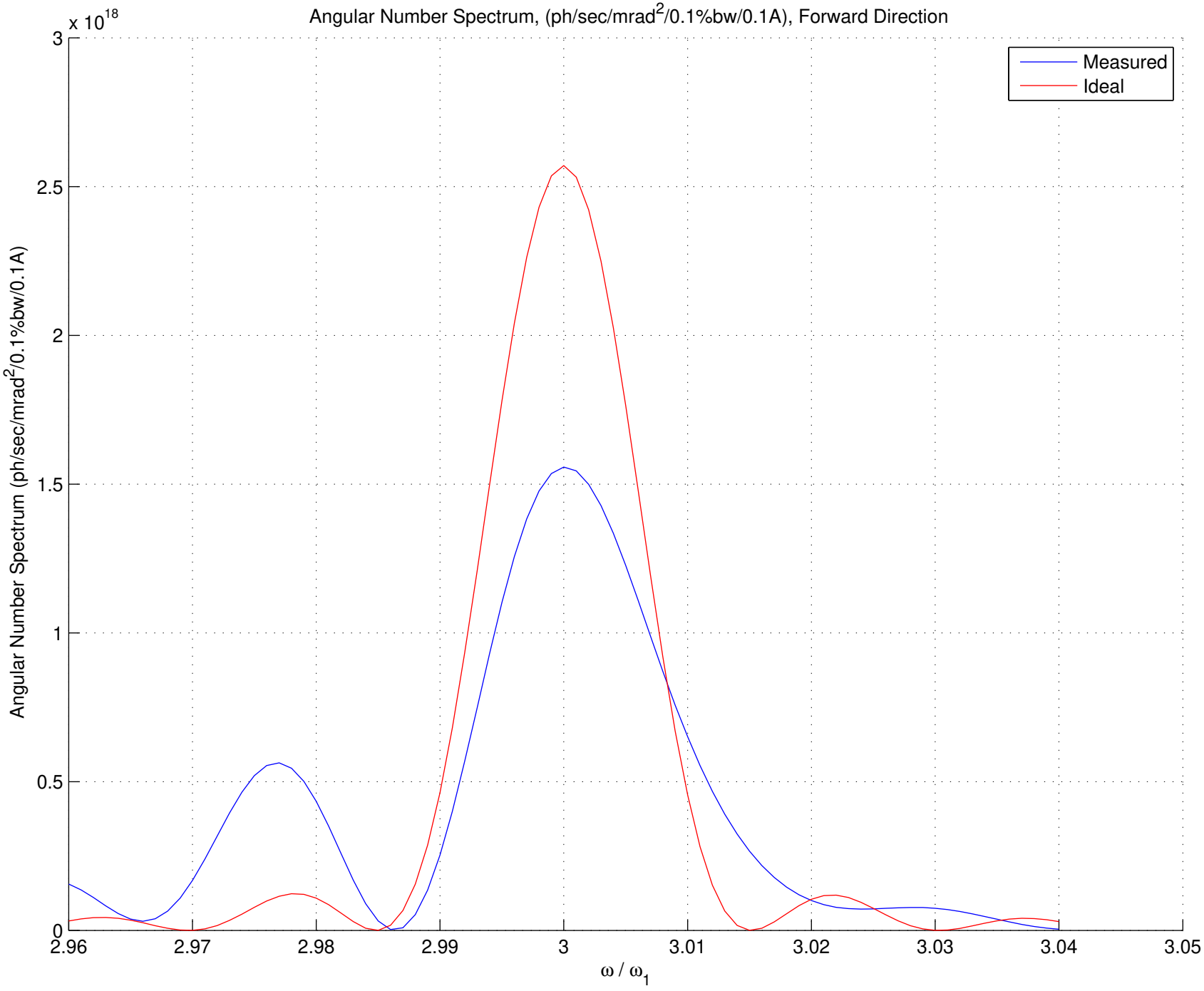

Phase Error Relative To Nominal Radiation Wave At Field Peaks, No Ends
15
33
50
68
86
103
121
Pole
10000
8000
6000
4000
2000
0
−2000
Phase Error (deg)
−2
−1.5
−1
−0.5
0
0.5
1
1.5
2
Z (m)

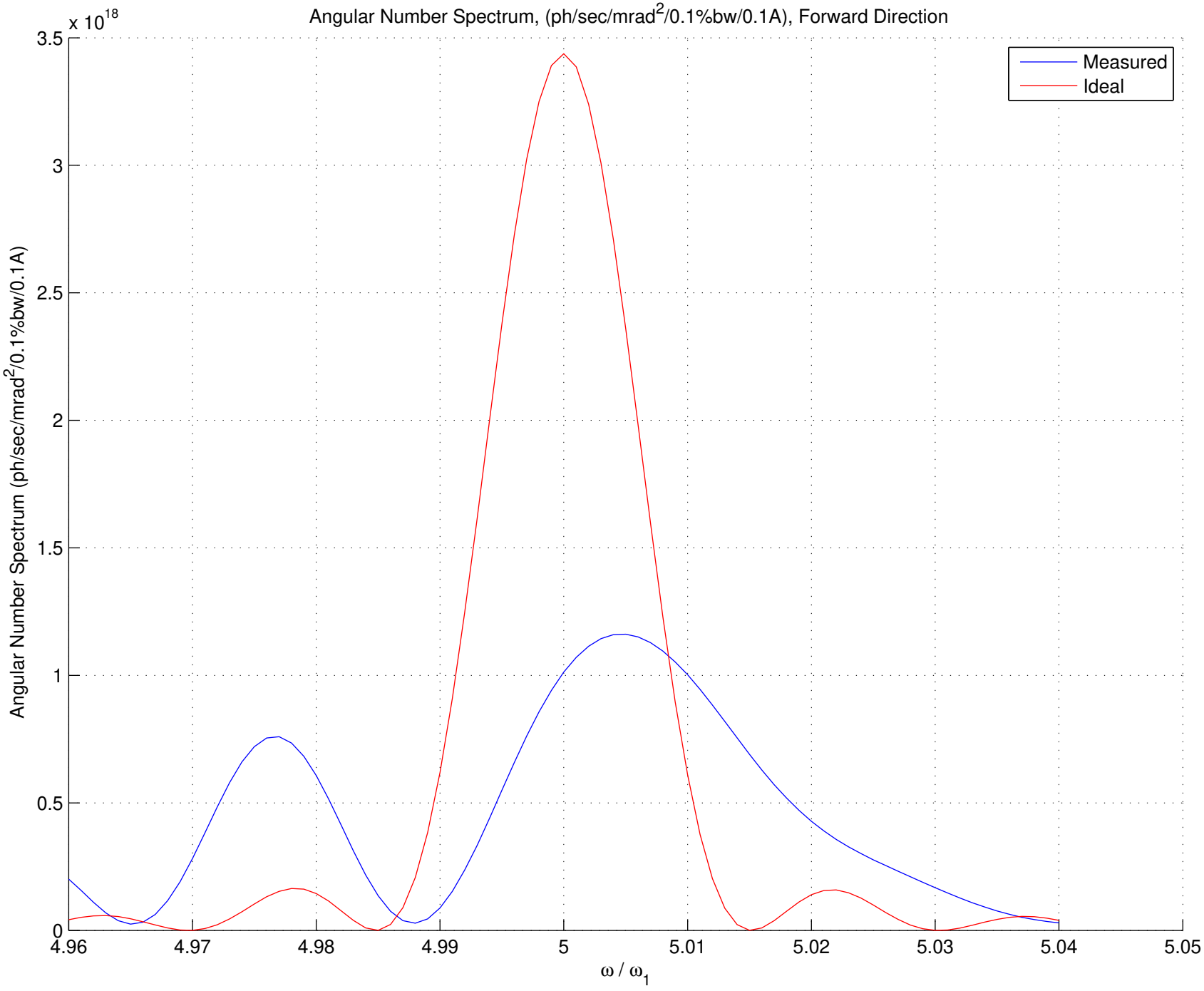

Re and Im Parts Of Ex(ω), Forward Direction, ω = ω1
90
8e−012
120
60
6e−012
150
30
4e−012
2e−012
180
0
210
330
240
300
270


Re and Im Parts Of Ey(ω), Forward Direction, ω = ω1
90
1e−013
120
60
8e−014
6e−014
150
30
4e−014
2e−014
180
0
210
330
240
300
270


Angular Number Spectrum, (ph/sec/mrad^2/0.1%bw/0.1A), Forward Direction
x 10^{17}
Angular Number Spectrum (ph/sec/mrad^2/0.1%bw/0.1A)
ω / ω_1
0
2
4
6
8
10
12
14
16
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^{17}
Measured
Ideal
Angular Number Spectrum (ph/sec/mrad^2/0.1%bw/0.1A)
ω / ω_1
0
2
4
6
8
10
12
14
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)
ω / ω_1
0
0.5
1
1.5
2
2.5
3
2.96
2.97
2.98
2.99
3
3.01
3.02
3.03
3.04
3.05


Angular Number Spectrum, (ph/sec/mrad2/0.1%bw/0.1A), Forward Direction
x 10^18
3.5
3
2.5
2
1.5
1
0.5
0
Angular Number Spectrum (ph/sec/mrad2/0.1%bw/0.1A)
4.96
4.97
4.98
4.99
5
5.01
5.02
5.03
5.04
5.05
ω / ω1
Measured
Ideal