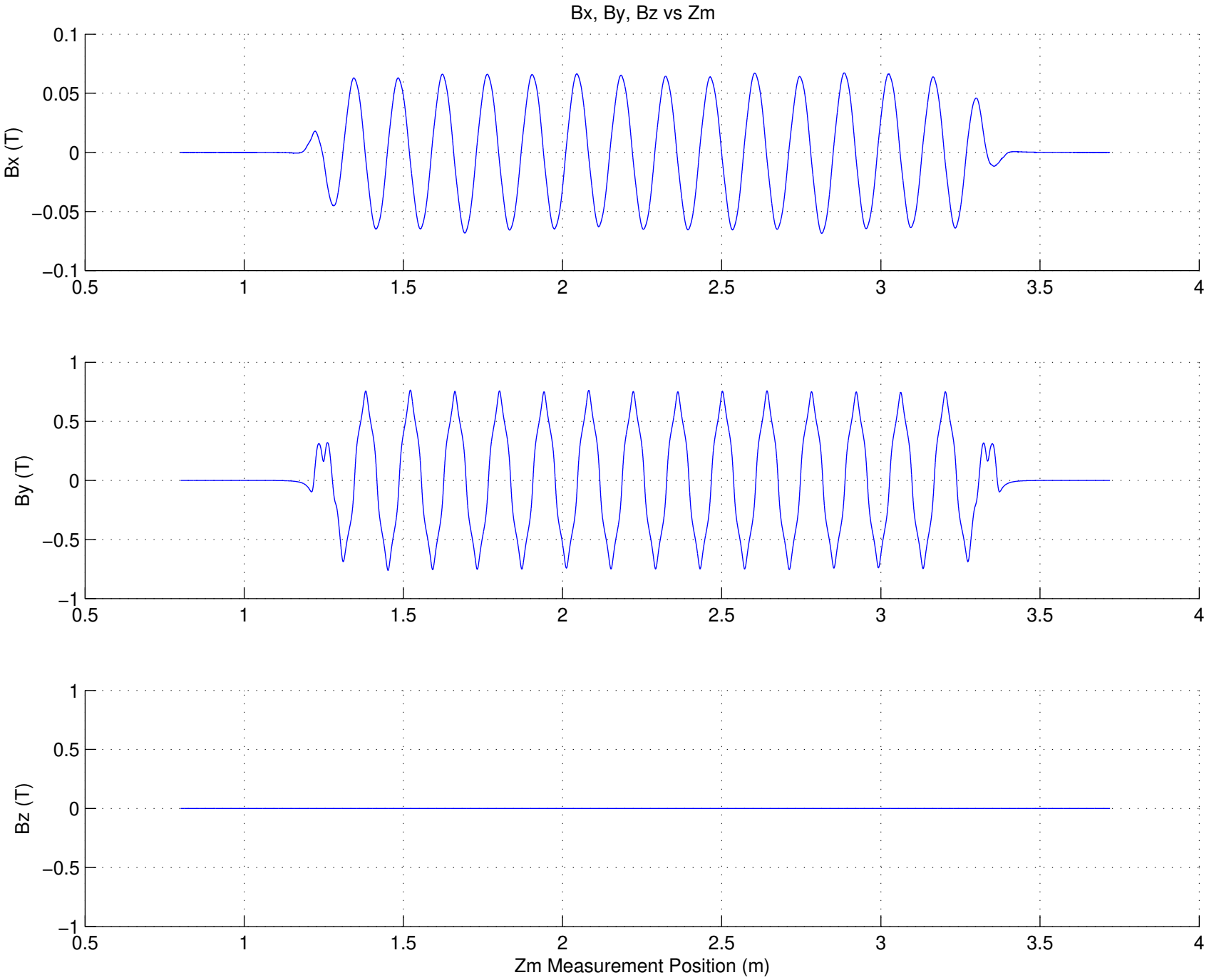
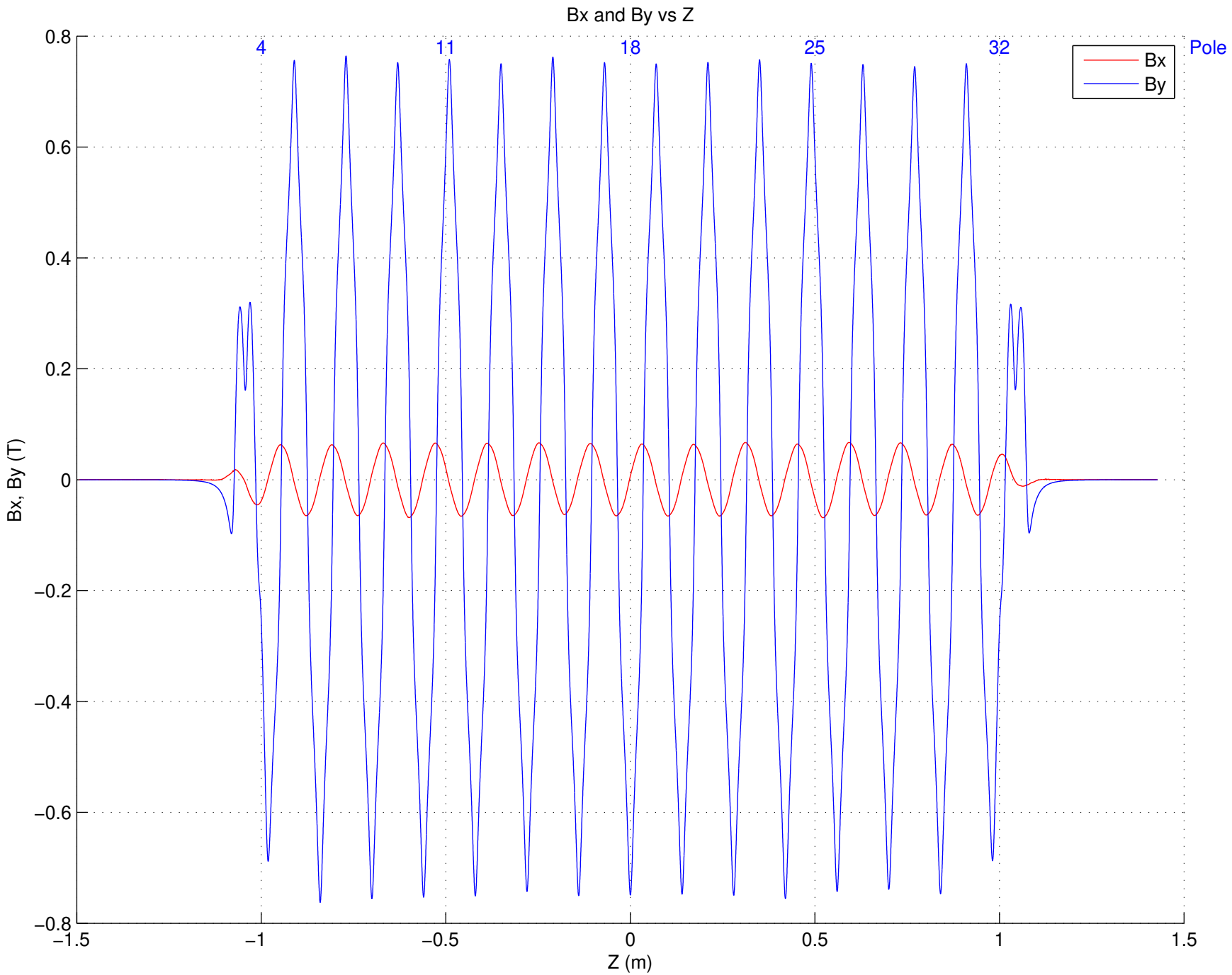
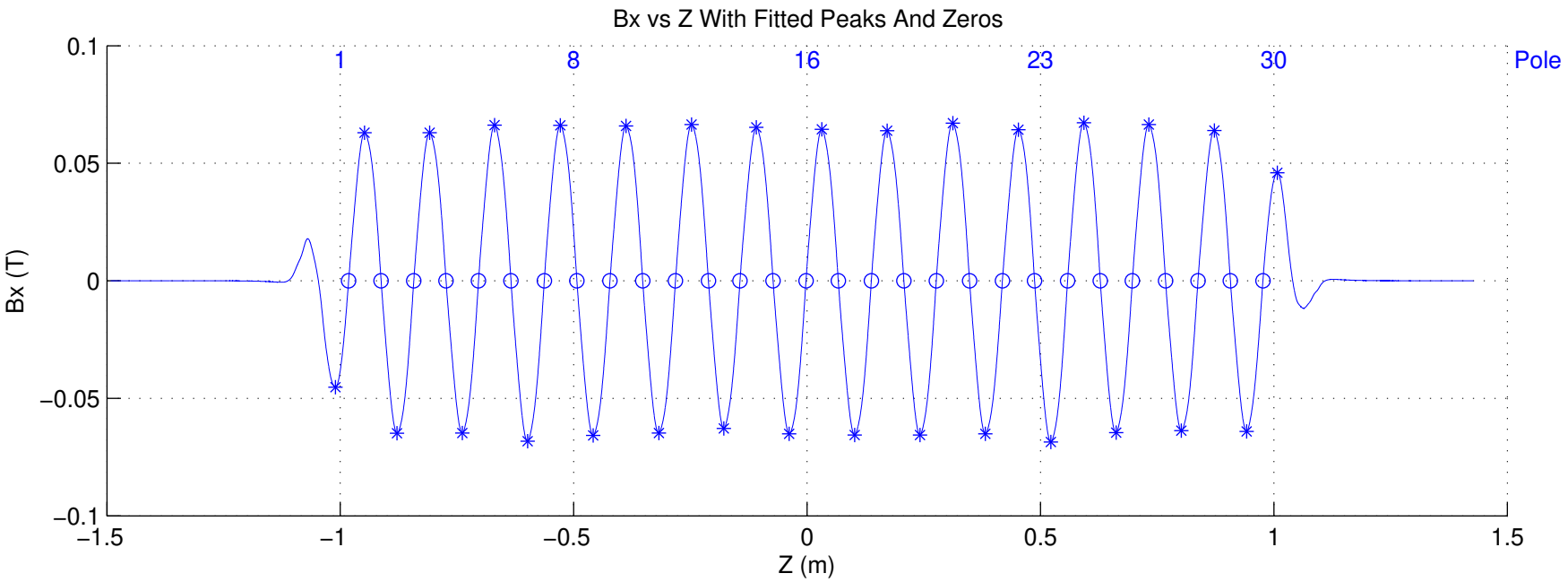
SLAC Magnetic Measurements

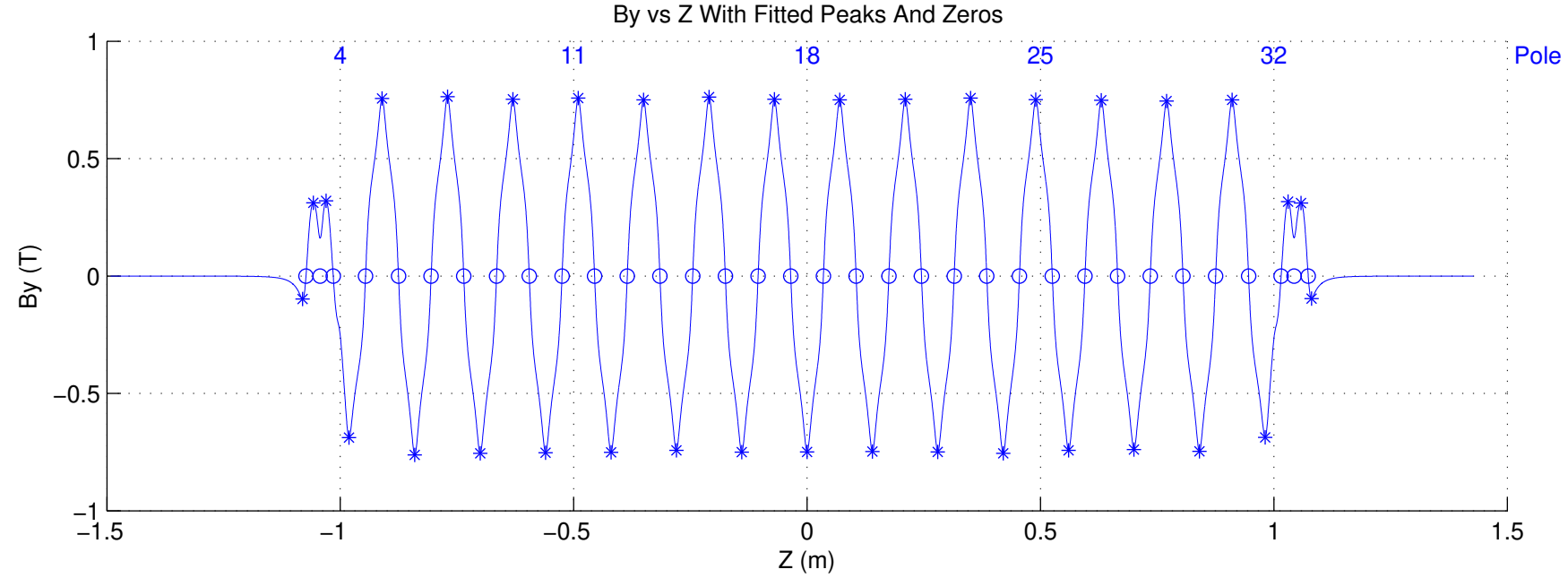
EPU Analysis
−−−−−−−−−−−

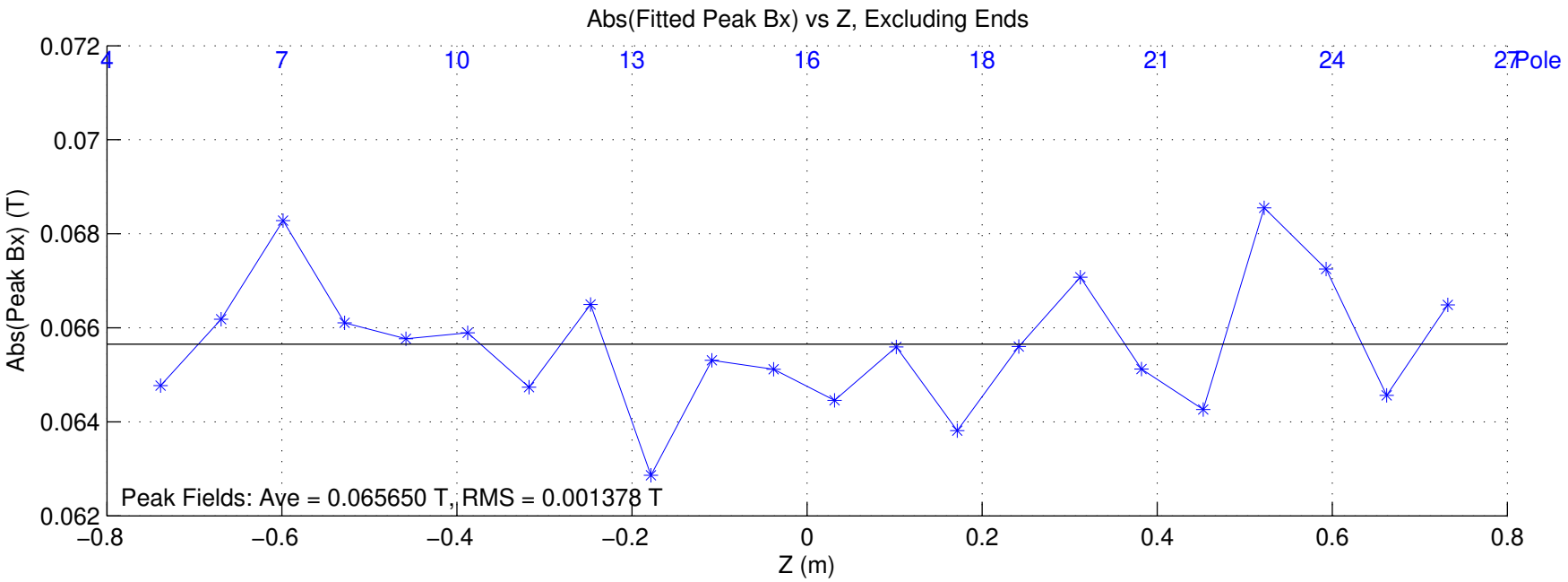
Parameters:
INPUT−FILE−DIR =S:\MagData\LCLS\Undulator\SSRL−BL5−EPU\DATASET0001\Rough Tuning\Z Scans\Run 018\
INPUT−FILE−NAME =x−24000−y+000−bscanz.dat
INPUT−FILE−TYPE =ZVXYBXYH
CORR−REQUIRED =0
GAMMA =26627.1
NOM−LAMBDA−U =0
NOM−K−VALUE =0
NOM−LAMBDA−R =0
NUM−POLES =31
NUM−END−POLES =4
CELL−LENGTH =3.126

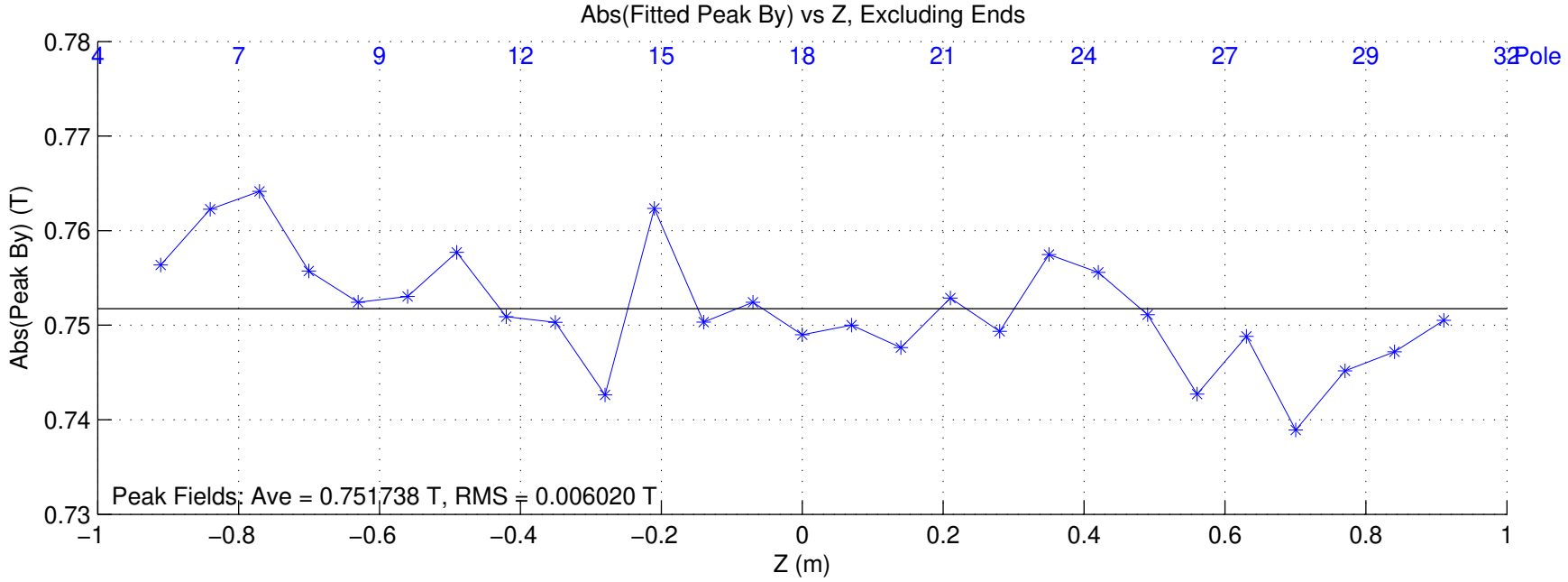

Bx, By, Bz vs Zm
Bx (T)
0.1
0.05
0
−0.05
−0.1
By (T)
1
0.5
0
−0.5
−1
Bz (T)
1
0.5
0
−0.5
−1
0.5
1
1.5
2
2.5
3
3.5
4
Zm Measurement Position (m)

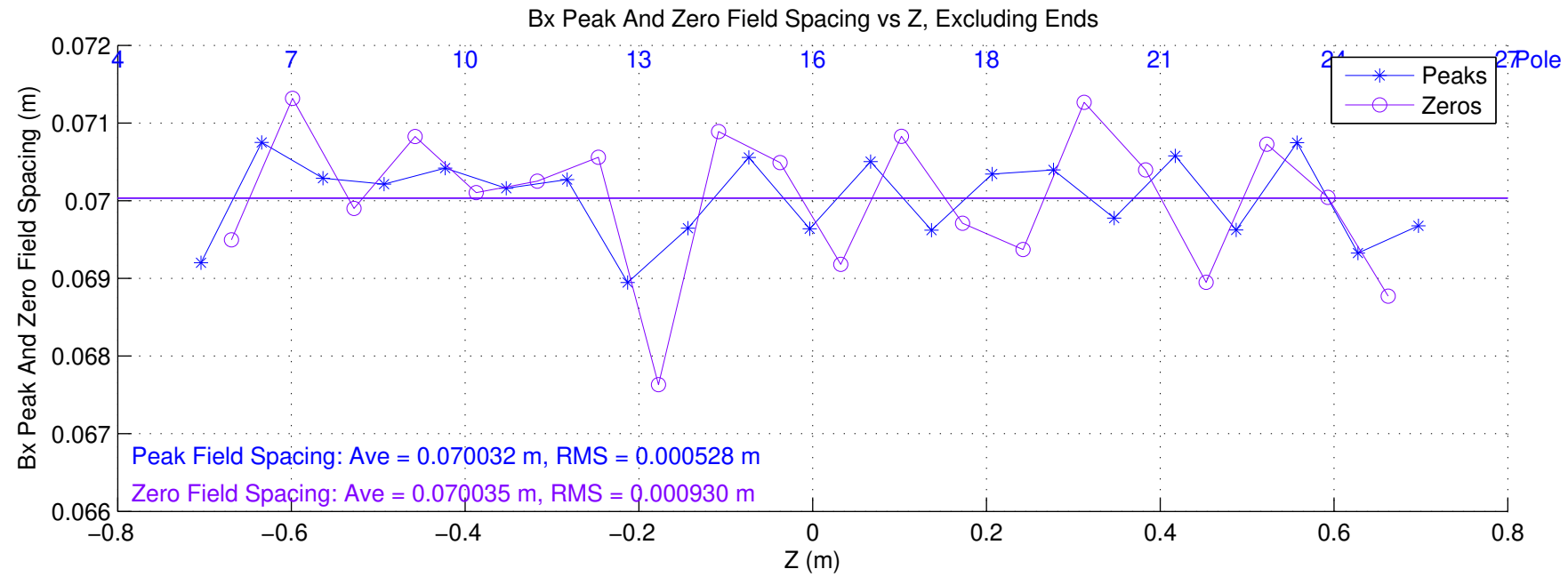

Bx and By vs Z
4
11
18
25
32
Pole
Bx
By
0.8
0.6
0.4
0.2
0
−0.2
−0.4
−0.6
−0.8
Bx, By (T)
−1.5
−1
−0.5
0
0.5
1
1.5
Z (m)

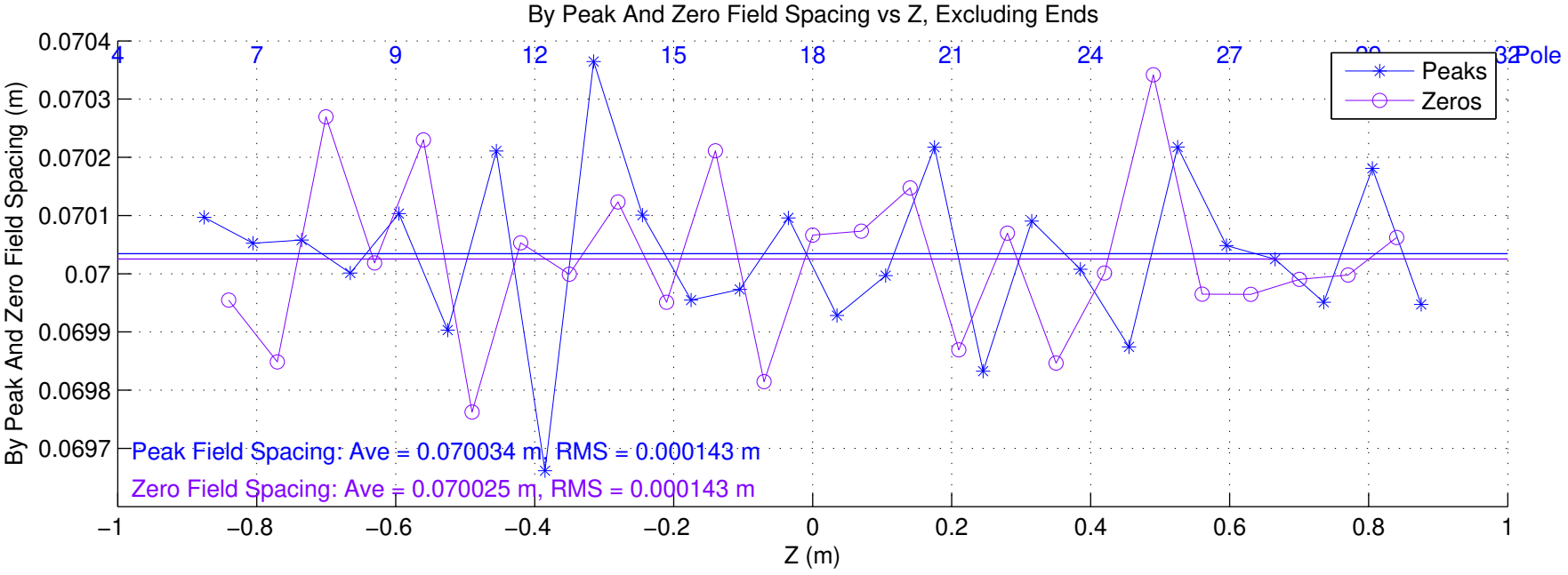

Bx vs Z With Fitted Peaks And Zeros
1
8
16
23
30
Pole
0.1
0.05
0
−0.05
−0.1
Bx (T)
−1.5
−1
−0.5
0
0.5
1
1.5
Z (m)

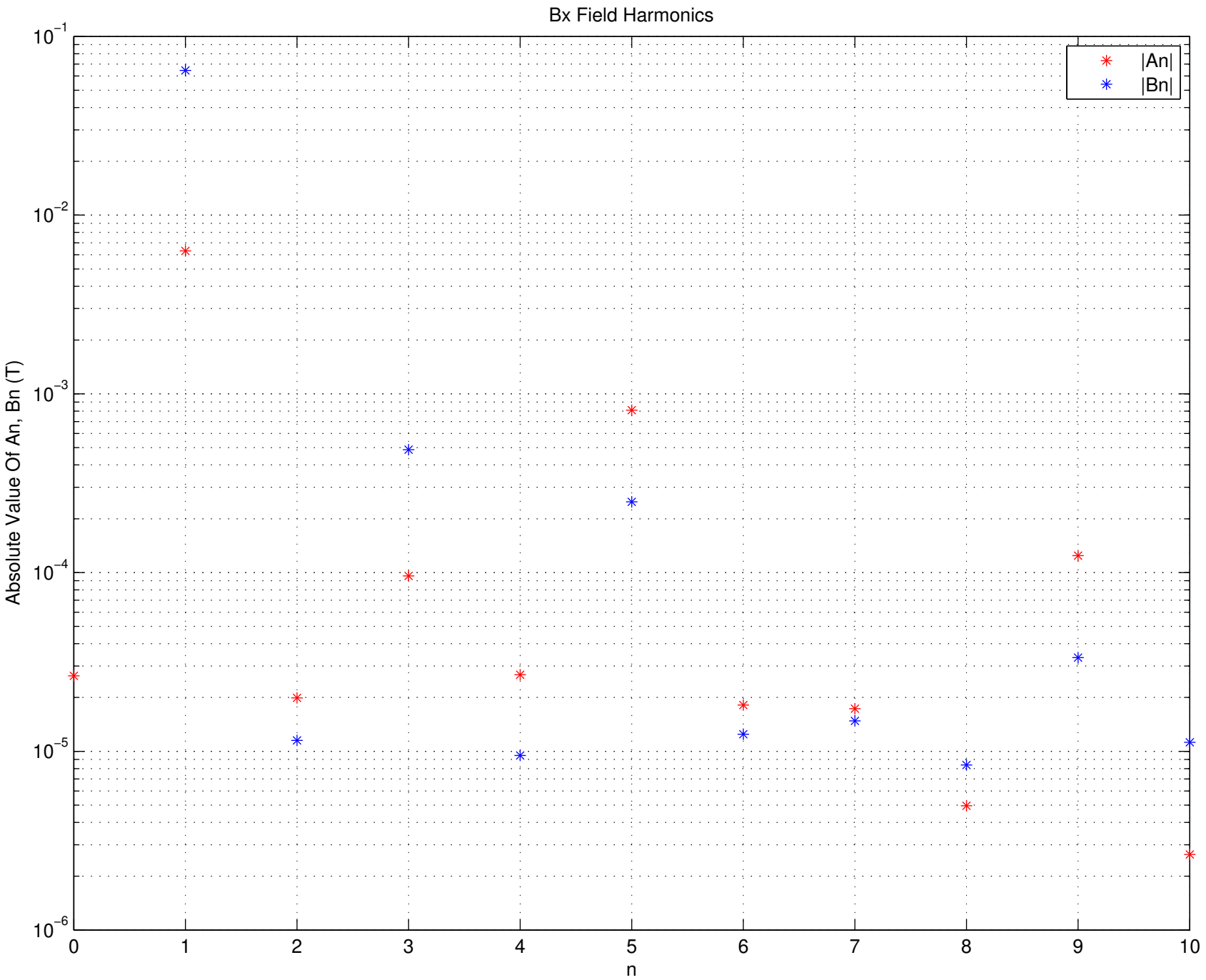

By vs Z With Fitted Peaks And Zeros
4
11
18
25
32
Pole
1
0.5
0
−0.5
−1
By (T)
−1.5
−1
−0.5
0
0.5
1
1.5
Z (m)

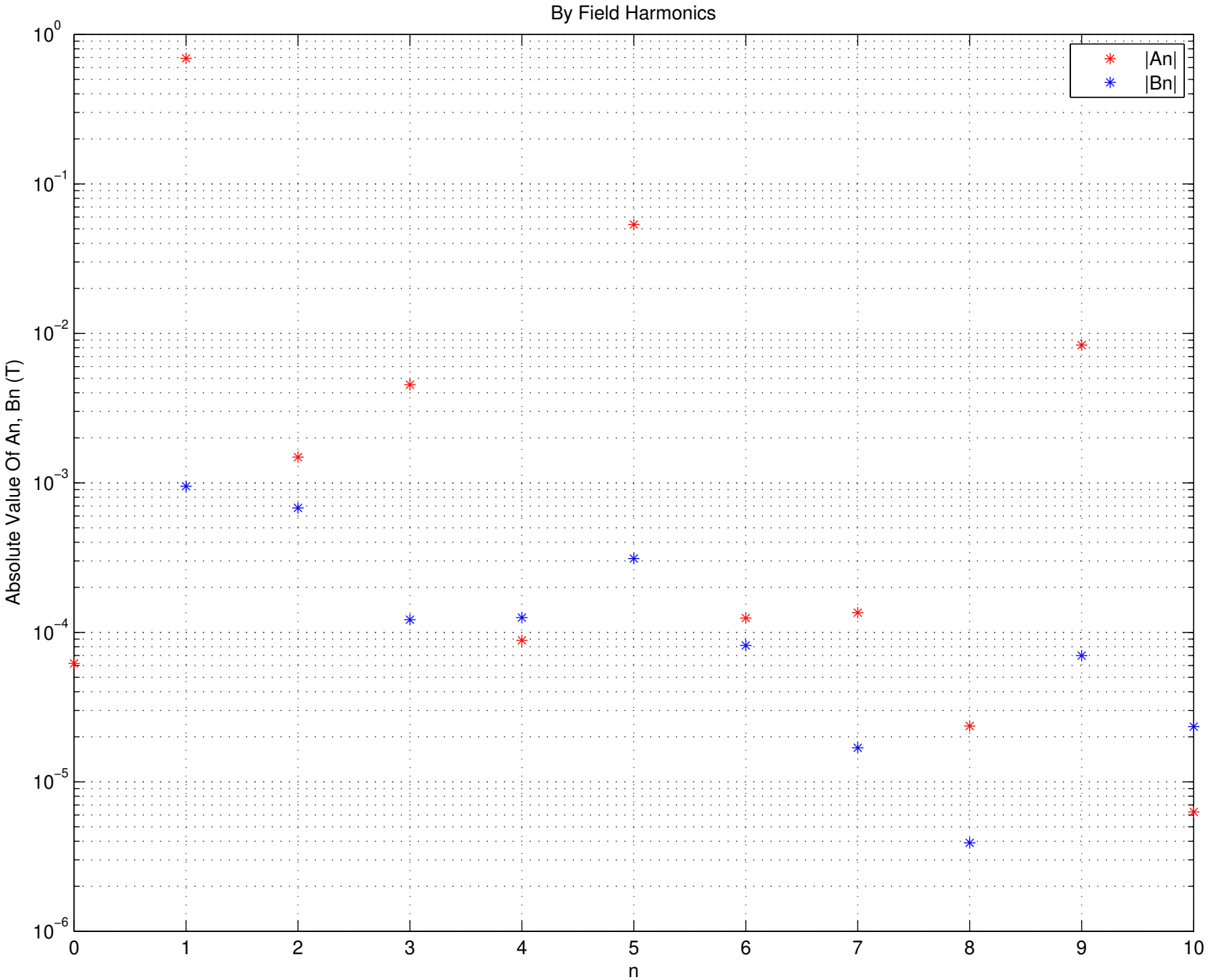

Abs(Fitted Peak Bx) vs Z, Excluding Ends
Pole
4
7
10
13
16
18
21
24
27
0.072
0.07
0.068
0.066
0.064
0.062
Abs(Peak Bx) (T)
Peak Fields: Ave = 0.065650 T, RMS = 0.001378 T
−0.8
−0.6
−0.4
−0.2
0
0.2
0.4
0.6
0.8
Z (m)

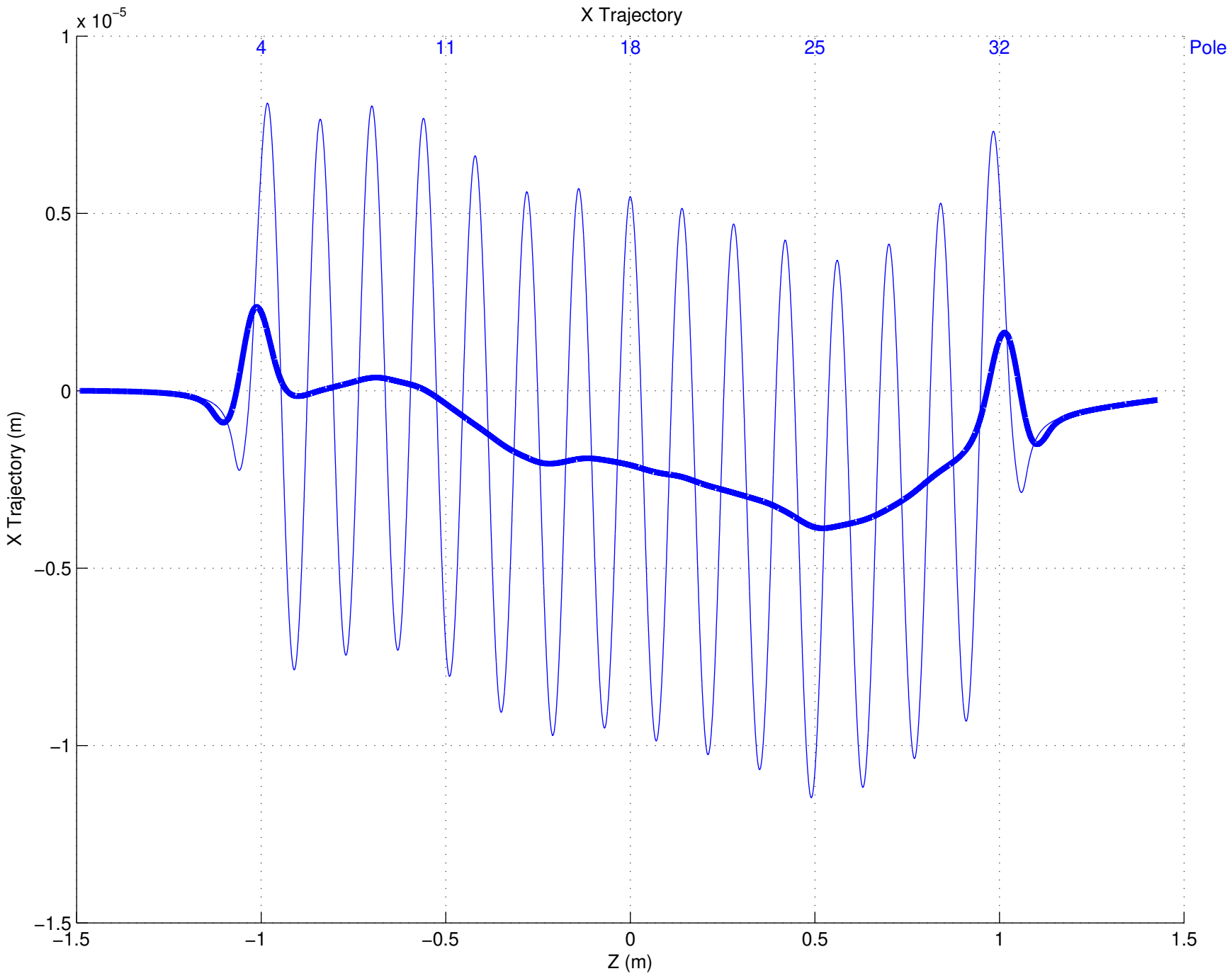

Abs(Fitted Peak By) vs Z, Excluding Ends
Pole
4
7
9
12
15
18
21
24
27
29
32
0.78
0.77
0.76
0.75
0.74
0.73
Abs(Peak By) (T)
Peak Fields: Ave = 0.751738 T, RMS = 0.006020 T
−1
−0.8
−0.6
−0.4
−0.2
0
0.2
0.4
0.6
0.8
1
Z (m)

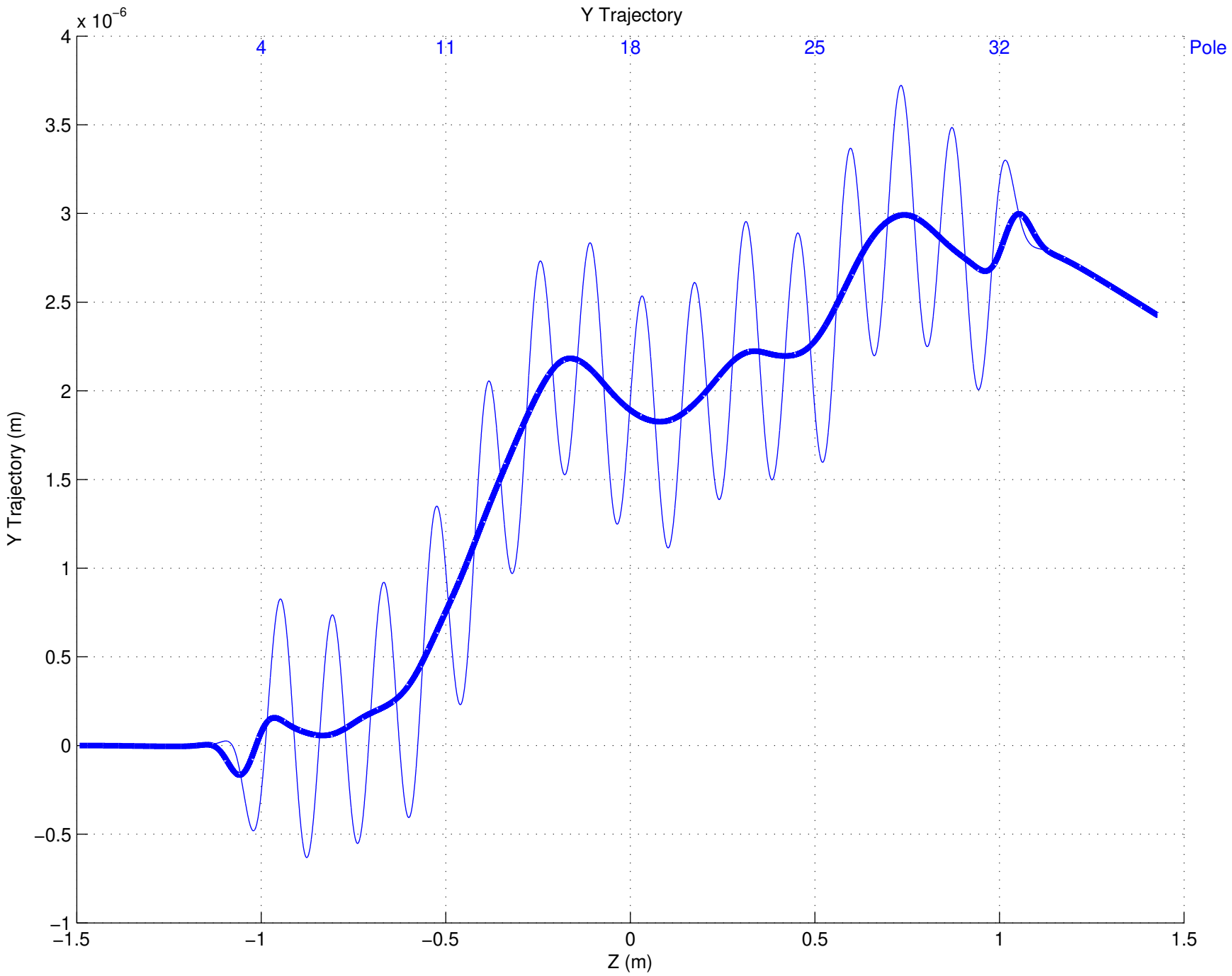

Bx Peak And Zero Field Spacing vs Z, Excluding Ends
Bx Peak And Zero Field Spacing (m)
Z (m)
Pole
Peaks
Zeros
Peak Field Spacing: Ave = 0.070032 m, RMS = 0.000528 m
Zero Field Spacing: Ave = 0.070035 m, RMS = 0.000930 m

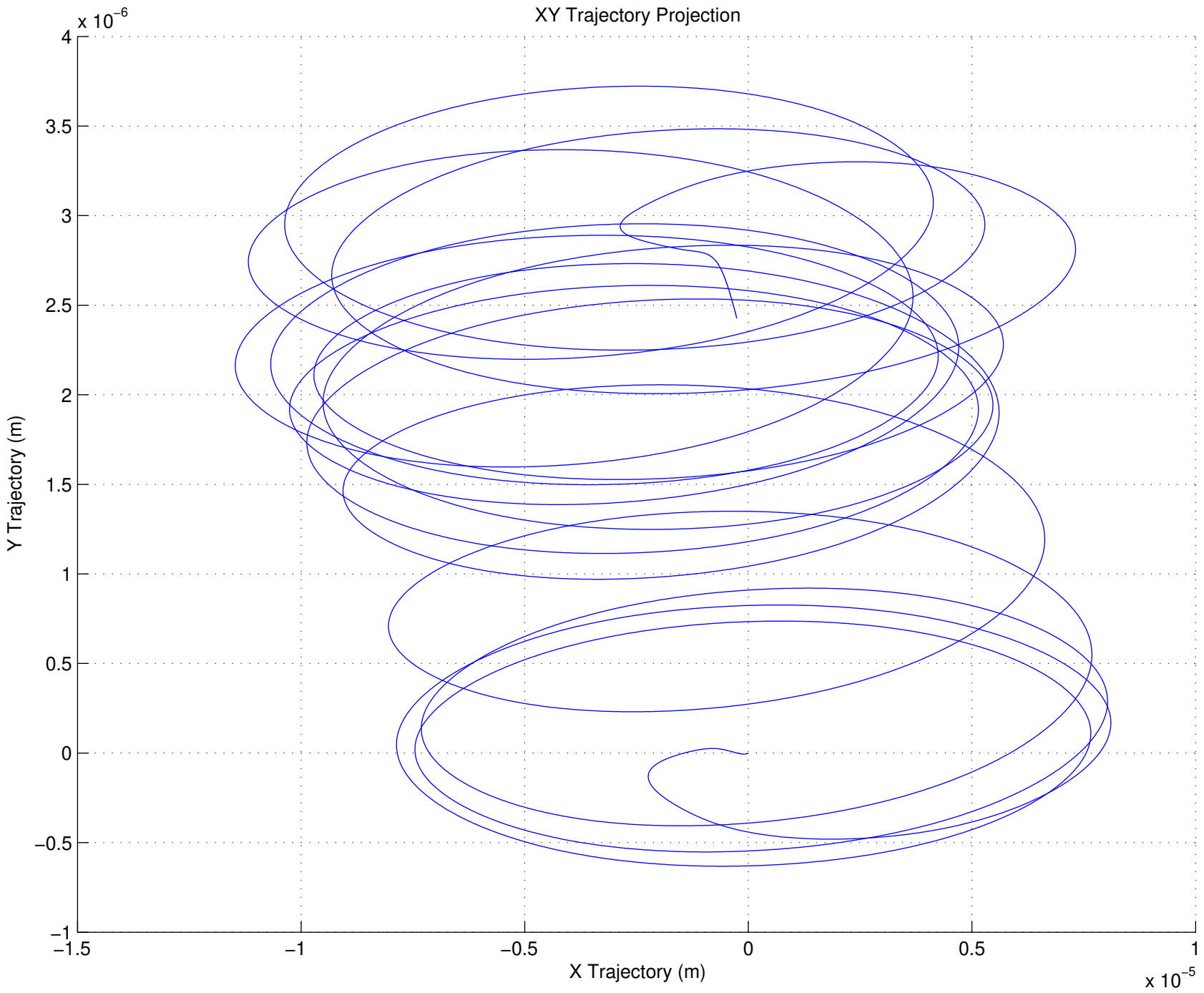

By Peak And Zero Field Spacing vs Z, Excluding Ends
By Peak And Zero Field Spacing (m)
Z (m)
Pole
Peaks
Zeros
Peak Field Spacing: Ave = 0.070034 m, RMS = 0.000143 m
Zero Field Spacing: Ave = 0.070025 m, RMS = 0.000143 m

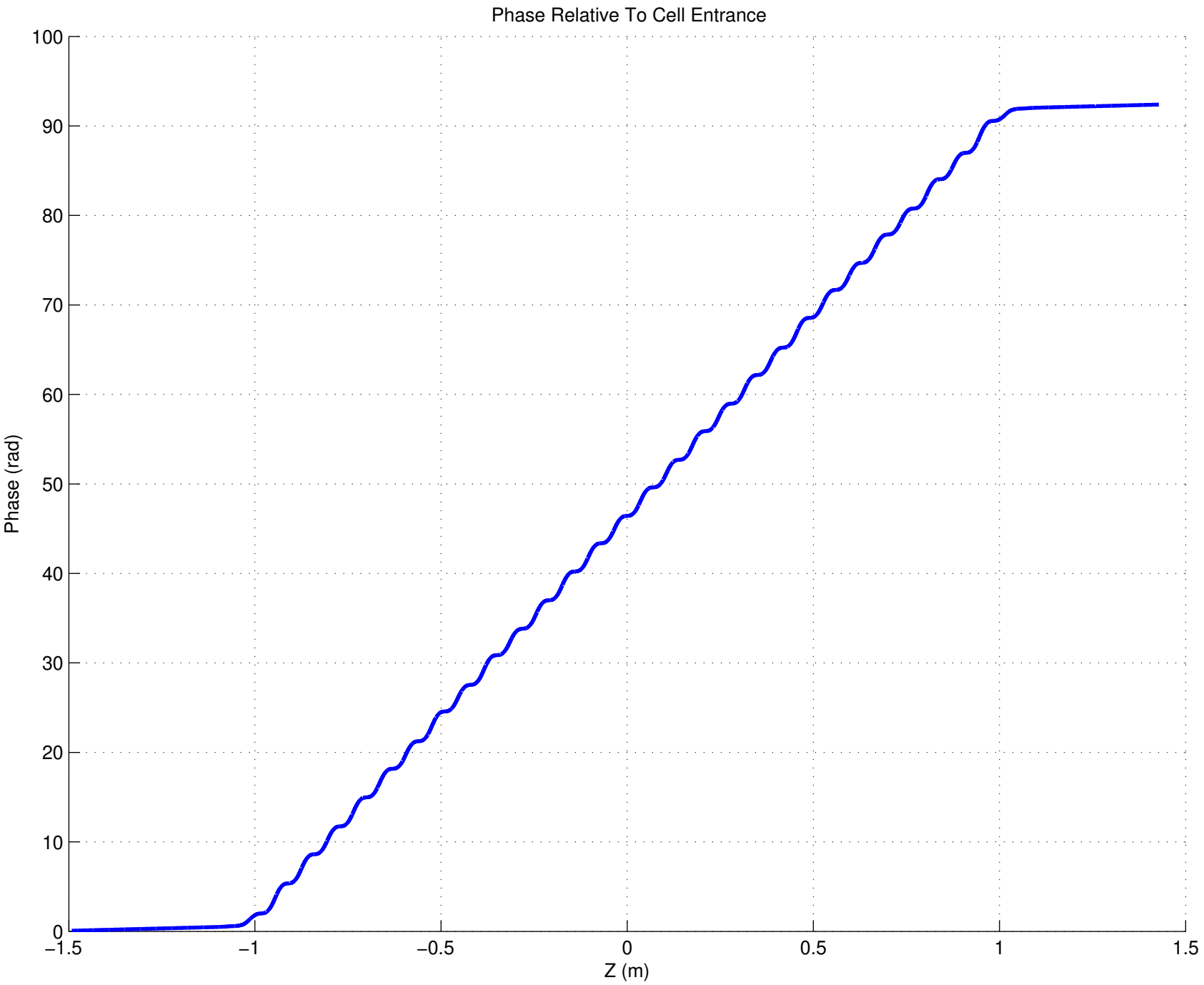

Bx Field Harmonics
|An|
|Bn|
Absolute Value Of An, Bn (T)
n
10^{-1}
10^{-2}
10^{-3}
10^{-4}
10^{-5}
10^{-6}
0
1
2
3
4
5
6
7
8
9
10

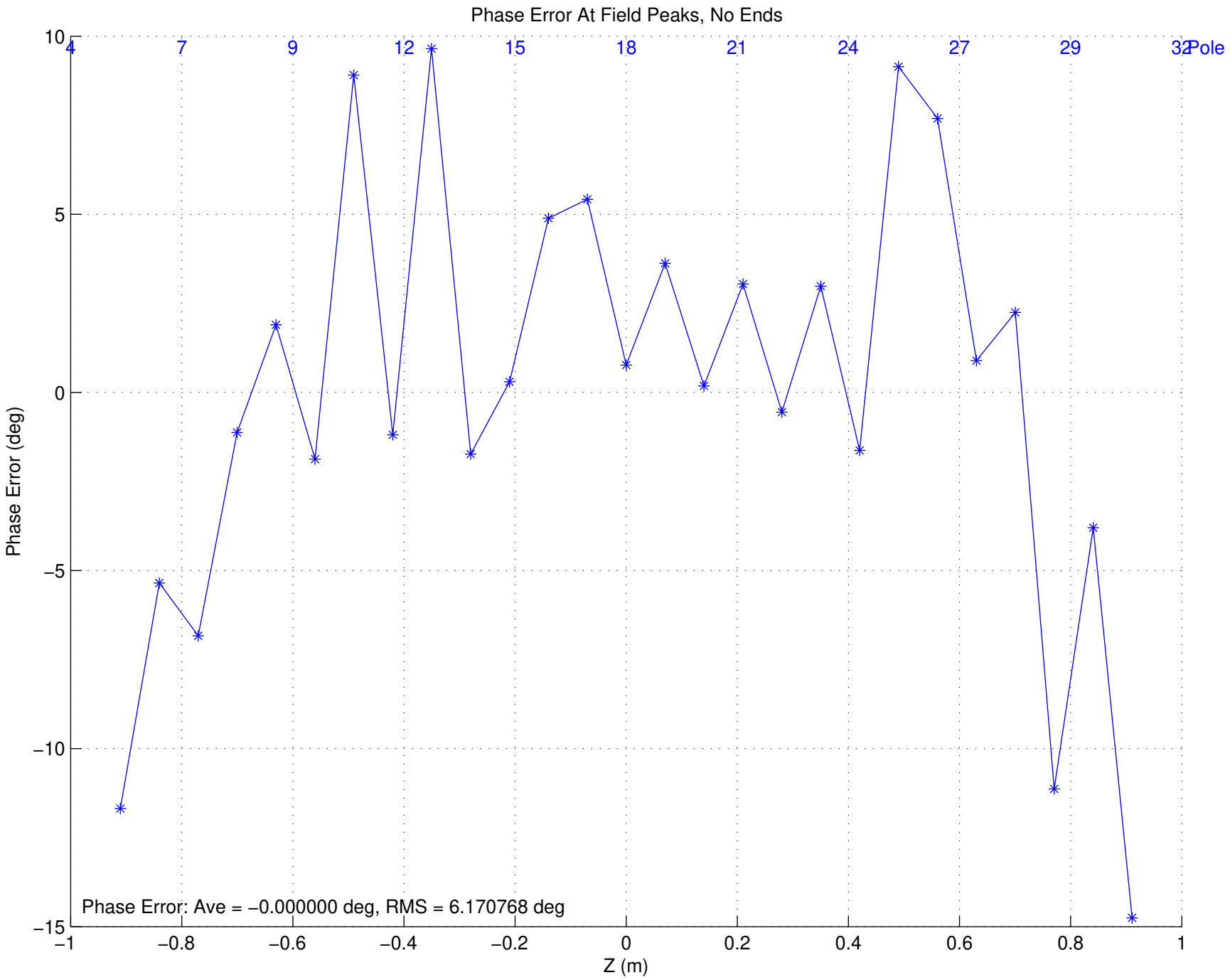

By Field Harmonics
|An|
|Bn|
Absolute Value Of An, Bn (T)
n
10^{0}
10^{-1}
10^{-2}
10^{-3}
10^{-4}
10^{-5}
10^{-6}
0
1
2
3
4
5
6
7
8
9
10

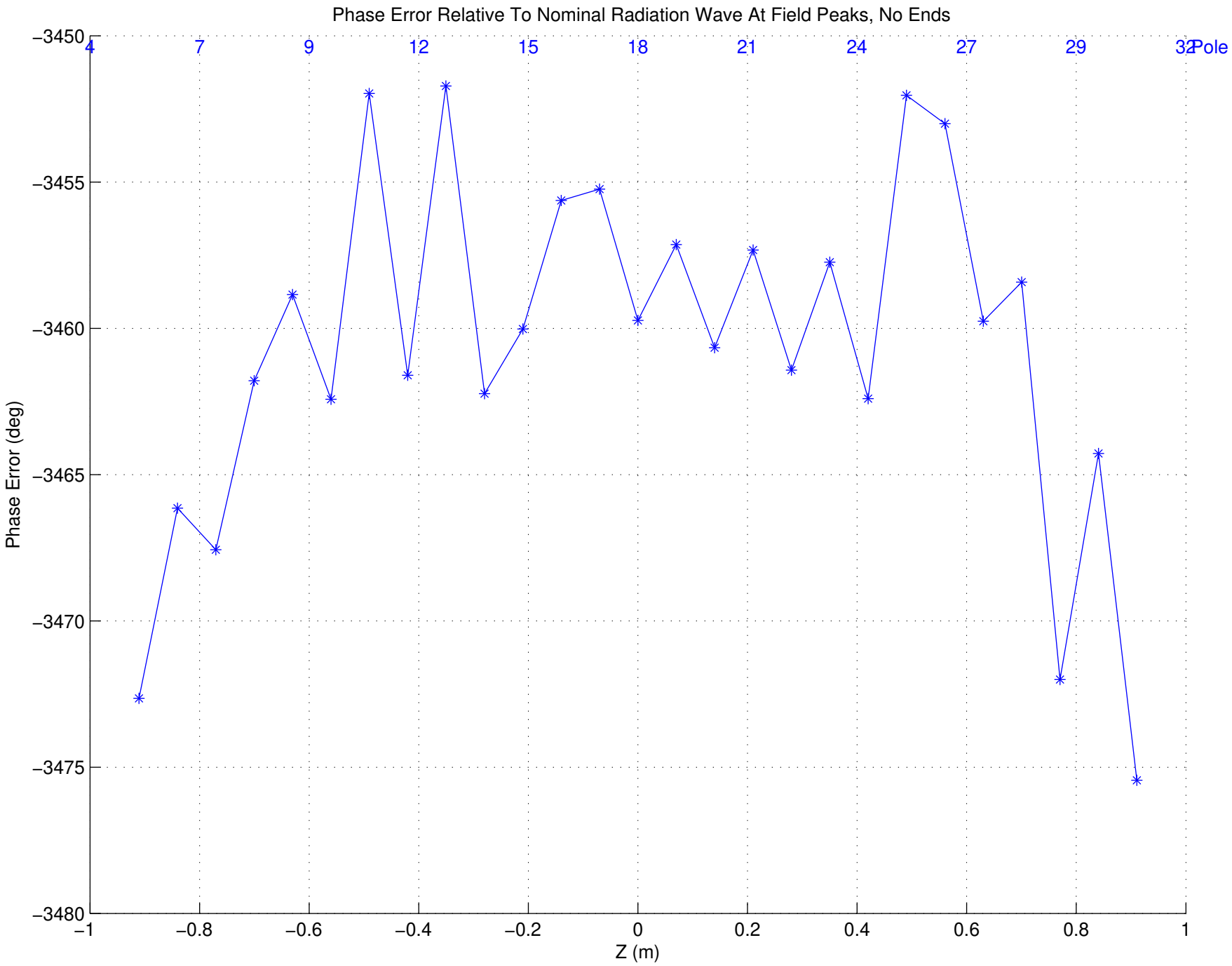

X Trajectory
x 10^-5
4
11
18
25
32
Pole
1
0.5
0
−0.5
−1
−1.5
X Trajectory (m)
−1.5
−1
−0.5
0
0.5
1
1.5
Z (m)

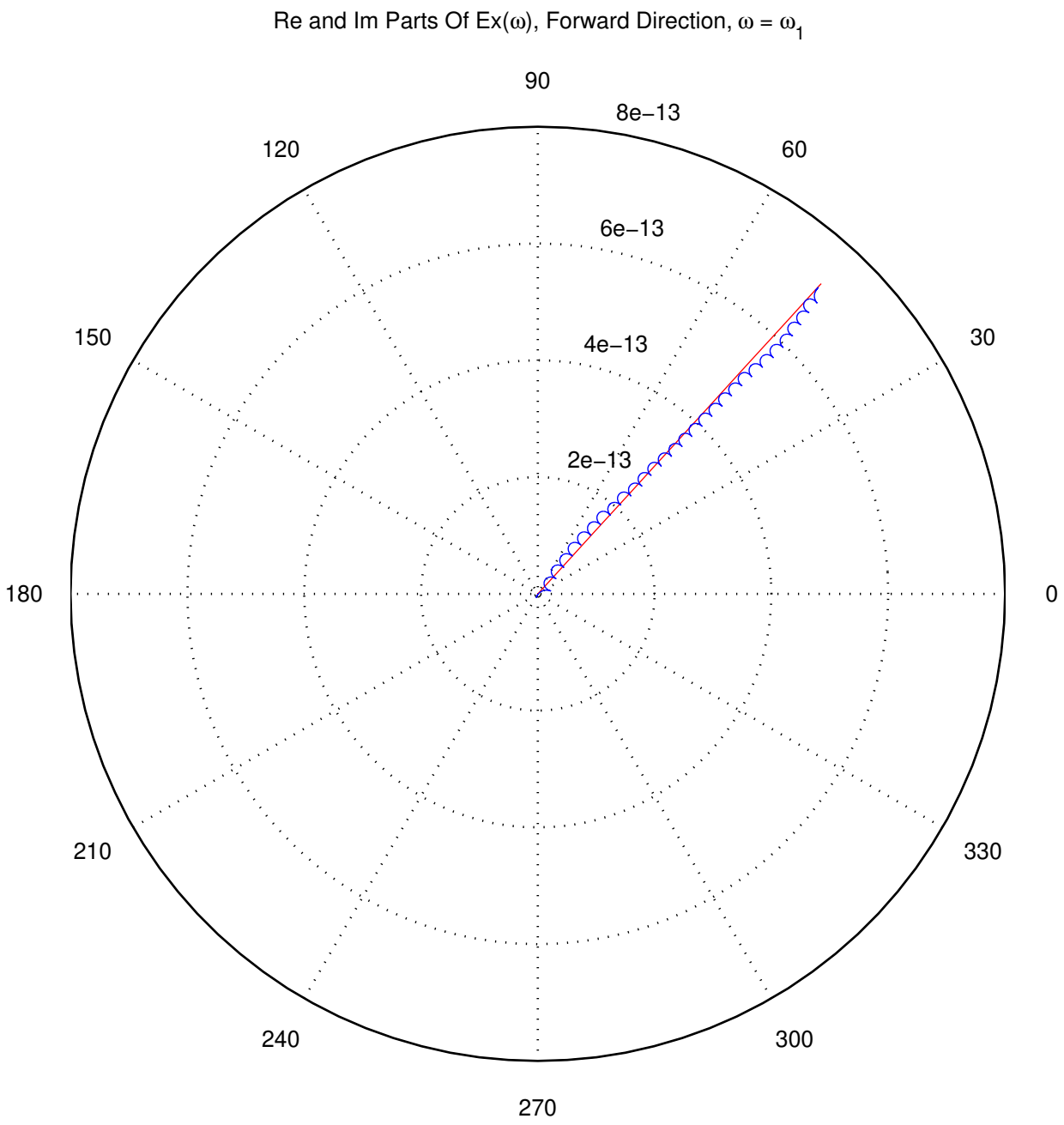

Y Trajectory
x 10^-6
4
11
18
25
32
Pole
4
3.5
3
2.5
2
1.5
1
0.5
0
−0.5
−1
Y Trajectory (m)
−1.5
−1
−0.5
0
0.5
1
1.5
Z (m)

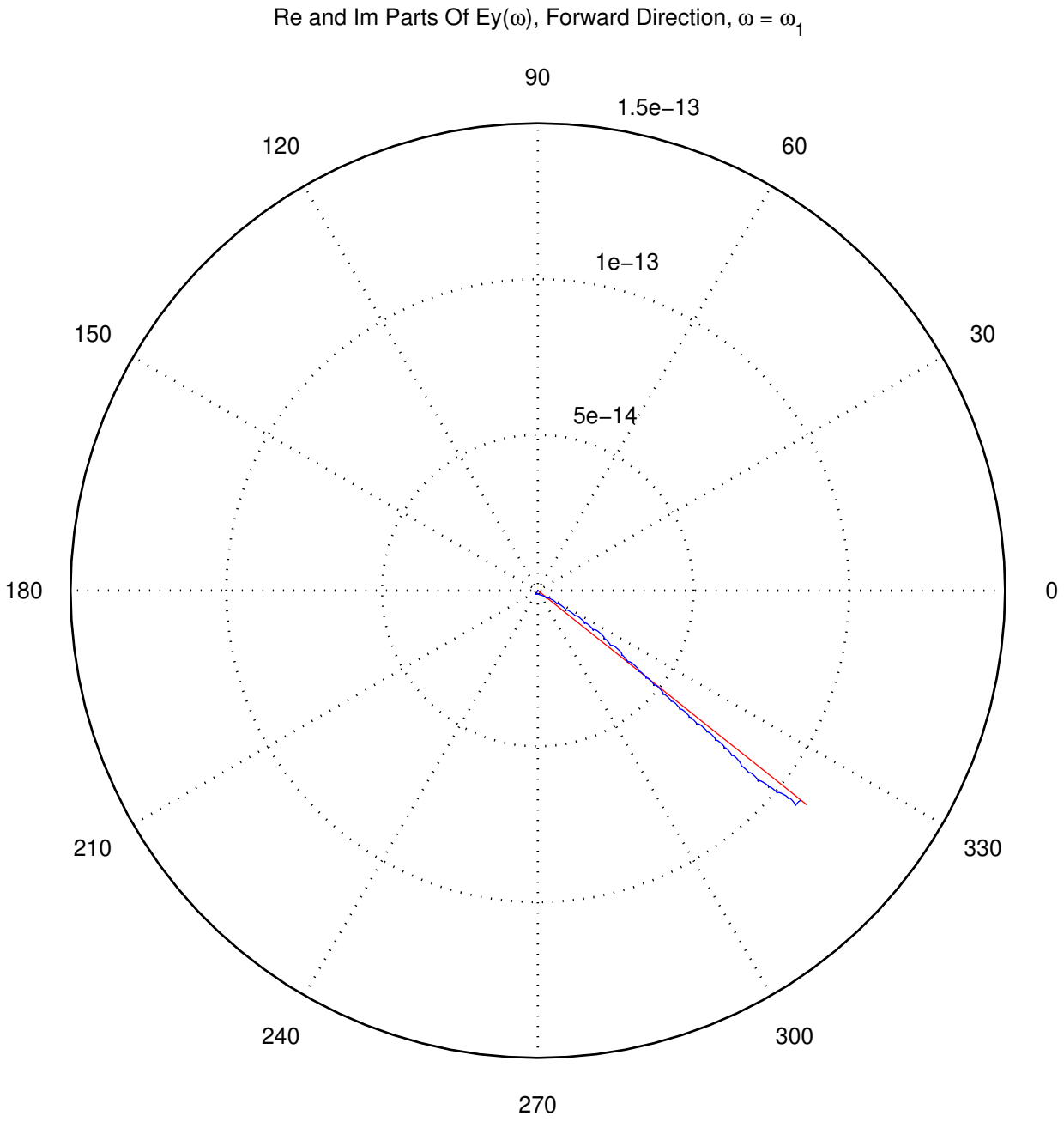

XY Trajectory Projection
x 10^-6
4
3.5
3
2.5
2
1.5
1
0.5
0
−0.5
−1
Y Trajectory (m)
−1.5
−1
−0.5
0
0.5
1
X Trajectory (m)
x 10^-5

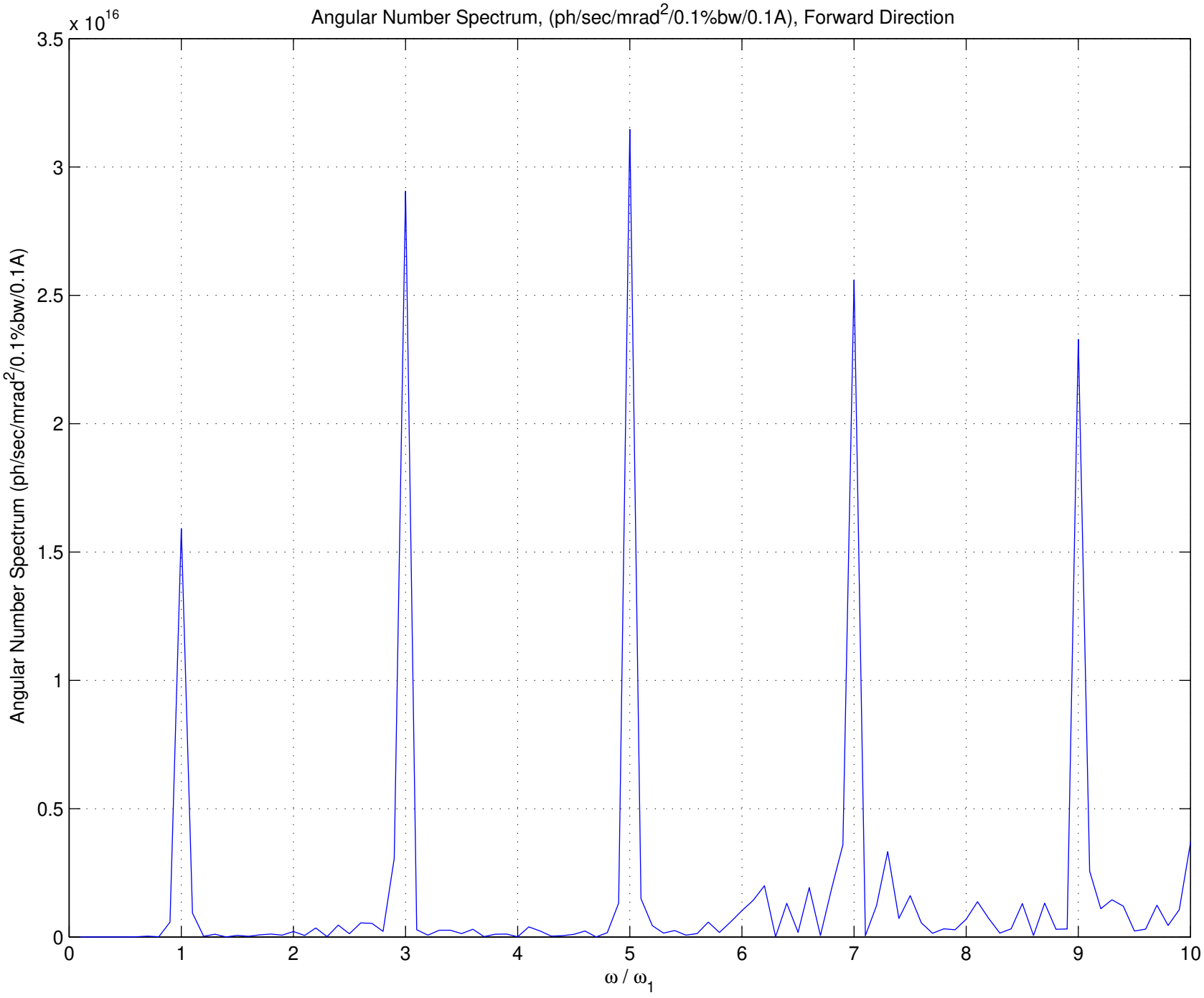

Phase Relative To Cell Entrance
Phase (rad)
Z (m)
100
90
80
70
60
50
40
30
20
10
0
−1.5
−1
−0.5
0
0.5
1
1.5

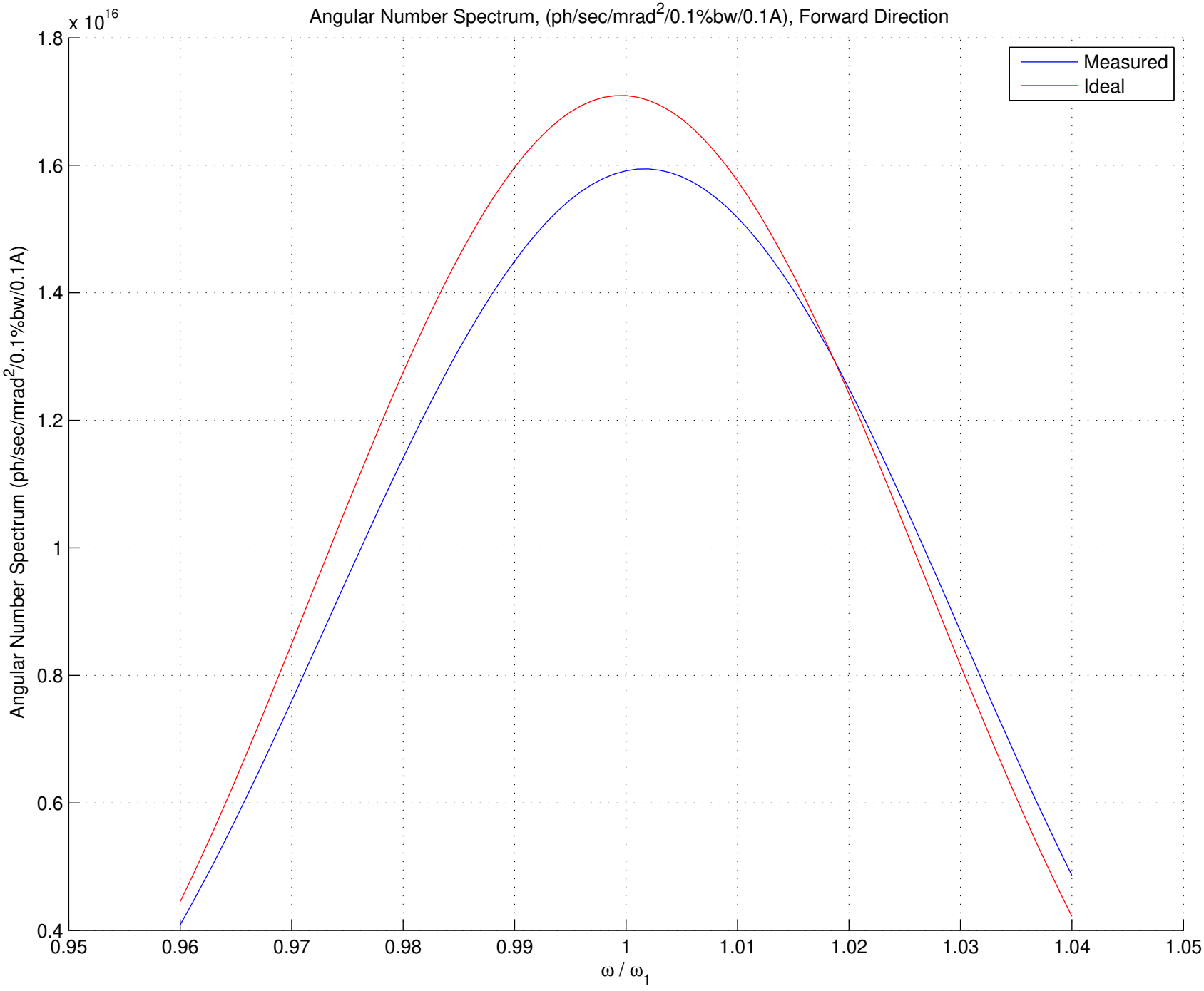

Phase Error At Field Peaks, No Ends
4
7
9
12
15
18
21
24
27
29
32
Pole
10
5
0
−5
−10
−15
Phase Error (deg)
−1
−0.8
−0.6
−0.4
−0.2
0
0.2
0.4
0.6
0.8
1
Z (m)
Phase Error: Ave = −0.000000 deg, RMS = 6.170768 deg

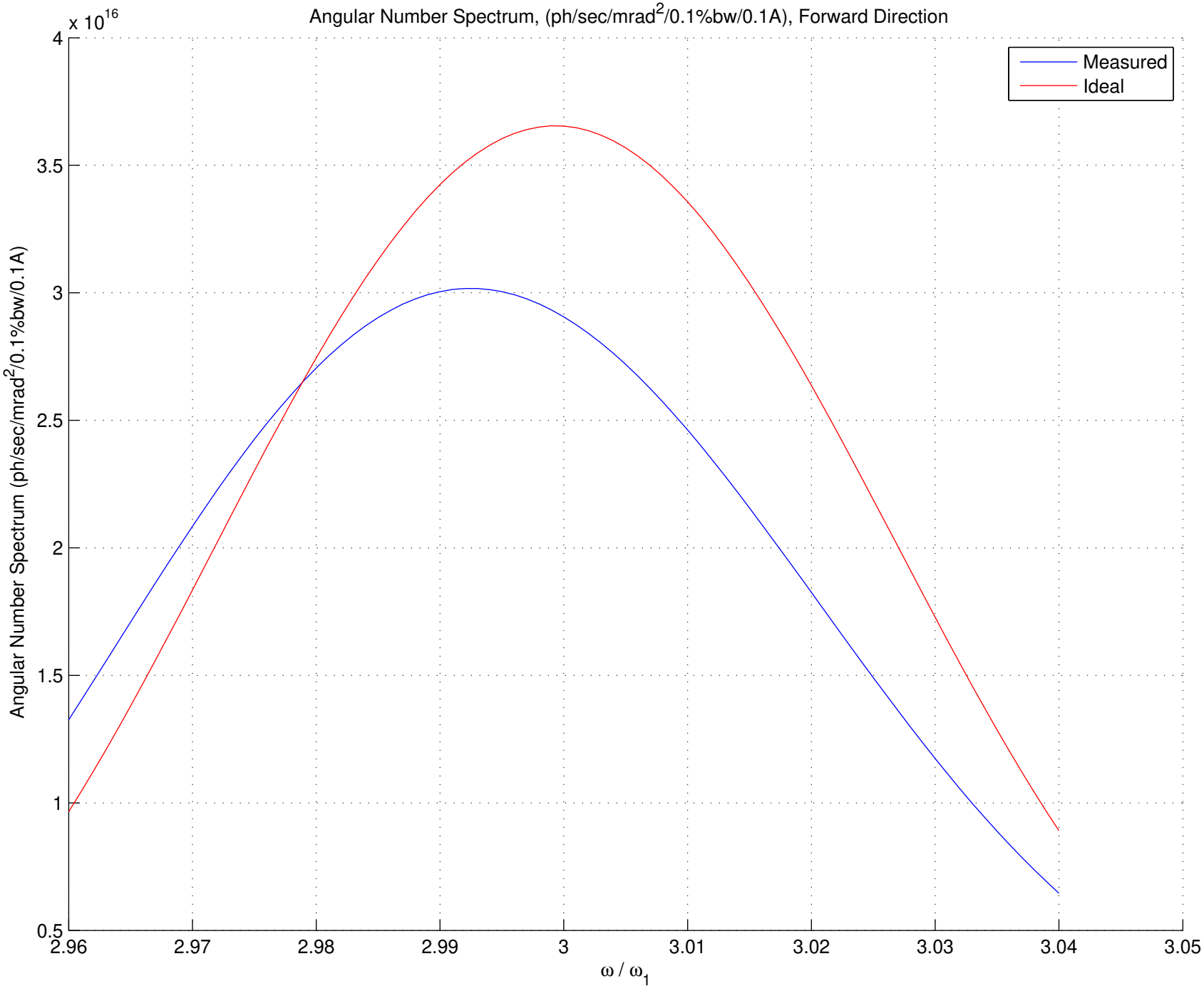

Phase Error Relative To Nominal Radiation Wave At Field Peaks, No Ends
4
7
9
12
15
18
21
24
27
29
32
Pole
−3450
−3455
−3460
−3465
−3470
−3475
−3480
Phase Error (deg)
−1
−0.8
−0.6
−0.4
−0.2
0
0.2
0.4
0.6
0.8
1
Z (m)

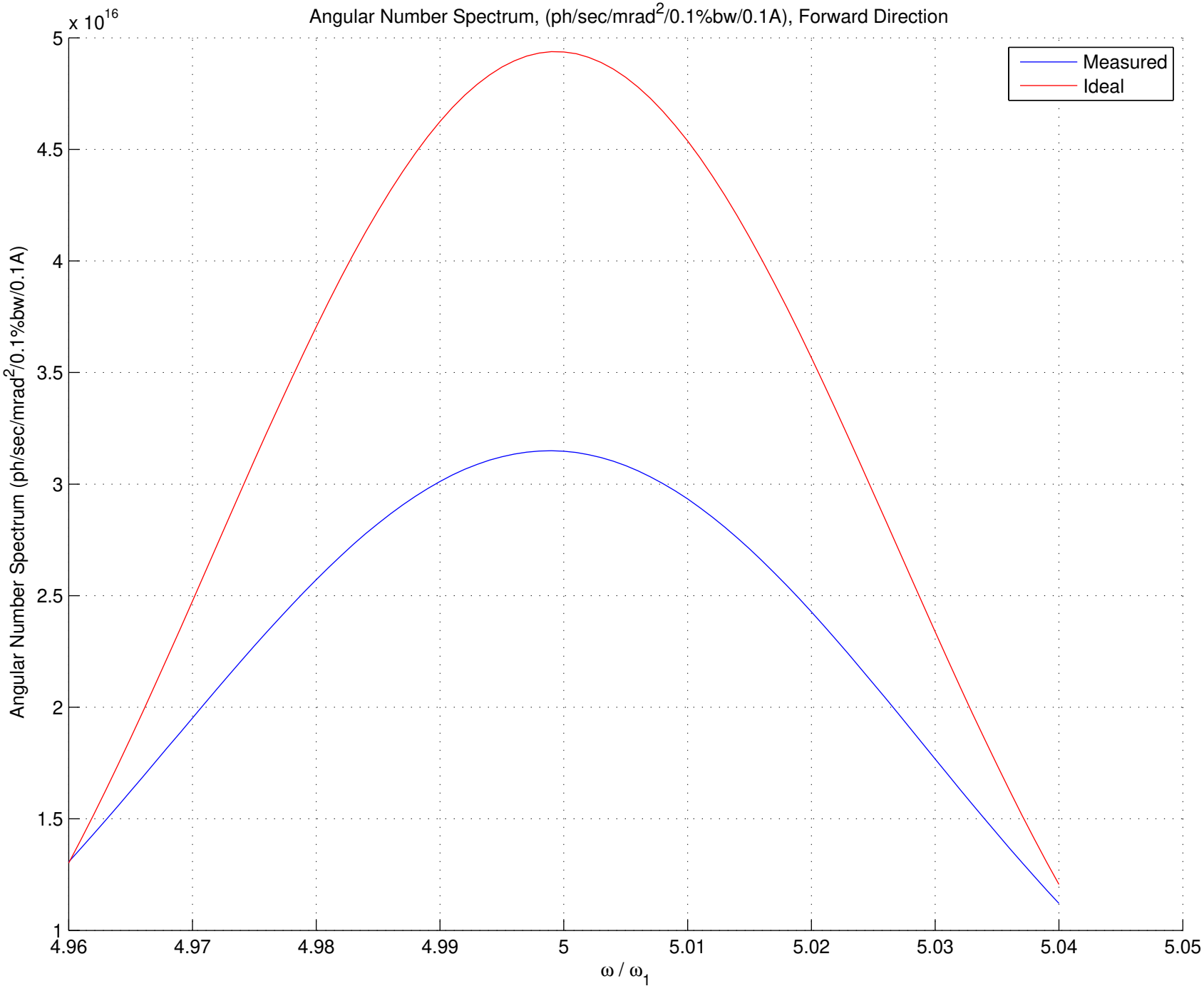

Re and Im Parts Of Ex(ω), Forward Direction, ω = ω1
90
8e−13
120
60
6e−13
150
30
4e−13
2e−13
180
0
210
330
240
300
270


Re and Im Parts Of Ey(ω), Forward Direction, ω = ω1
90
1.5e−13
120
60
1e−13
150
30
5e−14
180
0
210
330
240
300
270


Angular Number Spectrum, (ph/sec/mrad^2/0.1%bw/0.1A), Forward Direction
x 10^{16}
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
3.5
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^{16}
Angular Number Spectrum (ph/sec/mrad^2/0.1%bw/0.1A)
ω / ω_1
Measured
Ideal
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
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^{16}
Measured
Ideal
Angular Number Spectrum (ph/sec/mrad^2/0.1%bw/0.1A)
ω / ω_1
4
3.5
3
2.5
2
1.5
1
0.5
2.96
2.97
2.98
2.99
3
3.01
3.02
3.03
3.04
3.05


Angular Number Spectrum, (ph/sec/mrad^2/0.1%bw/0.1A), Forward Direction
x 10^{16}
Measured
Ideal
Angular Number Spectrum (ph/sec/mrad^2/0.1%bw/0.1A)
5
4.5
4
3.5
3
2.5
2
1.5
1
4.96
4.97
4.98
4.99
5
5.01
5.02
5.03
5.04
5.05
ω / $ω_1$