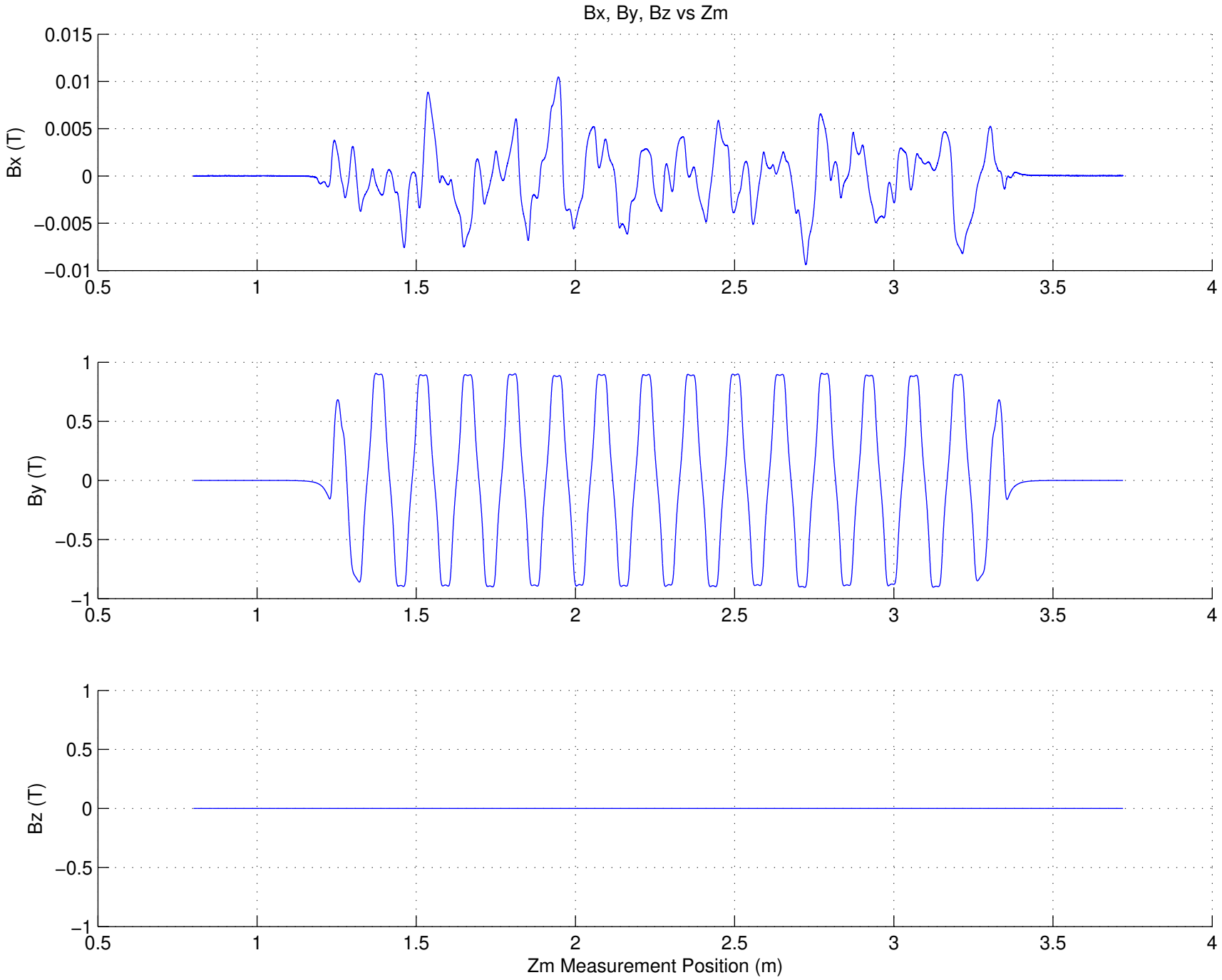
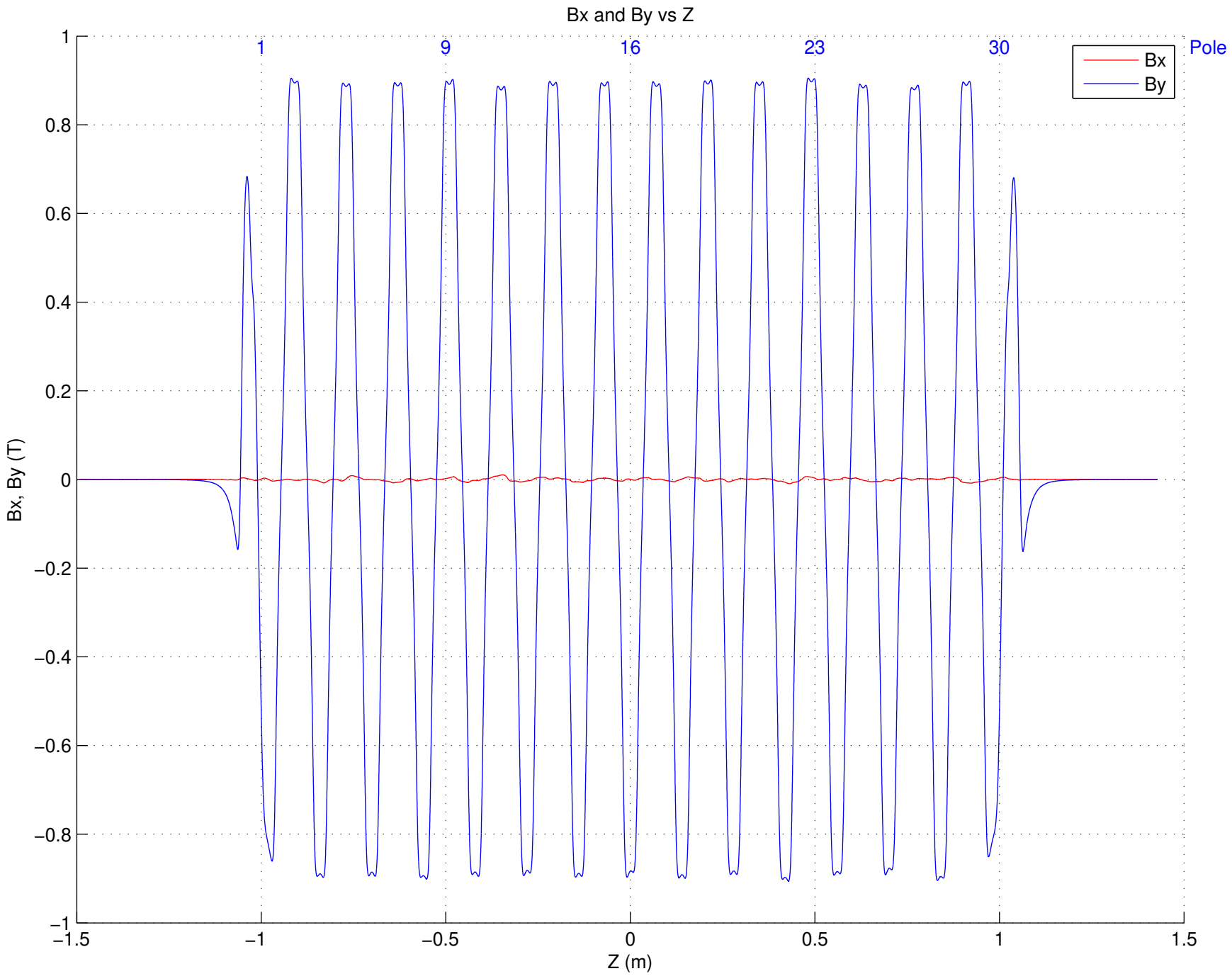
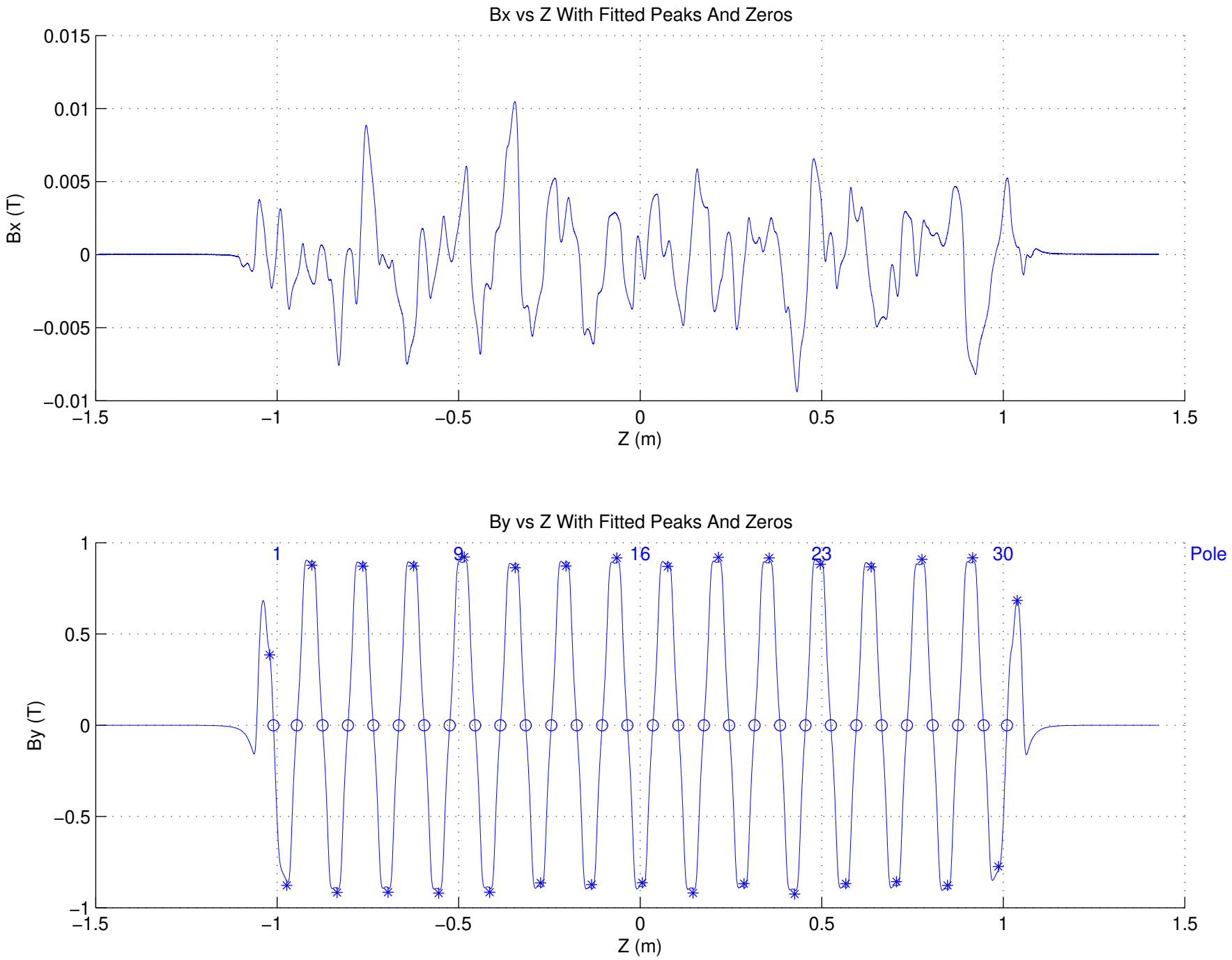
SLAC Magnetic Measurements

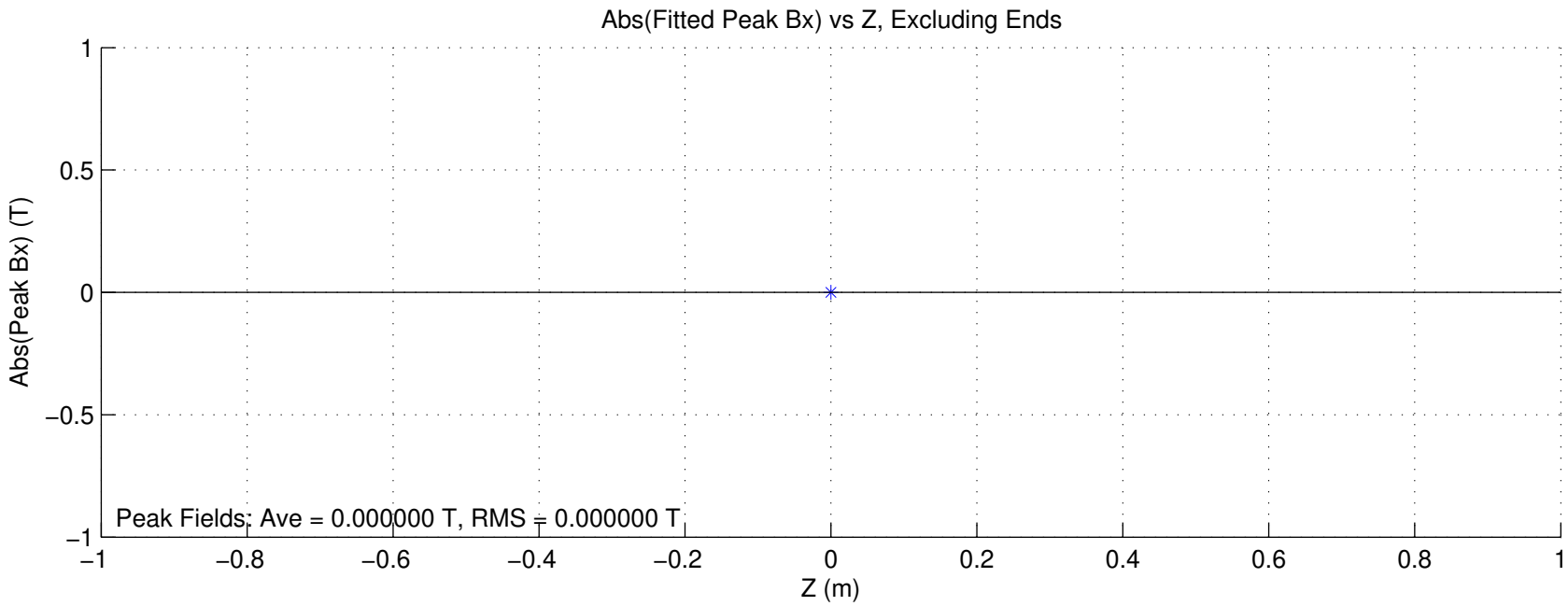
EPU Analysis
−−−−−−−−−−−

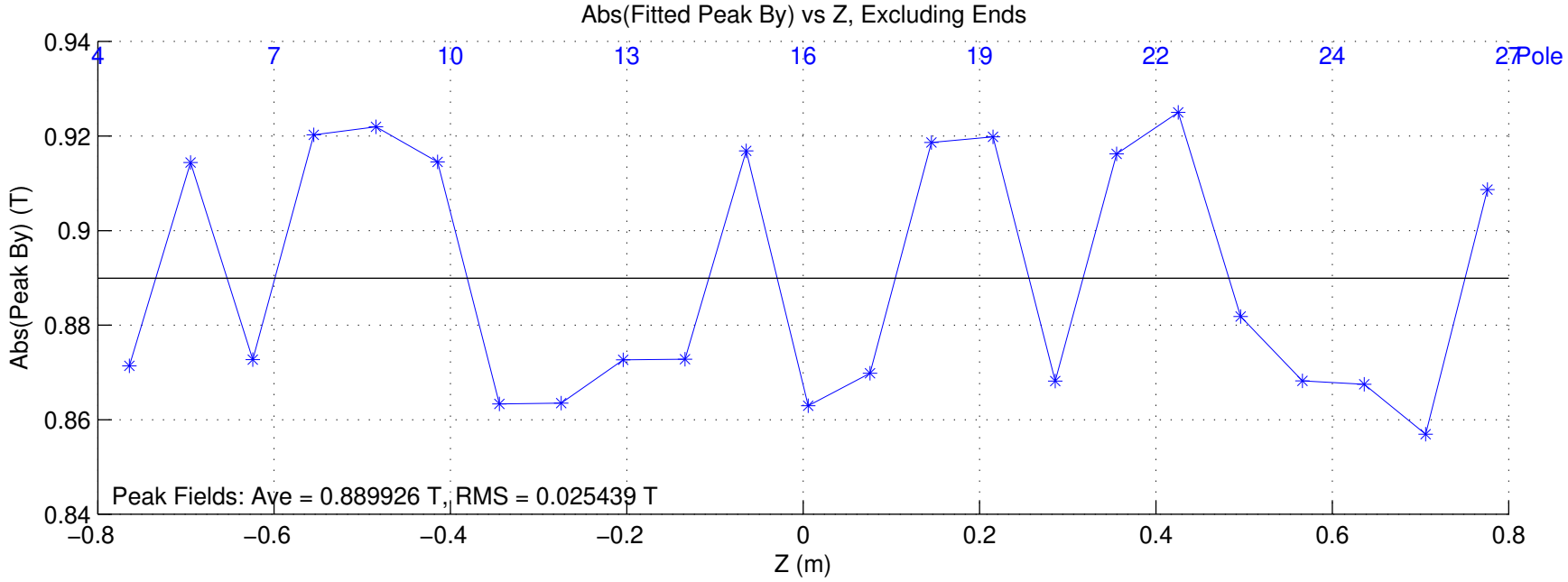
Parameters:
INPUT−FILE−DIR =S:\MagData\LCLS\Undulator\SSRL−BL5−EPU\DATASET0001\Rough Tuning\Z Scans\Run 003\
INPUT−FILE−NAME =x+00000−y+000−bscanz.dat
INPUT−FILE−TYPE =ZVXYBXYH
CORR−REQUIRED =0
GAMMA =5878
NOM−LAMBDA−U =140
NOM−K−VALUE =9
NOM−LAMBDA−R =0
NUM−POLES =31
NUM−END−POLES =4
CELL−LENGTH =3.126

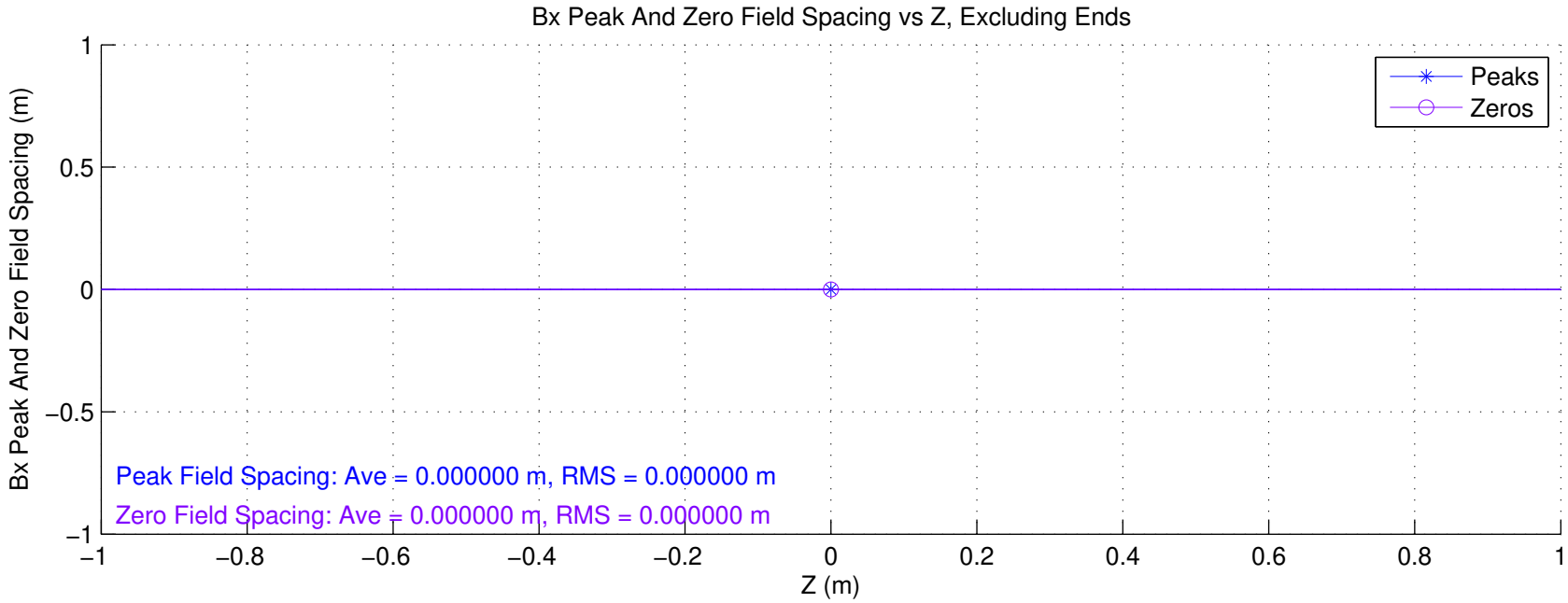

Bx, By, Bz vs Zm
Bx (T)
0.015
0.01
0.005
0
−0.005
−0.01
By (T)
1
0.5
0
−0.5
−1
Bz (T)
1
0.5
0
−0.5
−1
0.5
1
1.5
2
2.5
3
3.5
4
Zm Measurement Position (m)

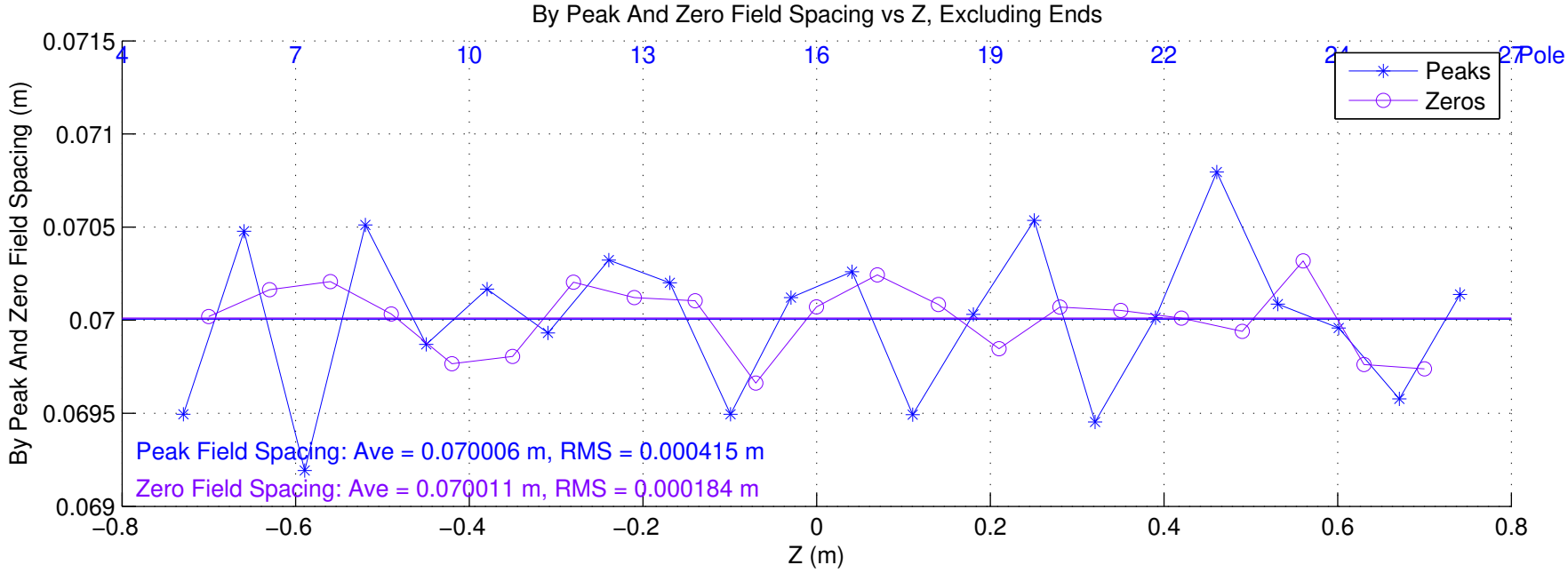

Bx and By vs Z
1
9
16
23
30
Pole
Bx
By
Bx, By (T)
Z (m)
1
0.8
0.6
0.4
0.2
0
−0.2
−0.4
−0.6
−0.8
−1
−1.5
−1
−0.5
0
0.5
1
1.5

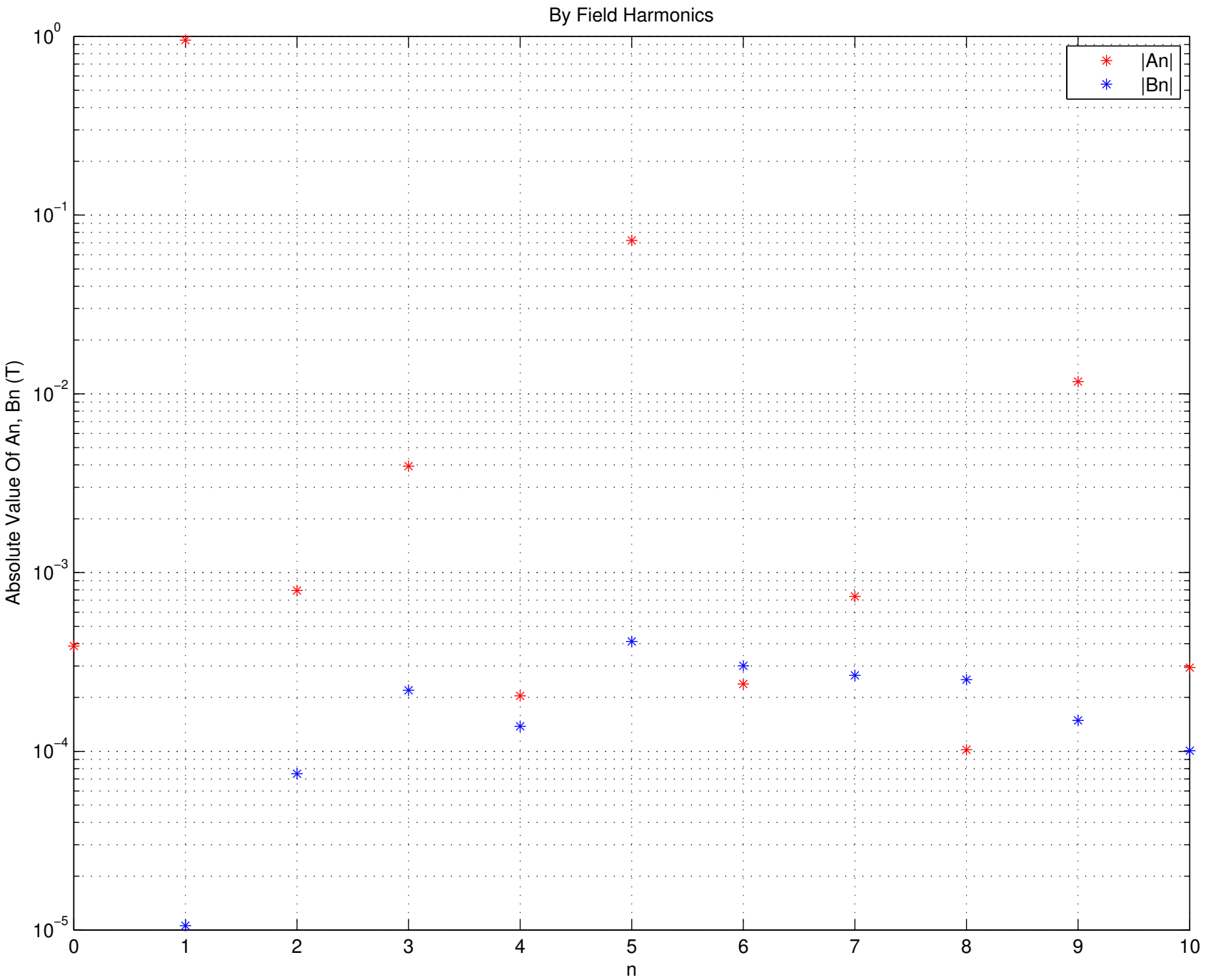

Bx vs Z With Fitted Peaks And Zeros
Bx (T)
Z (m)
0.015
0.01
0.005
0
−0.005
−0.01
−1.5
−1
−0.5
0
0.5
1
1.5
By vs Z With Fitted Peaks And Zeros
By (T)
Z (m)
1
9
16
23
30
Pole
1
0.5
0
−0.5
−1

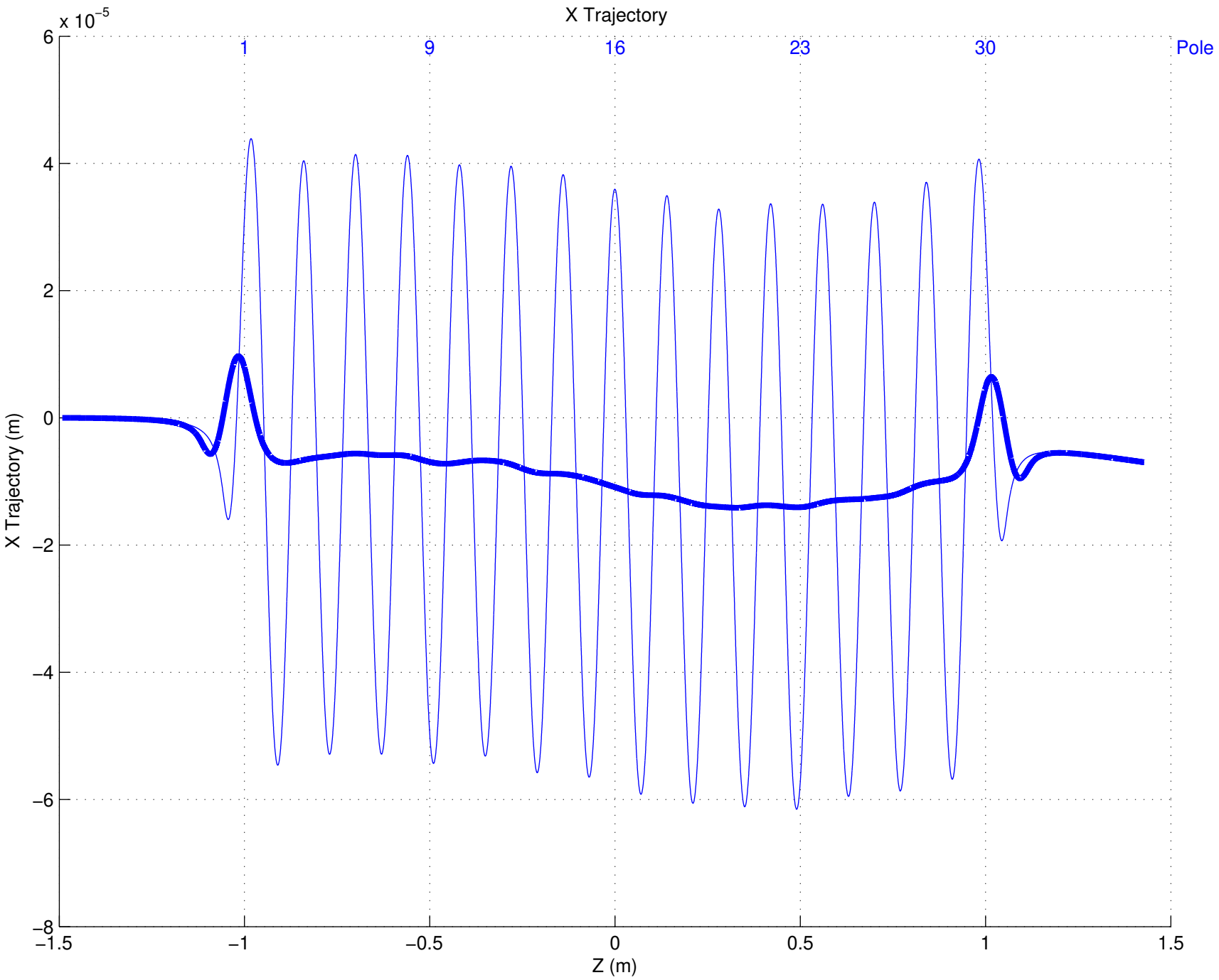

Abs(Fitted Peak Bx) vs Z, Excluding Ends
Abs(Peak Bx) (T)
Z (m)
Peak Fields: Ave = 0.000000 T, RMS = 0.000000 T
1
0.5
0
−0.5
−1
−1
−0.8
−0.6
−0.4
−0.2
0
0.2
0.4
0.6
0.8
1

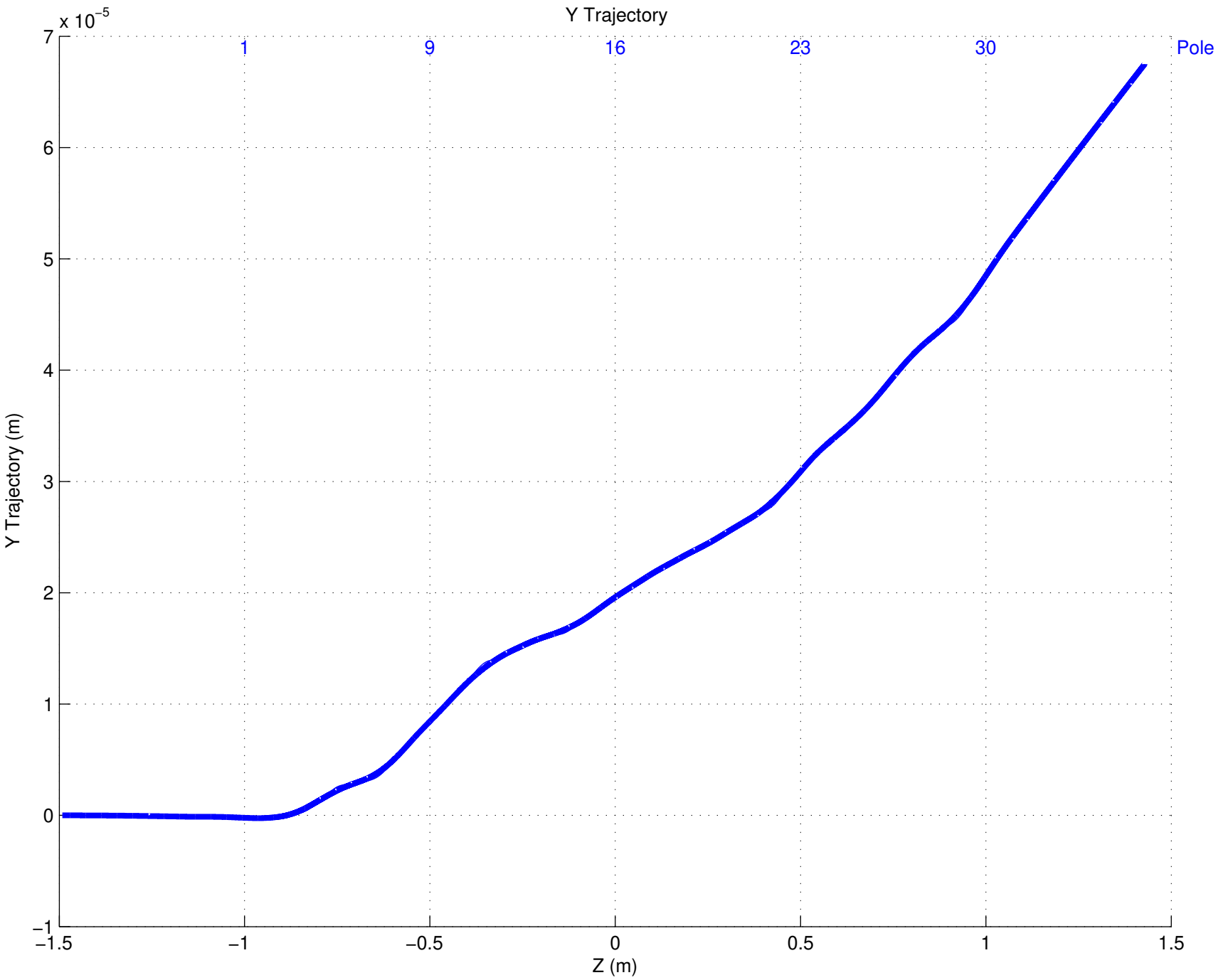

Abs(Fitted Peak By) vs Z, Excluding Ends
Abs(Peak By) (T)
Z (m)
Pole
Peak Fields: Ave = 0.889926 T, RMS = 0.025439 T
4
7
10
13
16
19
22
24
27
0.94
0.92
0.9
0.88
0.86
0.84
−0.8
−0.6
−0.4
−0.2
0
0.2
0.4
0.6
0.8

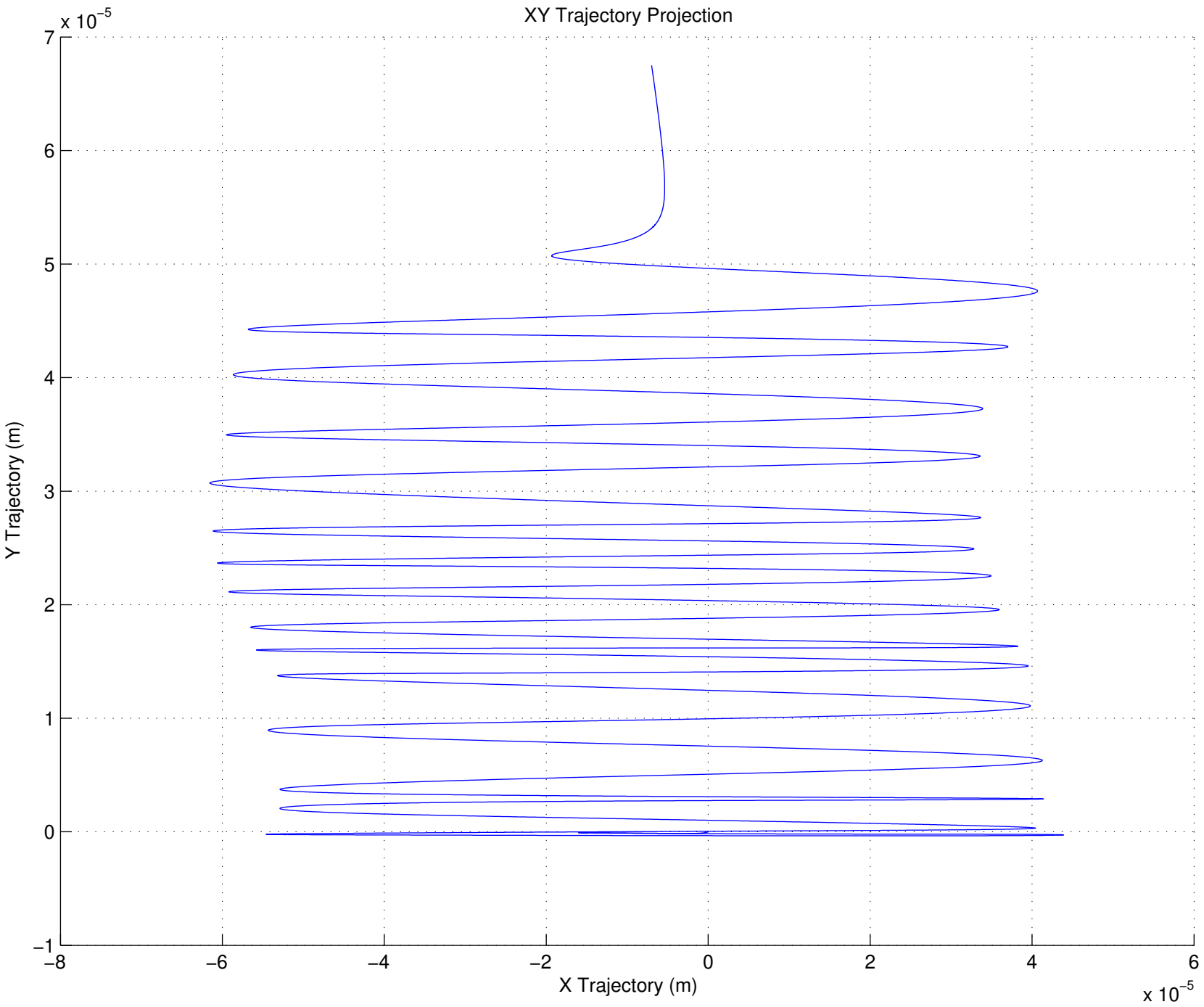

Bx Peak And Zero Field Spacing vs Z, Excluding Ends
Bx Peak And Zero Field Spacing (m)
Z (m)
Peaks
Zeros
Peak Field Spacing: Ave = 0.000000 m, RMS = 0.000000 m
Zero Field Spacing: Ave = 0.000000 m, RMS = 0.000000 m
1
0.5
0
−0.5
−1
−1
−0.8
−0.6
−0.4
−0.2
0
0.2
0.4
0.6
0.8
1

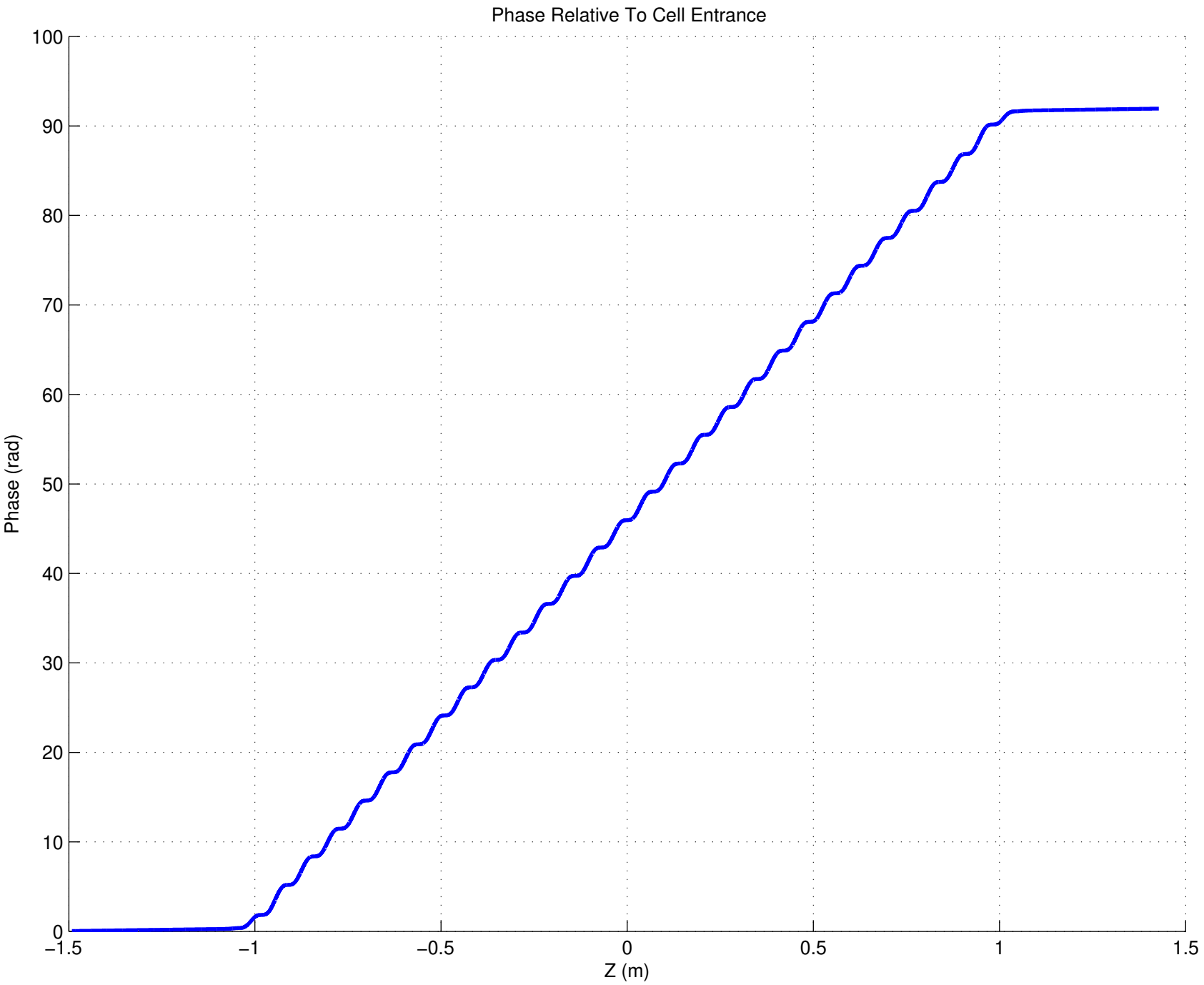

By Peak And Zero Field Spacing vs Z, Excluding Ends
By Peak And Zero Field Spacing (m)
Z (m)
Pole
Peaks
Zeros
Peak Field Spacing: Ave = 0.070006 m, RMS = 0.000415 m
Zero Field Spacing: Ave = 0.070011 m, RMS = 0.000184 m
4
7
10
13
16
19
22
27
0.0715
0.071
0.0705
0.07
0.0695
0.069
−0.8
−0.6
−0.4
−0.2
0
0.2
0.4
0.6
0.8

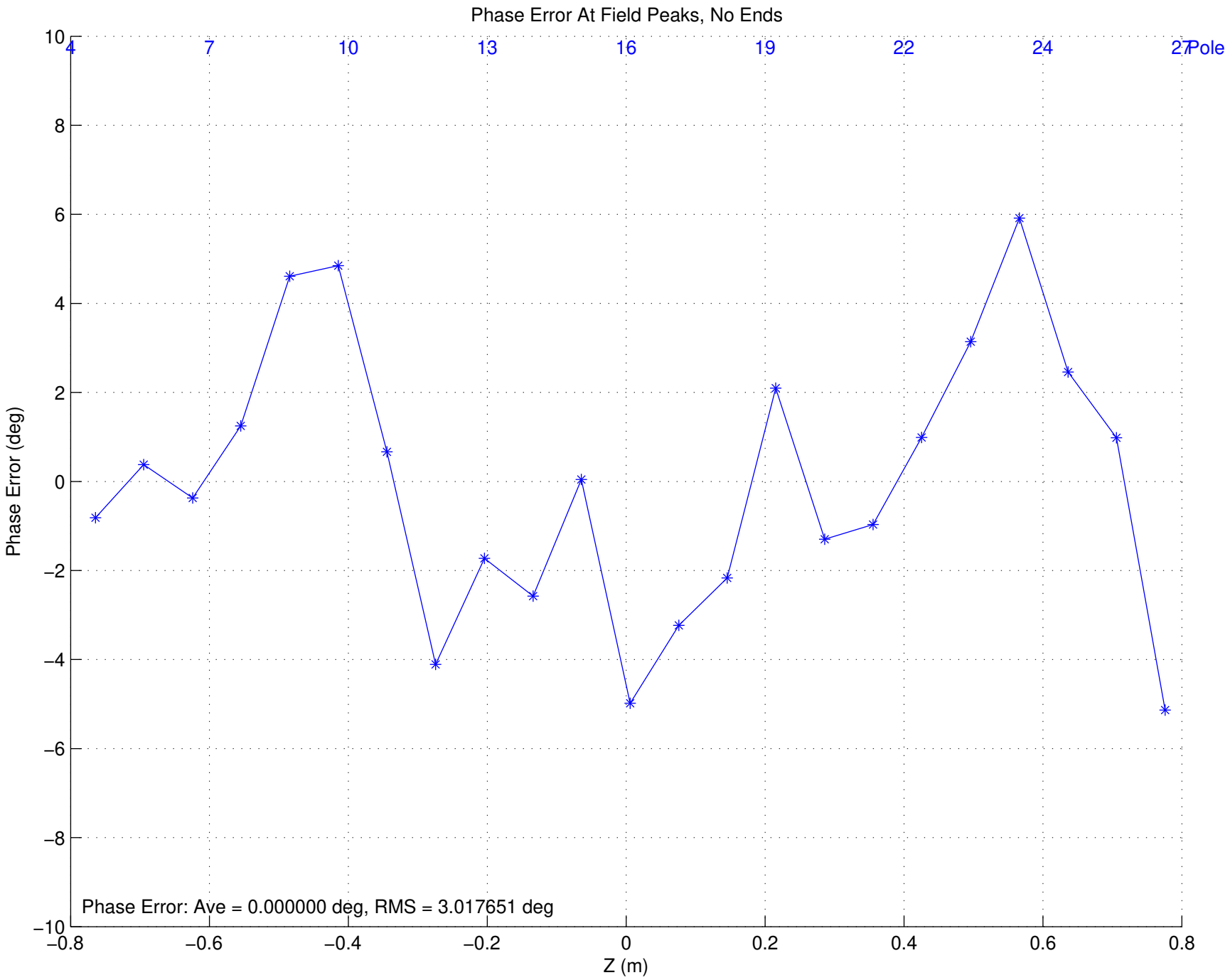

By Field Harmonics
Absolute Value Of An, Bn (T)
n
|An|
|Bn|
10^{0}
10^{-1}
10^{-2}
10^{-3}
10^{-4}
10^{-5}
0
1
2
3
4
5
6
7
8
9
10

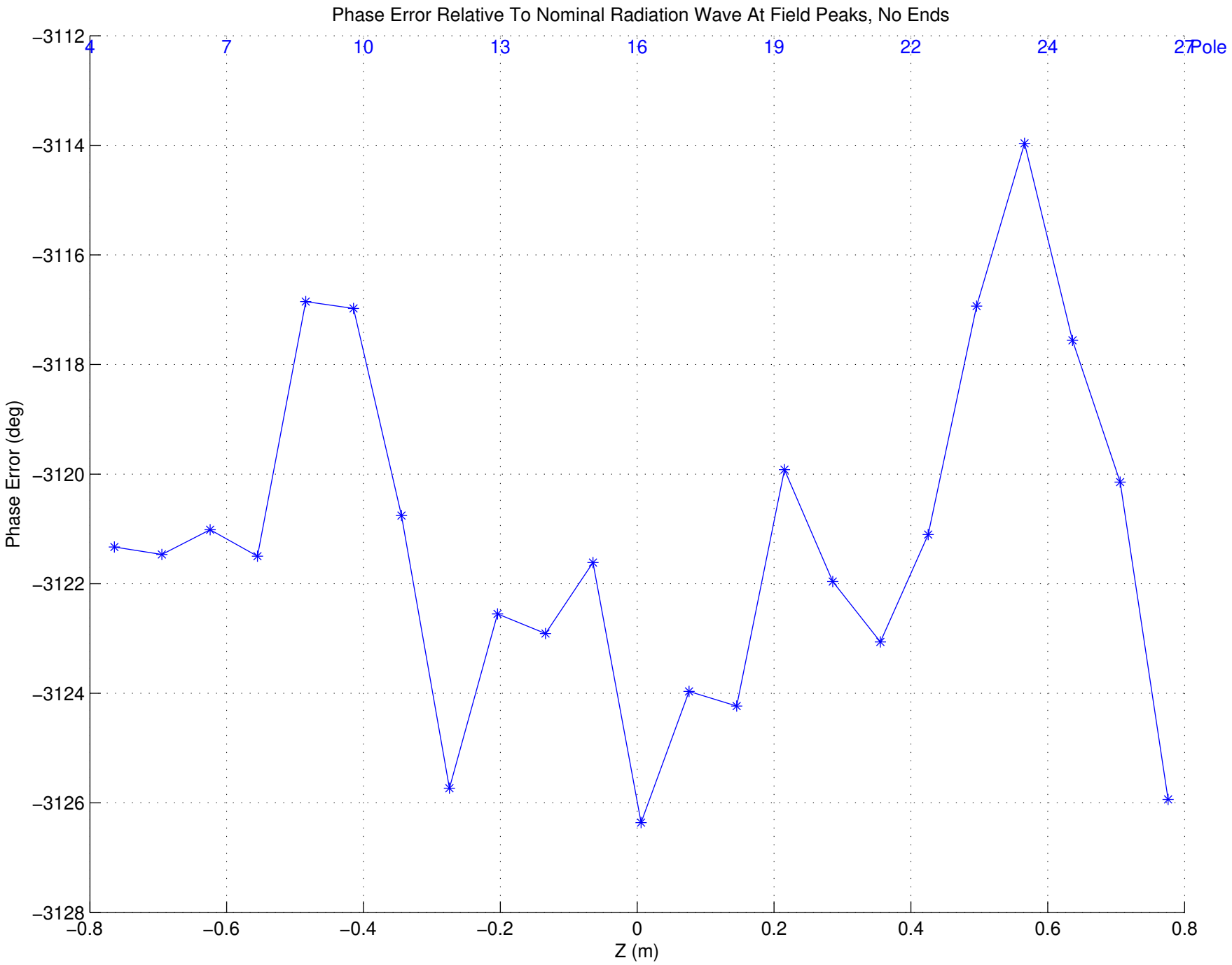

X Trajectory
x 10^-5
6
4
2
0
−2
−4
−6
−8
1
9
16
23
30
Pole
X Trajectory (m)
−1.5
−1
−0.5
0
0.5
1
1.5
Z (m)

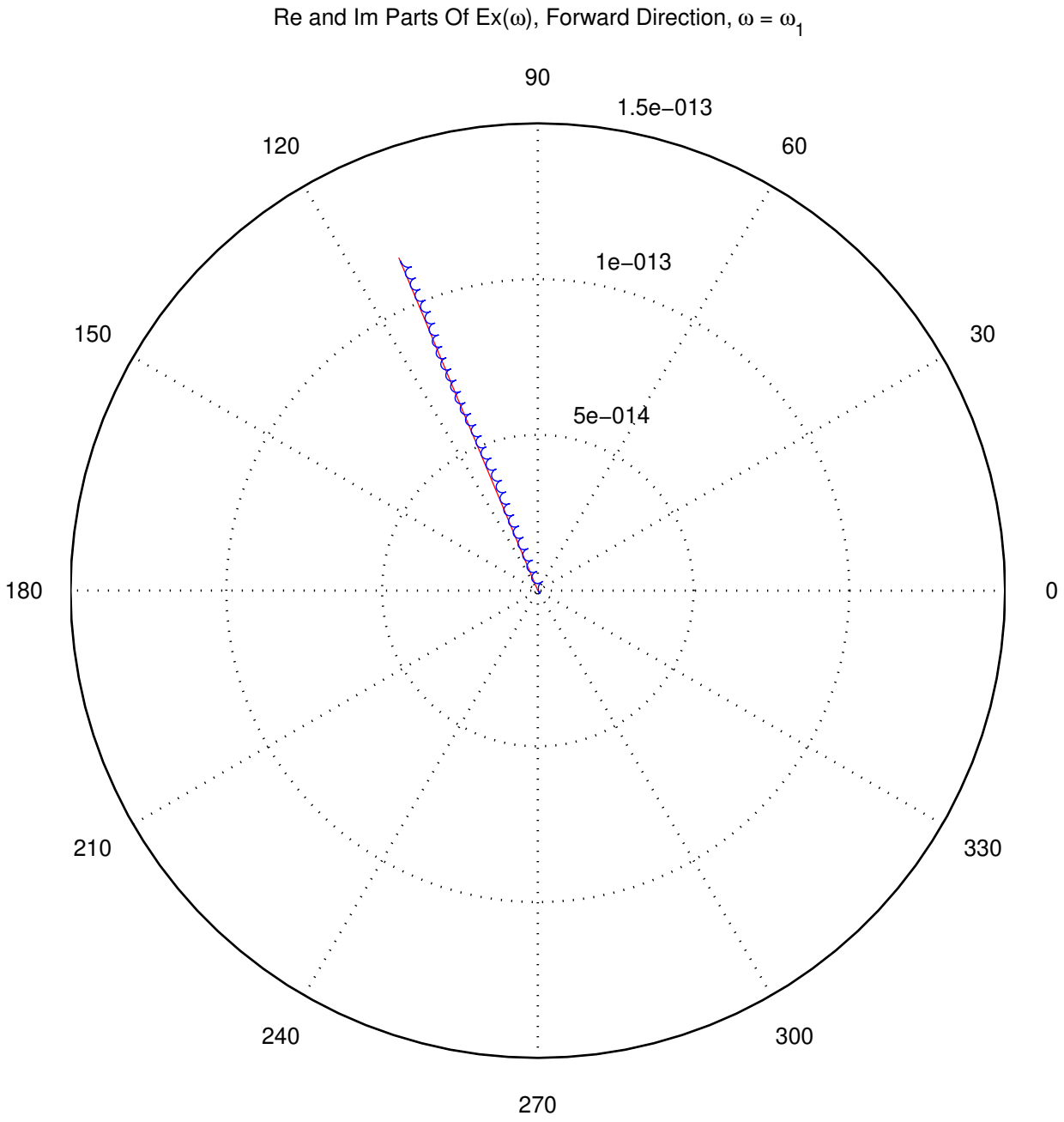

Y Trajectory
x 10^-5
7
6
5
4
3
2
1
0
−1
1
9
16
23
30
Pole
Y Trajectory (m)
−1.5
−1
−0.5
0
0.5
1
1.5
Z (m)

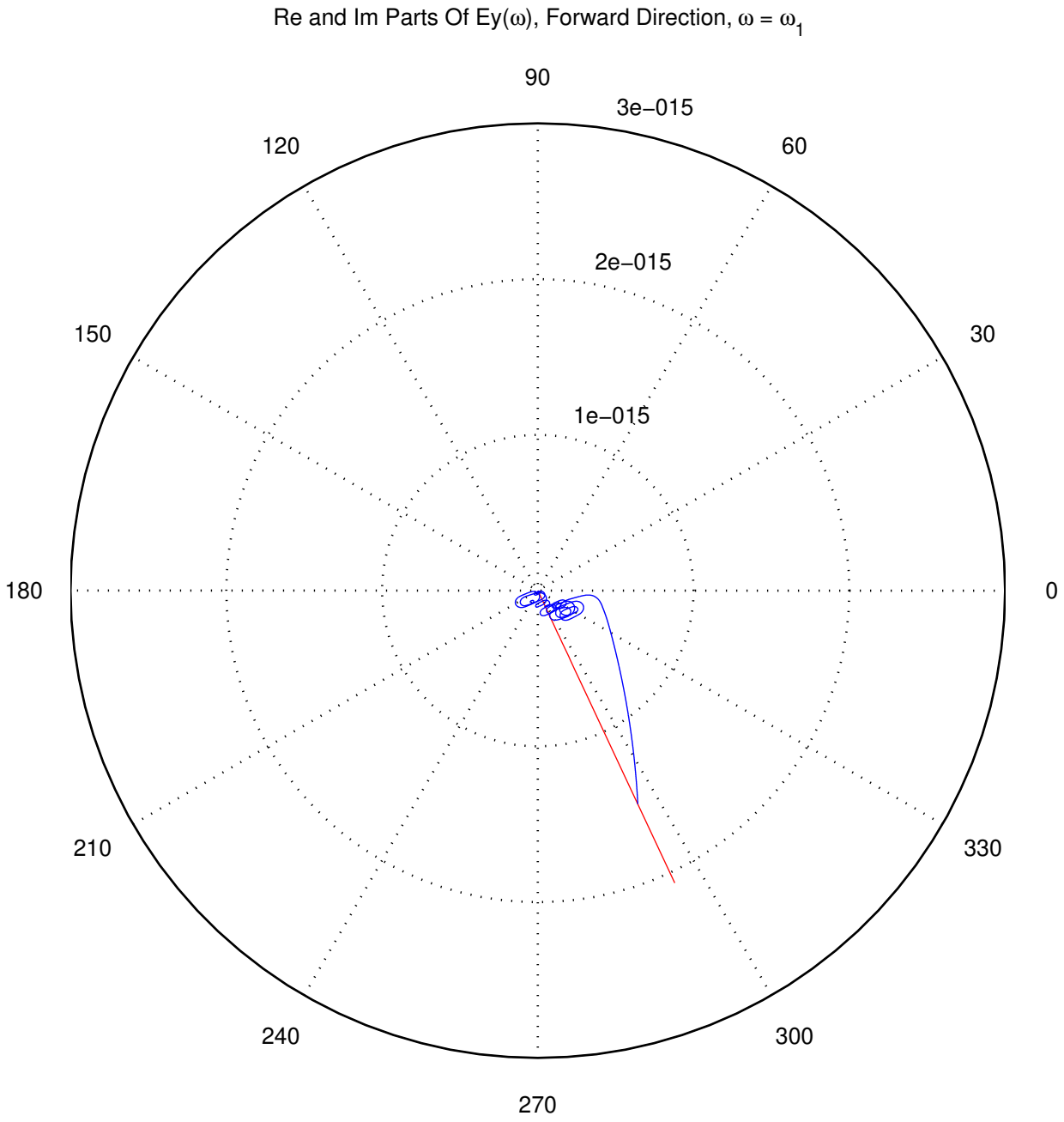

XY Trajectory Projection
x 10^-5
7
6
5
4
3
2
1
0
−1
Y Trajectory (m)
−8
−6
−4
−2
0
2
4
6
X Trajectory (m)
x 10^-5

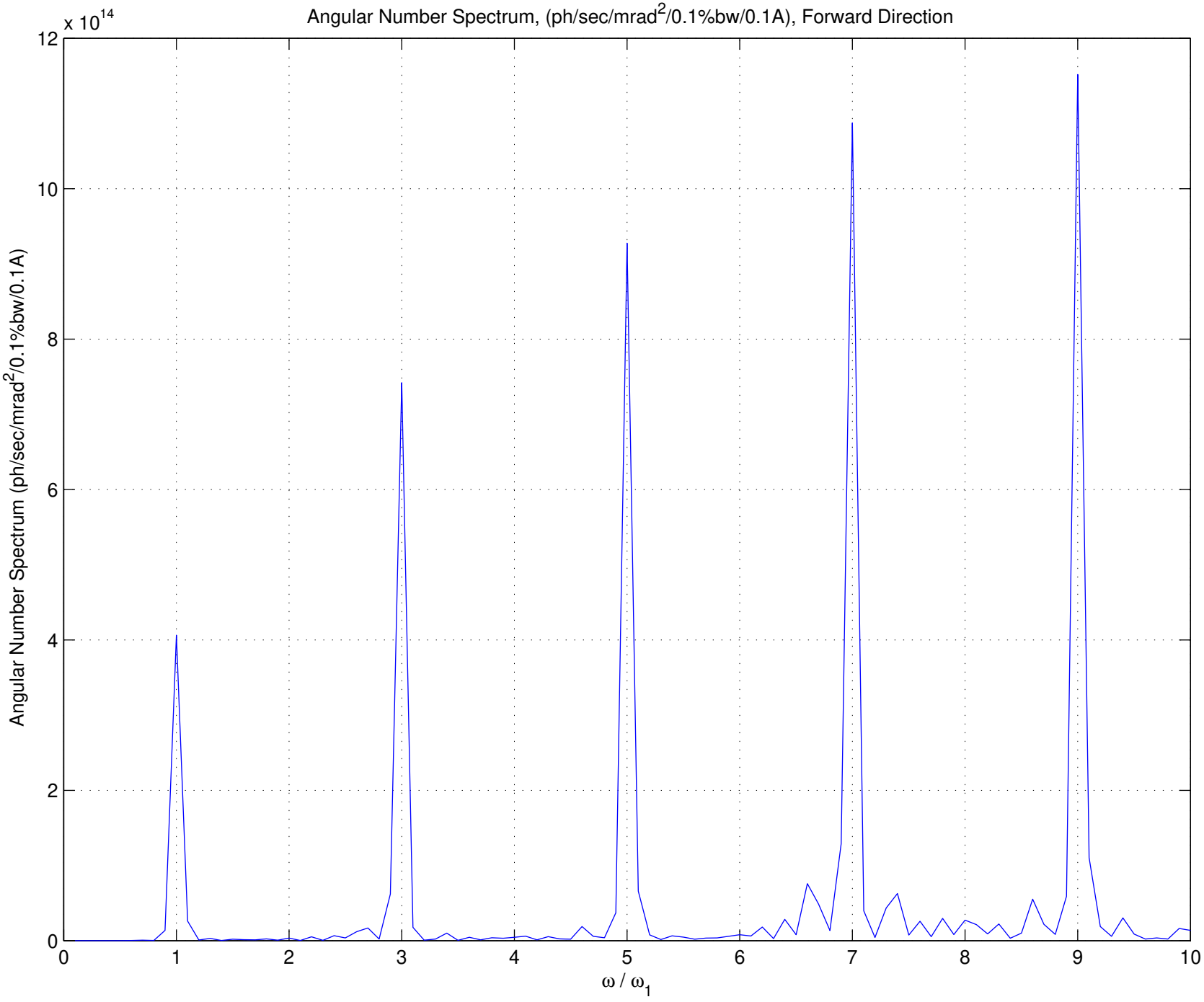

Phase Relative To Cell Entrance
Phase (rad)
Z (m)
100
90
80
70
60
50
40
30
20
10
0
−1.5
−1
−0.5
0
0.5
1
1.5

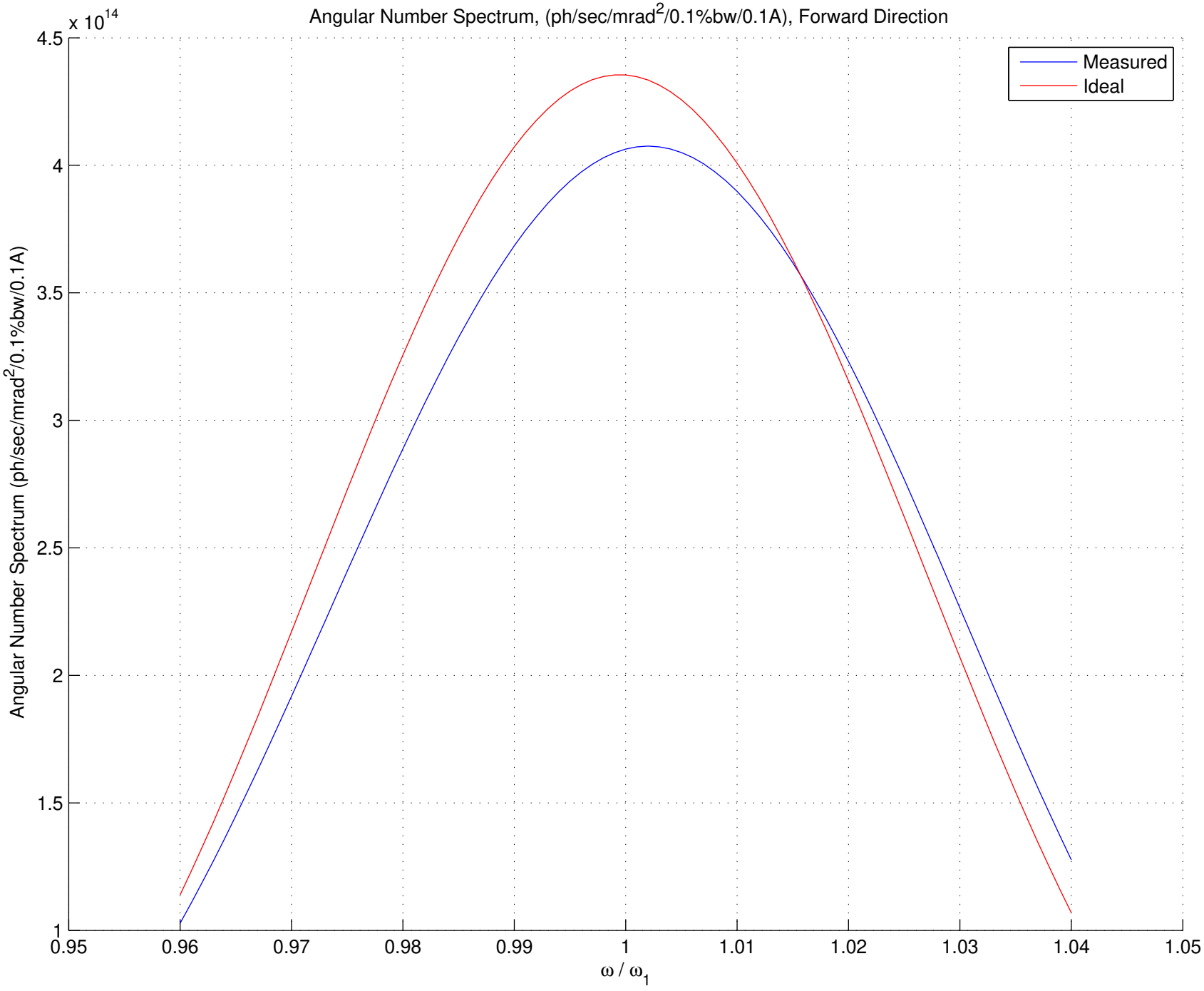

Phase Error At Field Peaks, No Ends
4
7
10
13
16
19
22
24
27
Pole
10
8
6
4
2
0
−2
−4
−6
−8
−10
Phase Error (deg)
Phase Error: Ave = 0.000000 deg, RMS = 3.017651 deg
−0.8
−0.6
−0.4
−0.2
0
0.2
0.4
0.6
0.8
Z (m)

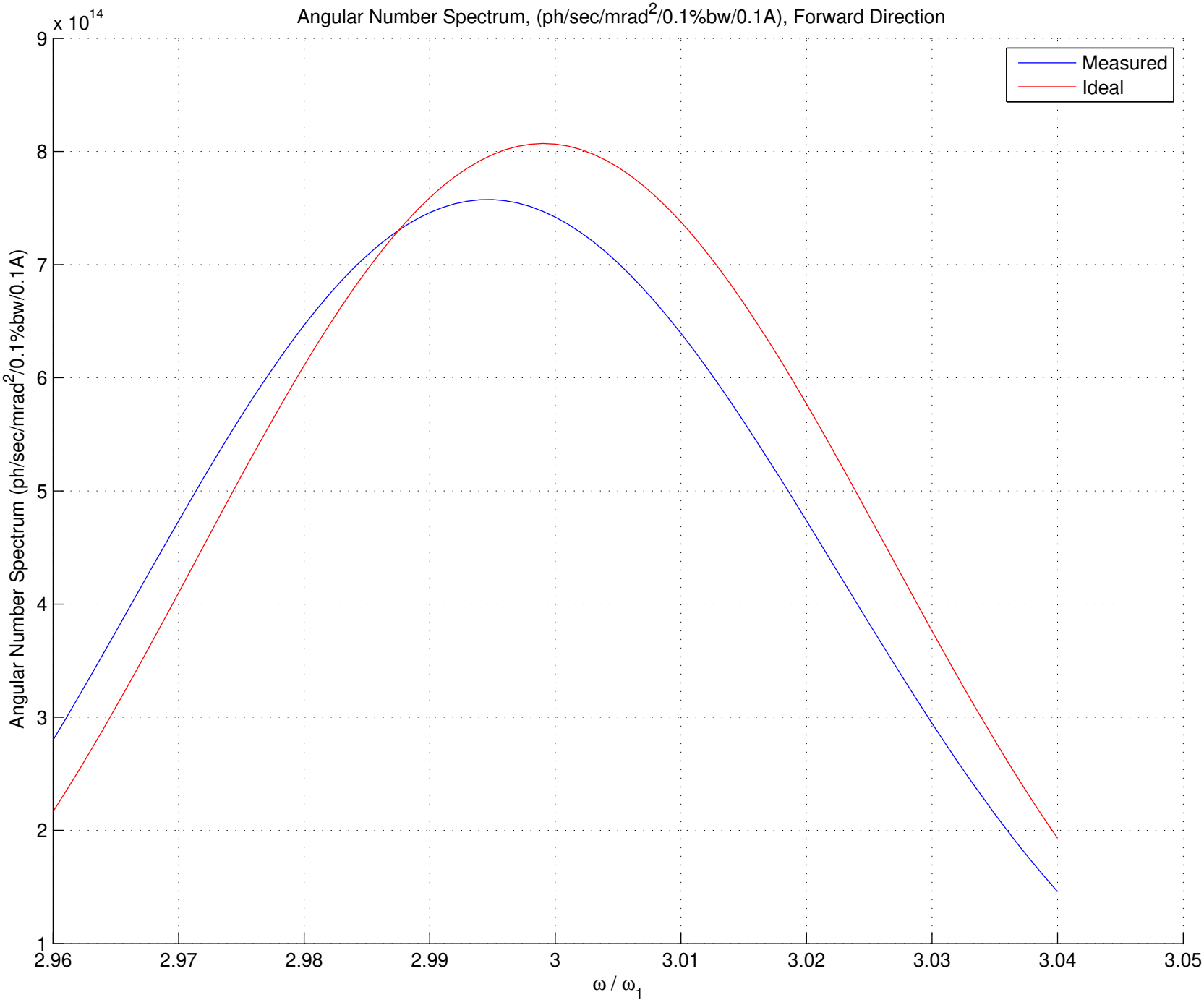

Phase Error Relative To Nominal Radiation Wave At Field Peaks, No Ends
4
7
10
13
16
19
22
24
27
Pole
−3112
−3114
−3116
−3118
−3120
−3122
−3124
−3126
−3128
Phase Error (deg)
−0.8
−0.6
−0.4
−0.2
0
0.2
0.4
0.6
0.8
Z (m)

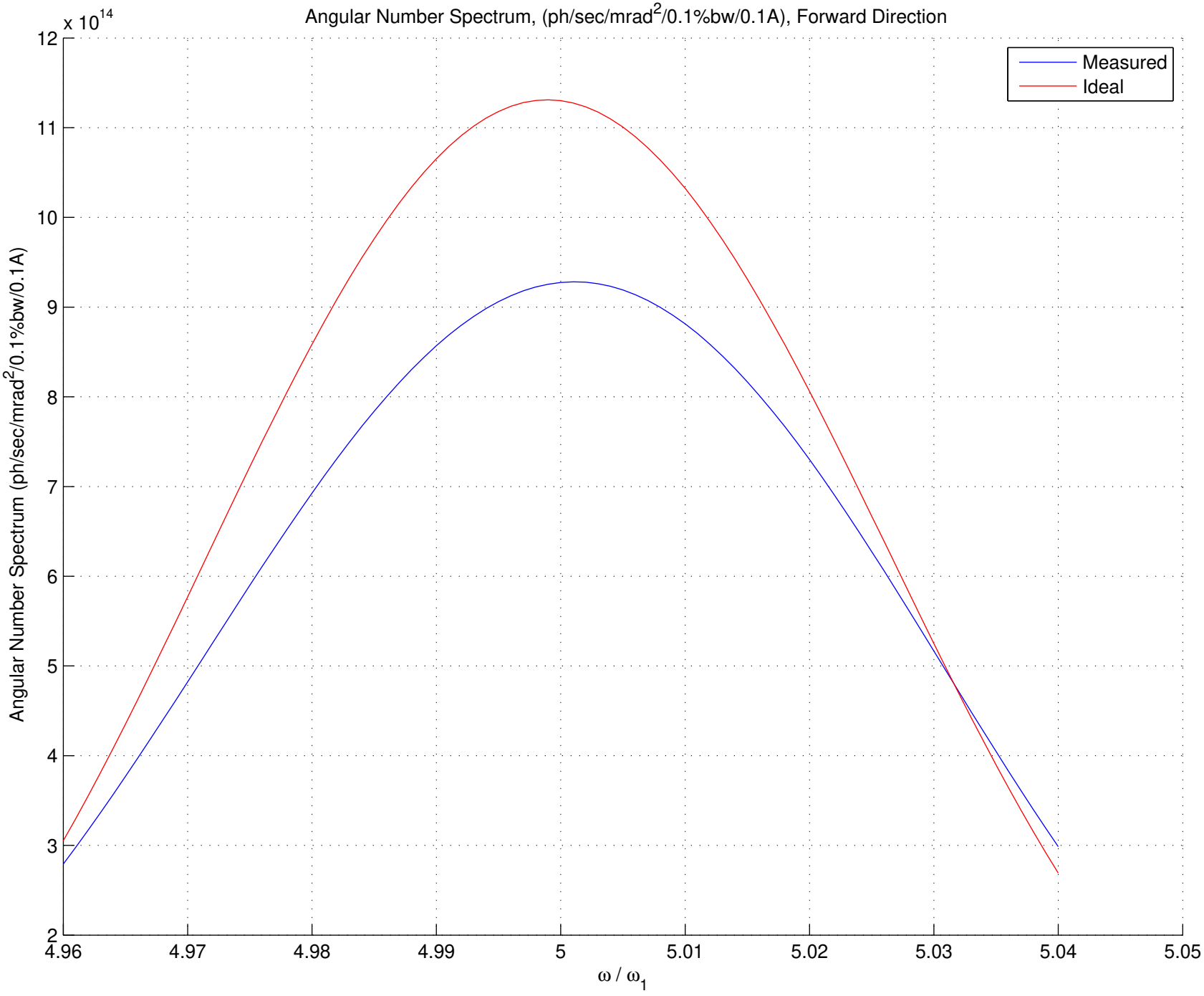

Re and Im Parts Of Ex(ω), Forward Direction, ω = ω1
90
1.5e−013
120
60
1e−013
150
30
5e−014
180
0
210
330
240
300
270


Re and Im Parts Of Ey(ω), Forward Direction, ω = ω1
90
3e−015
120
60
2e−015
150
30
1e−015
180
0
210
330
240
300
270


Angular Number Spectrum, (ph/sec/mrad2/0.1%bw/0.1A), Forward Direction
x 10^14
Angular Number Spectrum (ph/sec/mrad2/0.1%bw/0.1A)
ω / ω1
0
2
4
6
8
10
12
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^{14}
Angular Number Spectrum (ph/sec/mrad^2/0.1%bw/0.1A)
ω / ω_1
Measured
Ideal
4.5
4
3.5
3
2.5
2
1.5
1
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^{14}
Measured
Ideal
Angular Number Spectrum (ph/sec/mrad^2/0.1%bw/0.1A)
9
8
7
6
5
4
3
2
1
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}
Angular Number Spectrum (ph/sec/mrad^2/0.1%bw/0.1A)
ω / $ω_1$
Measured
Ideal
12
11
10
9
8
7
6
5
4
3
2
4.96
4.97
4.98
4.99
5
5.01
5.02
5.03
5.04
5.05