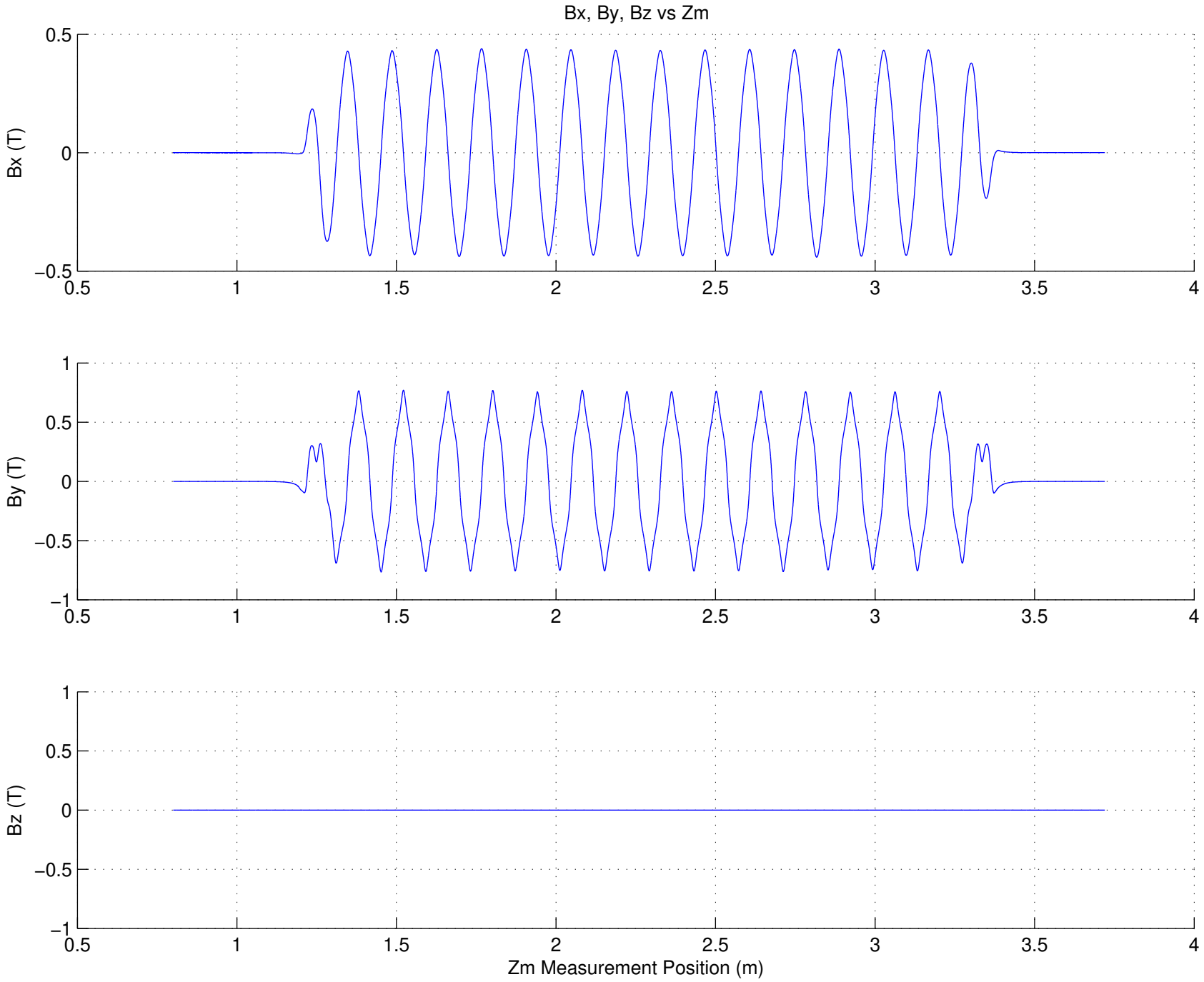
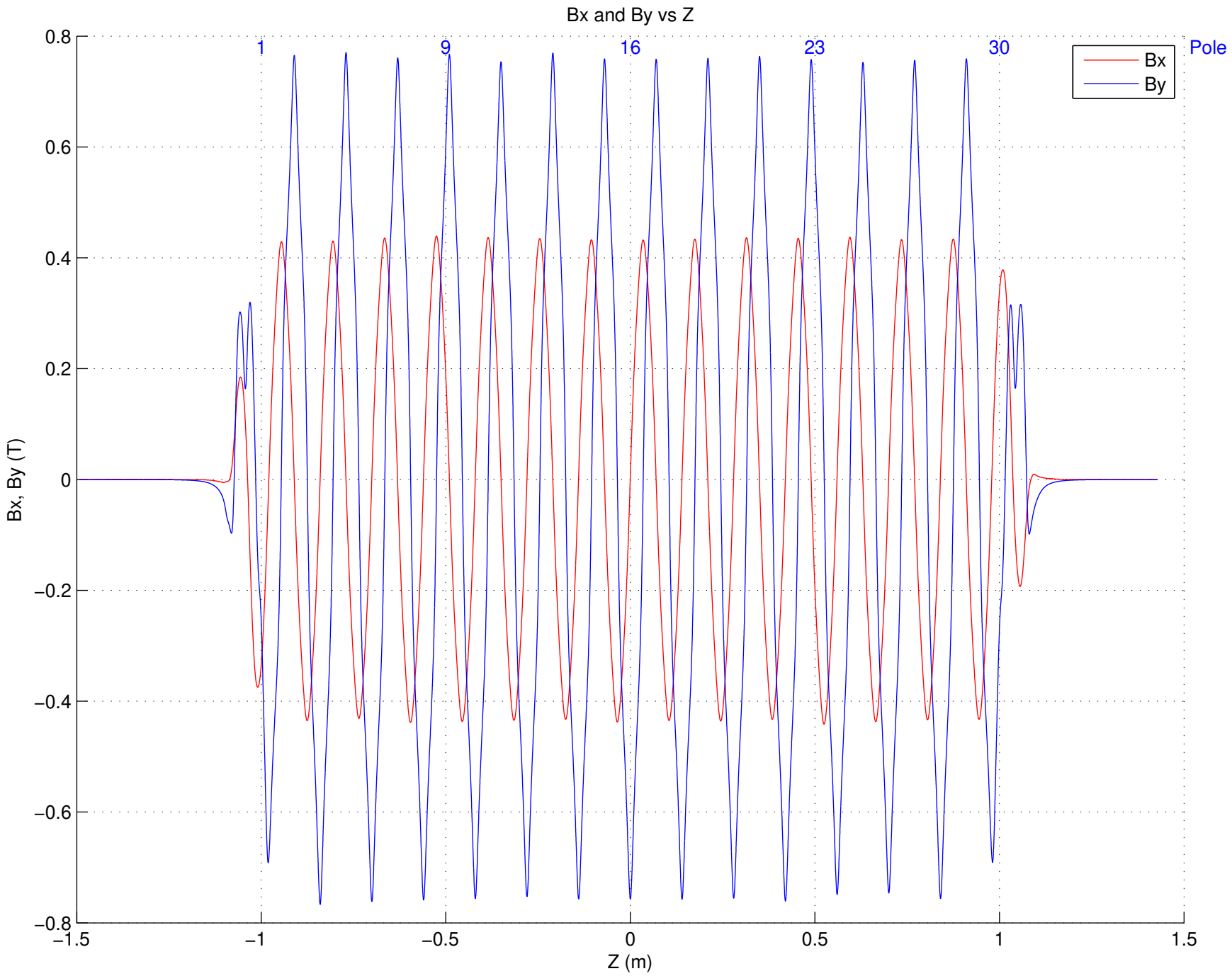
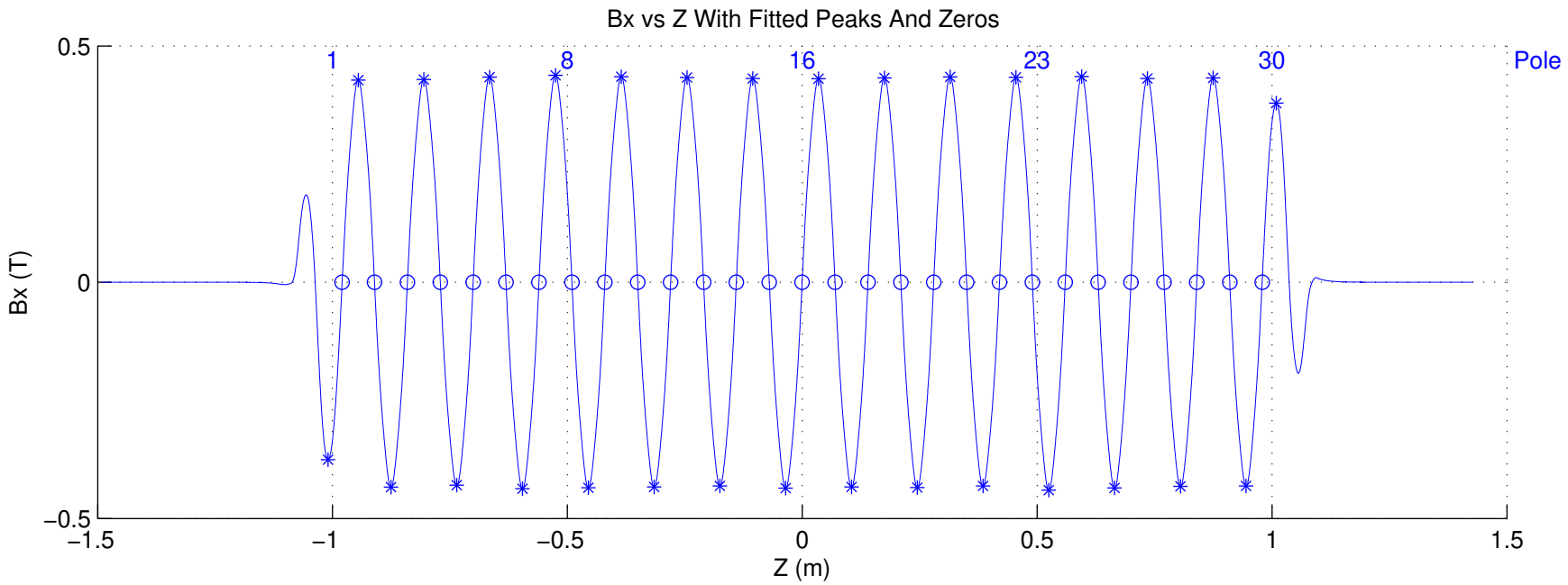
SLAC Magnetic Measurements

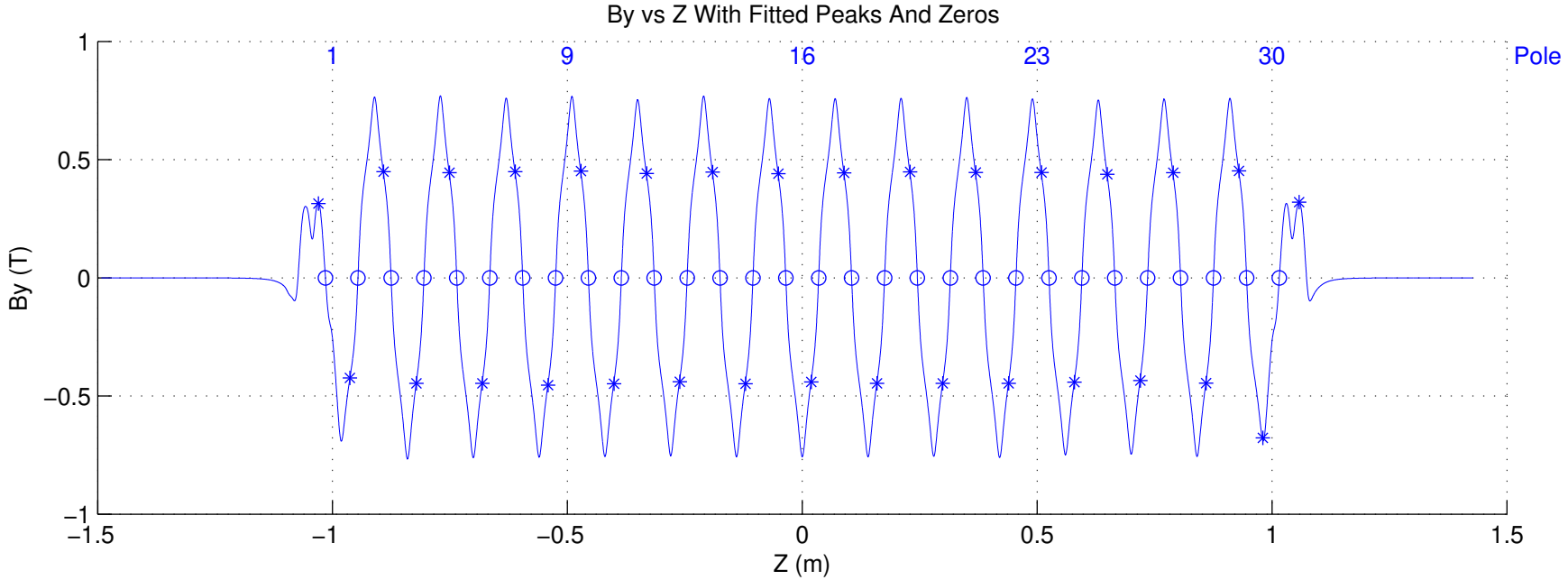
EPU Analysis
––––––––––––

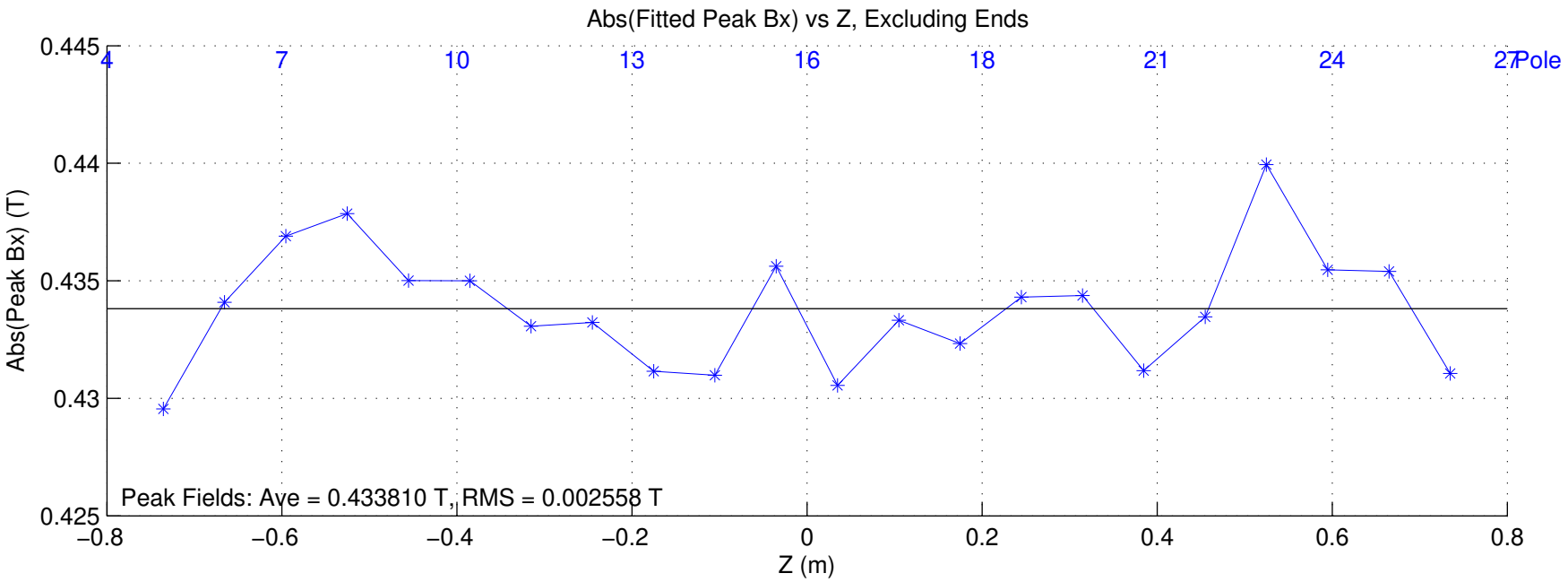
Parameters:
INPUT–FILE–DIR =S:\MagData\LCLS\Undulator\SSRL–BL5–EPU\DATASET0001\Rough Tuning\Z Scans\Run 010\
INPUT–FILE–NAME =x+00000–y+000–bscanz.dat
INPUT–FILE–TYPE =ZVXYBXYH
CORR–REQUIRED =0
GAMMA =5878
NOM–LAMBDA–U =140
NOM–K–VALUE =9
NOM–LAMBDA–R =0
NUM–POLES =31
NUM–END–POLES =4
CELL–LENGTH =3.126

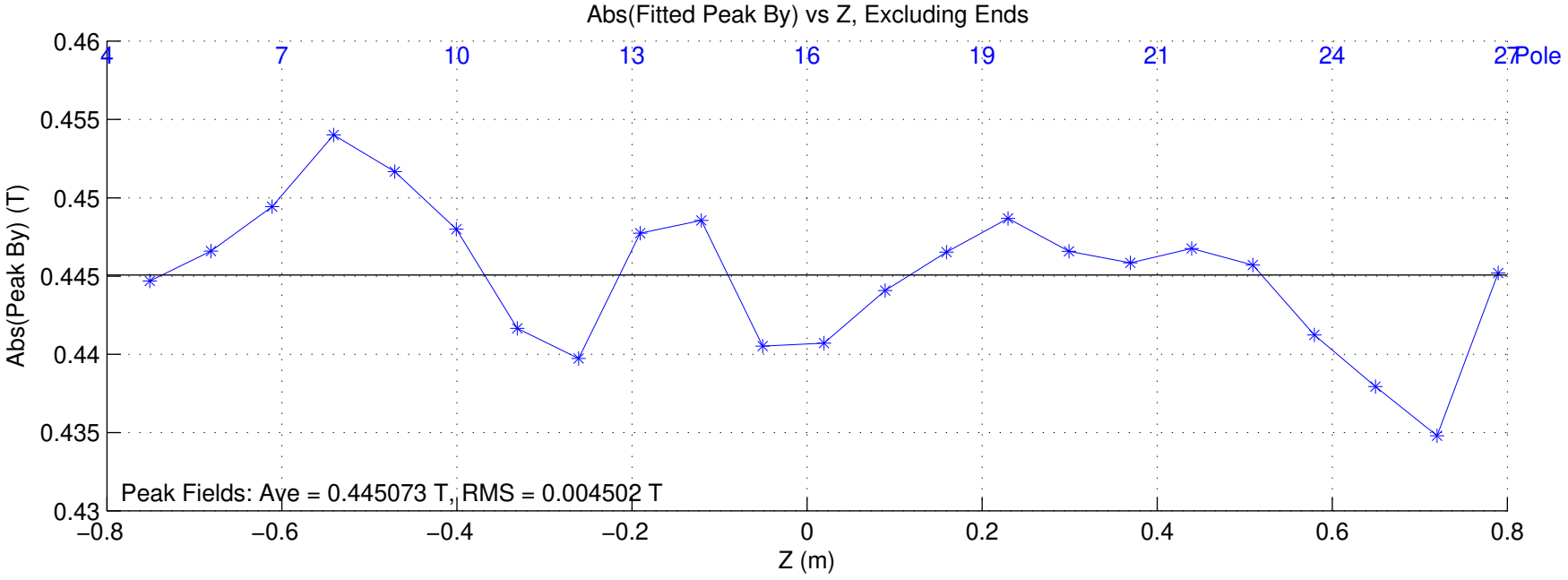

Bx, By, Bz vs Zm
Bx (T)
By (T)
Bz (T)
Zm Measurement Position (m)
0.5
0
−0.5
1
−1
1.5
2
2.5
3
3.5
4

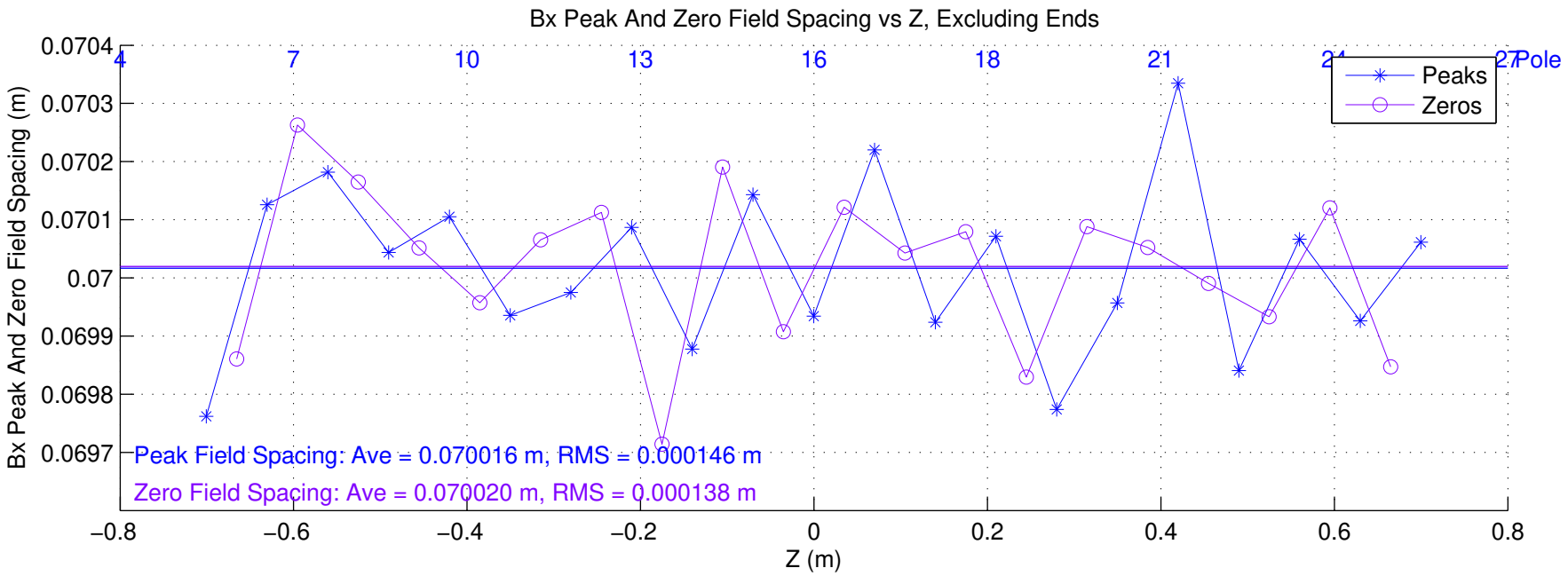

Bx and By vs Z
1
9
16
23
30
Pole
Bx
By
0.8
0.6
0.4
0.2
0
−0.2
−0.4
−0.6
−0.8
Bx, By (T)
−1.5
−1
−0.5
0
0.5
1
1.5
Z (m)

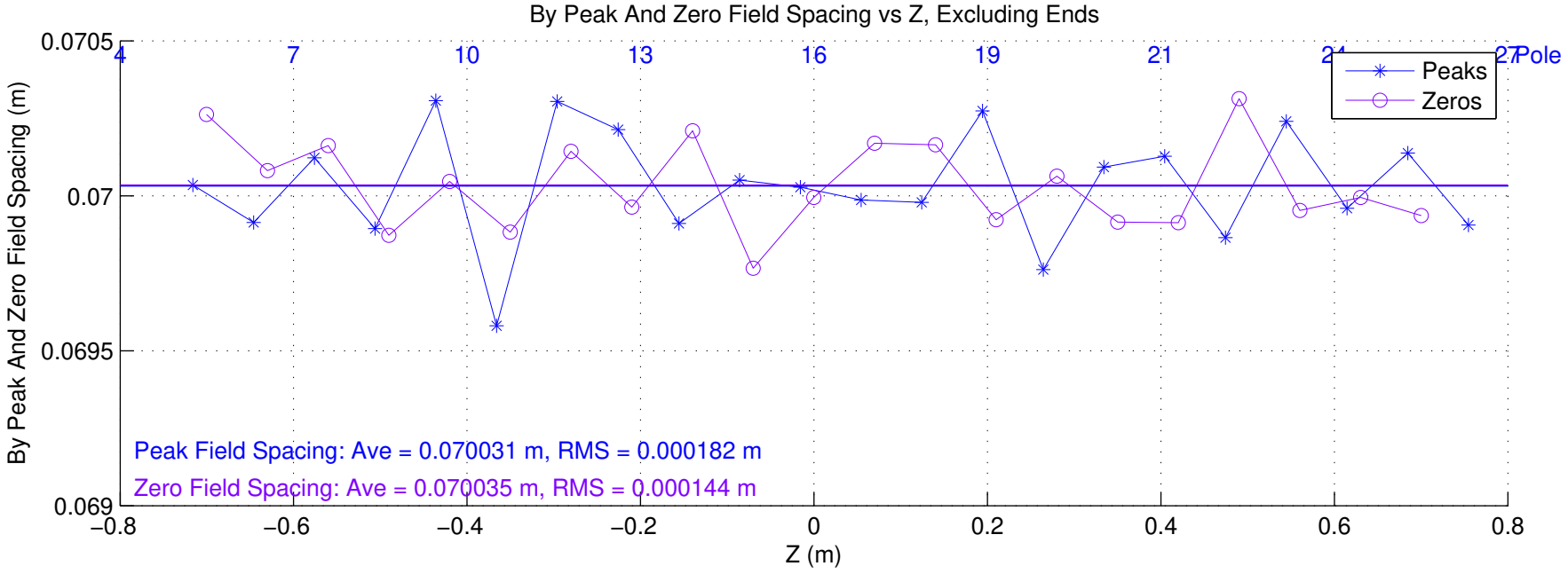

Bx vs Z With Fitted Peaks And Zeros
1
8
16
23
30
Pole
0.5
0
−0.5
Bx (T)
−1.5
−1
−0.5
0
0.5
1
1.5
Z (m)

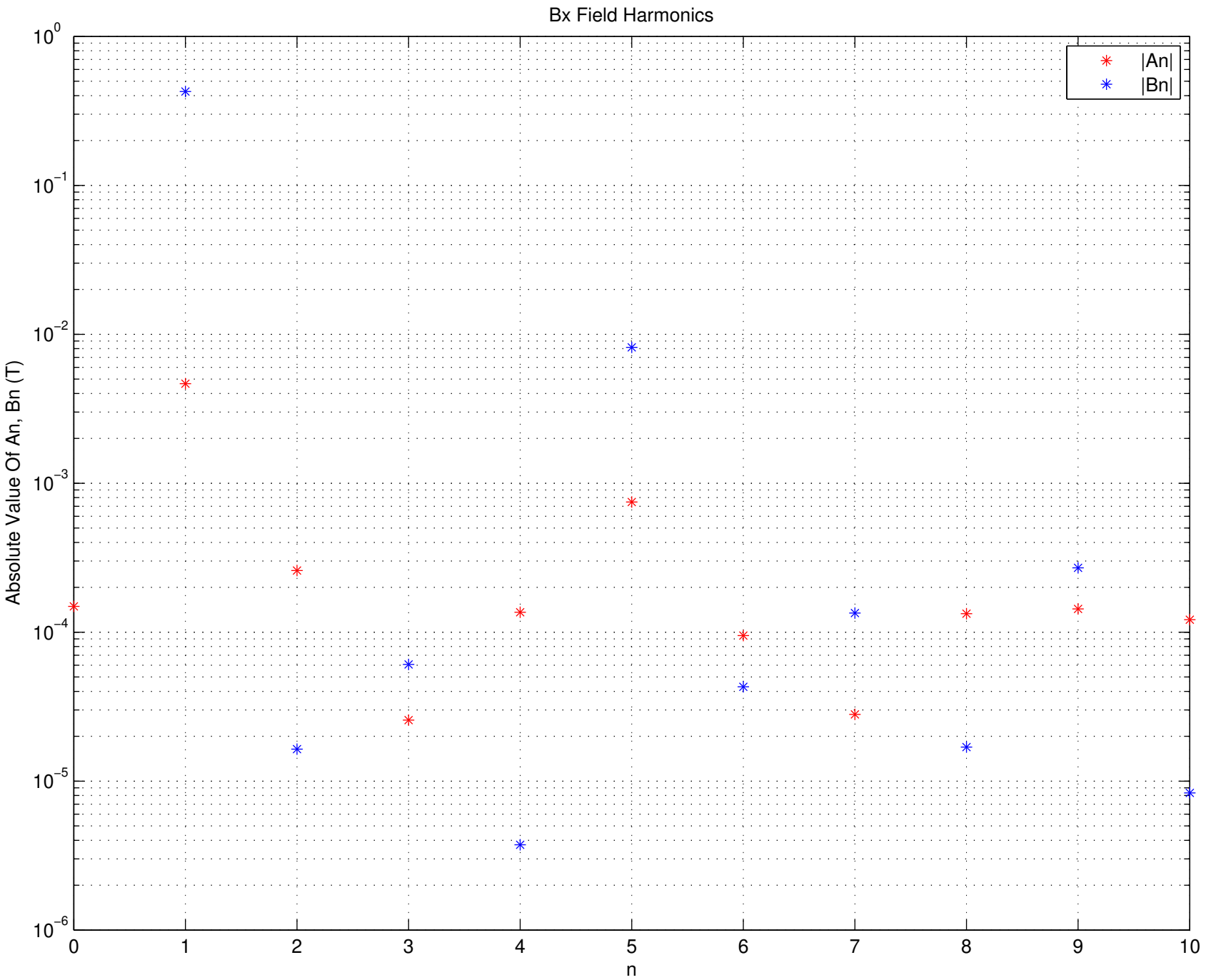

By vs Z With Fitted Peaks And Zeros
1
9
16
23
30
Pole
1
0.5
0
−0.5
−1
By (T)
−1.5
−1
−0.5
0
0.5
1
1.5
Z (m)

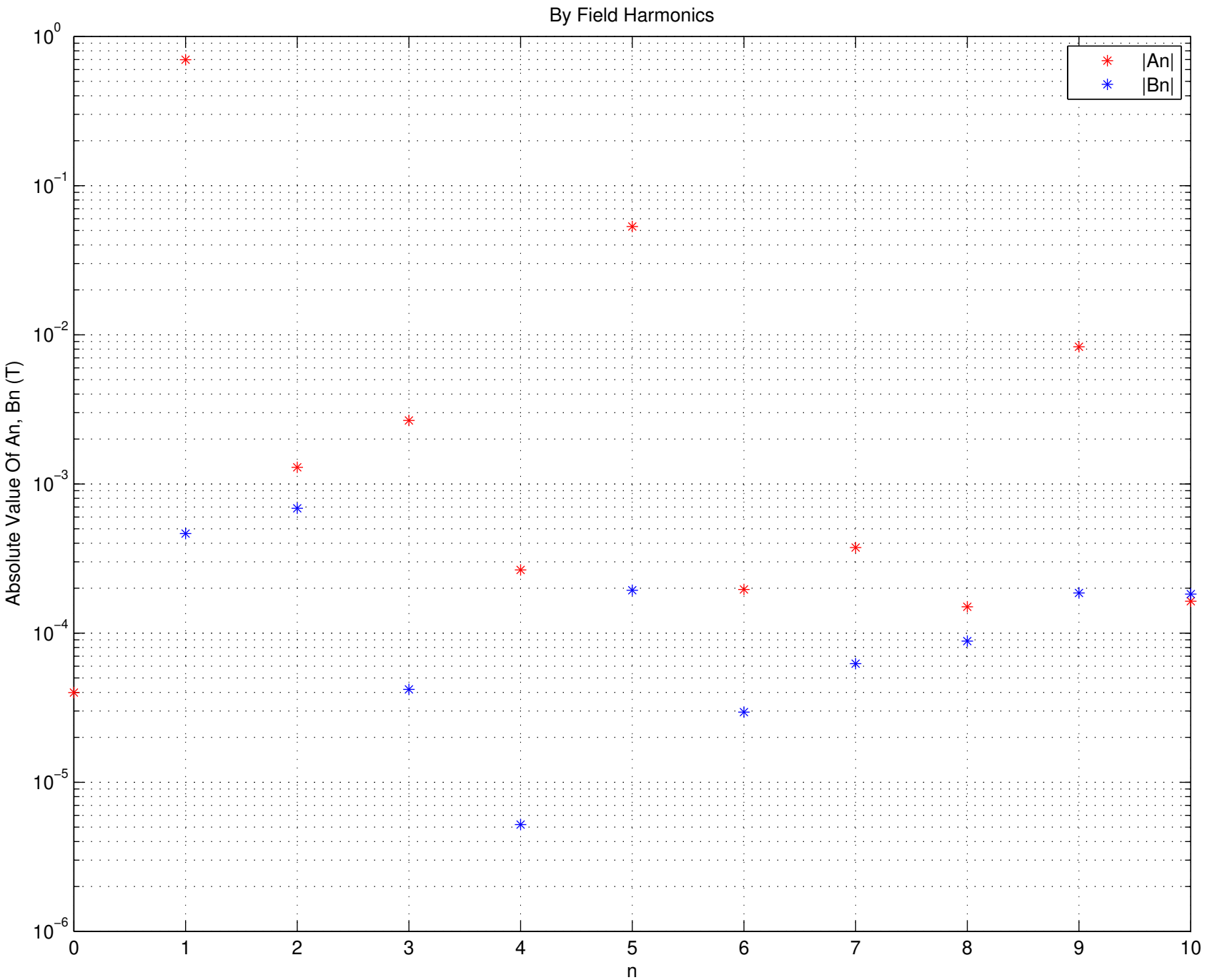

Abs(Fitted Peak Bx) vs Z, Excluding Ends
4
7
10
13
16
18
21
24
27
Pole
0.445
0.44
0.435
0.43
0.425
Abs(Peak Bx) (T)
Peak Fields: Ave = 0.433810 T, RMS = 0.002558 T
−0.8
−0.6
−0.4
−0.2
0
0.2
0.4
0.6
0.8
Z (m)

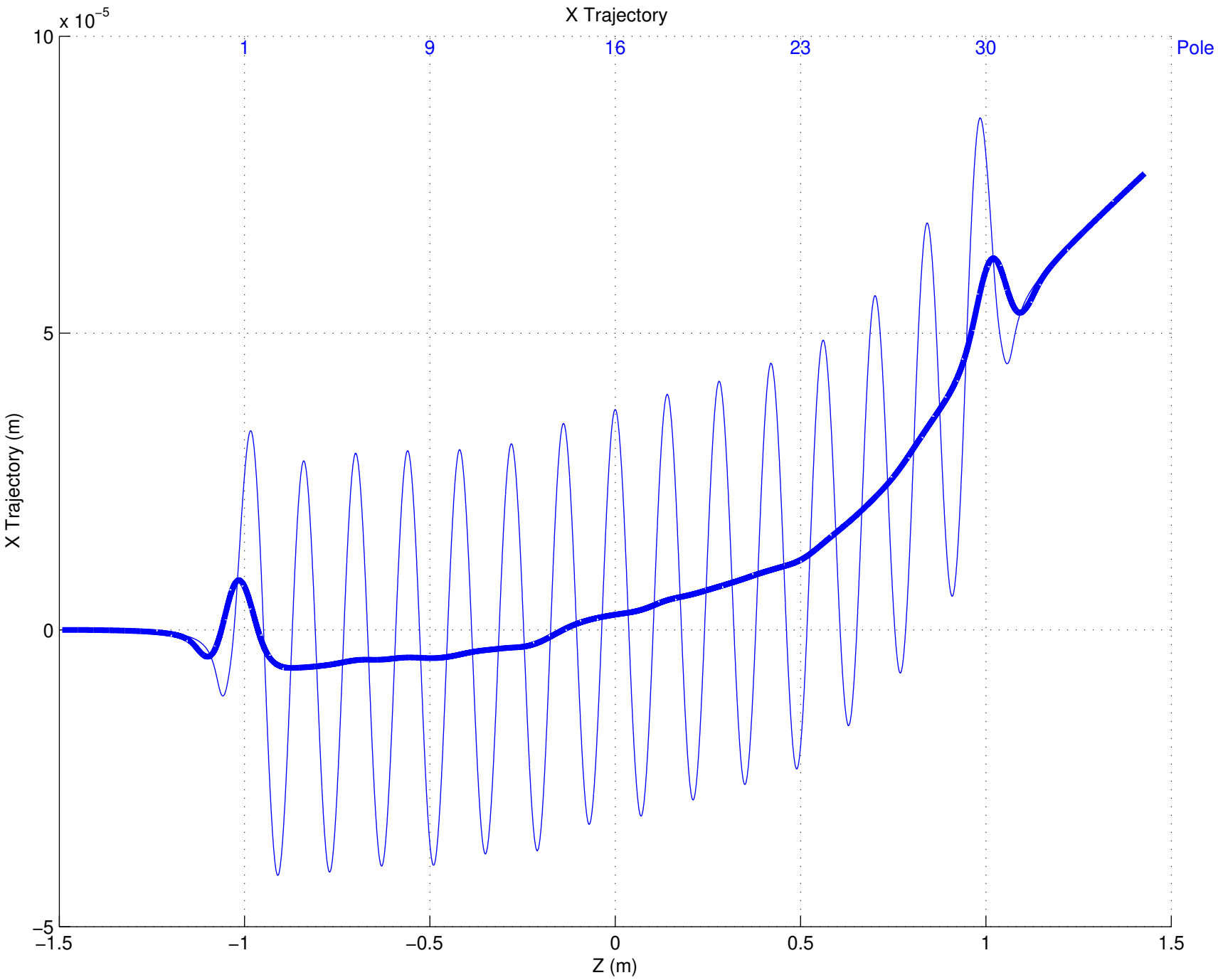

Abs(Fitted Peak By) vs Z, Excluding Ends
4
7
10
13
16
19
21
24
27
Pole
0.46
0.455
0.45
0.445
0.44
0.435
0.43
Abs(Peak By) (T)
Peak Fields: Ave = 0.445073 T, RMS = 0.004502 T
−0.8
−0.6
−0.4
−0.2
0
0.2
0.4
0.6
0.8
Z (m)

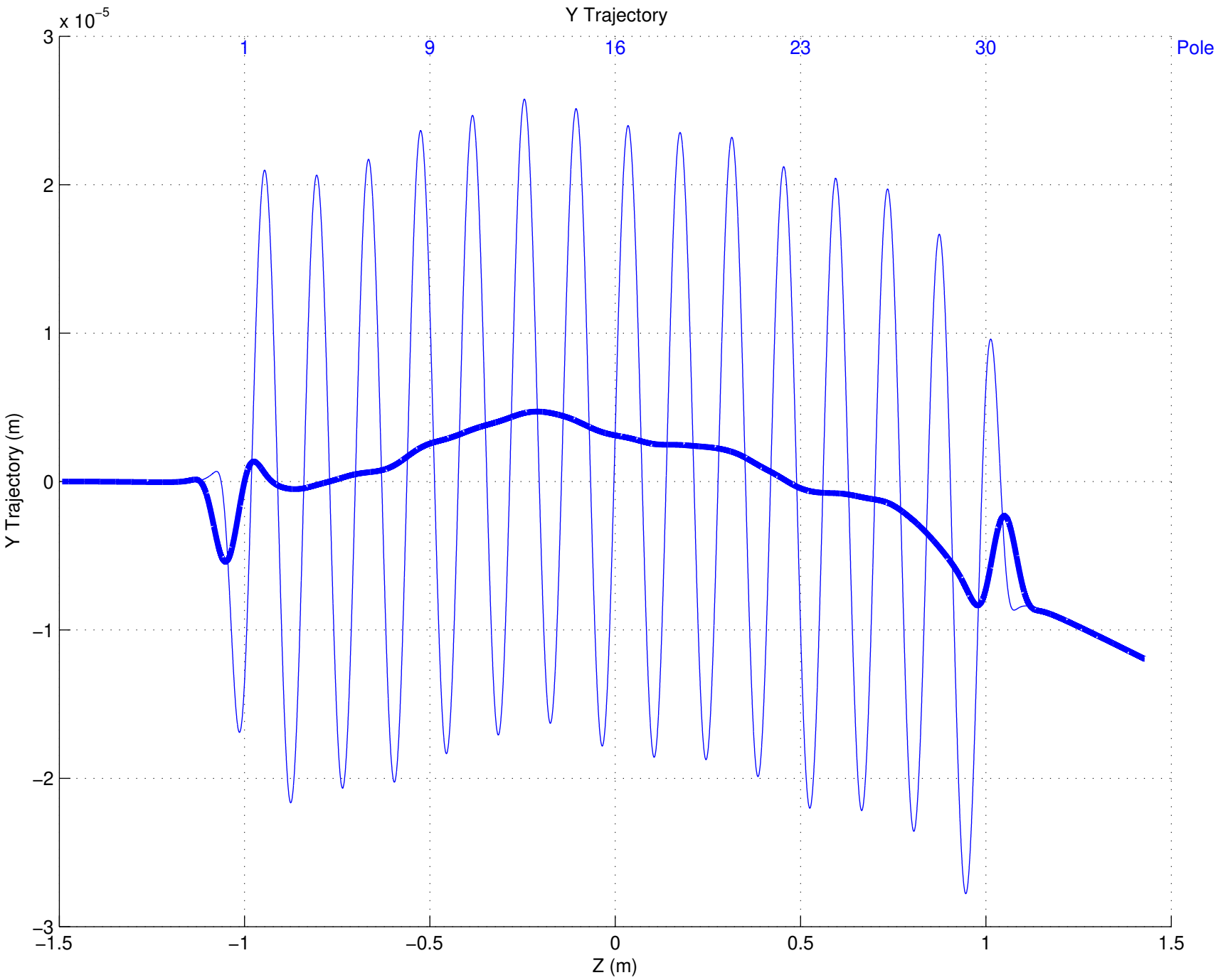

Bx Peak And Zero Field Spacing vs Z, Excluding Ends
Bx Peak And Zero Field Spacing (m)
Z (m)
Pole
Peaks
Zeros
Peak Field Spacing: Ave = 0.070016 m, RMS = 0.000146 m
Zero Field Spacing: Ave = 0.070020 m, RMS = 0.000138 m

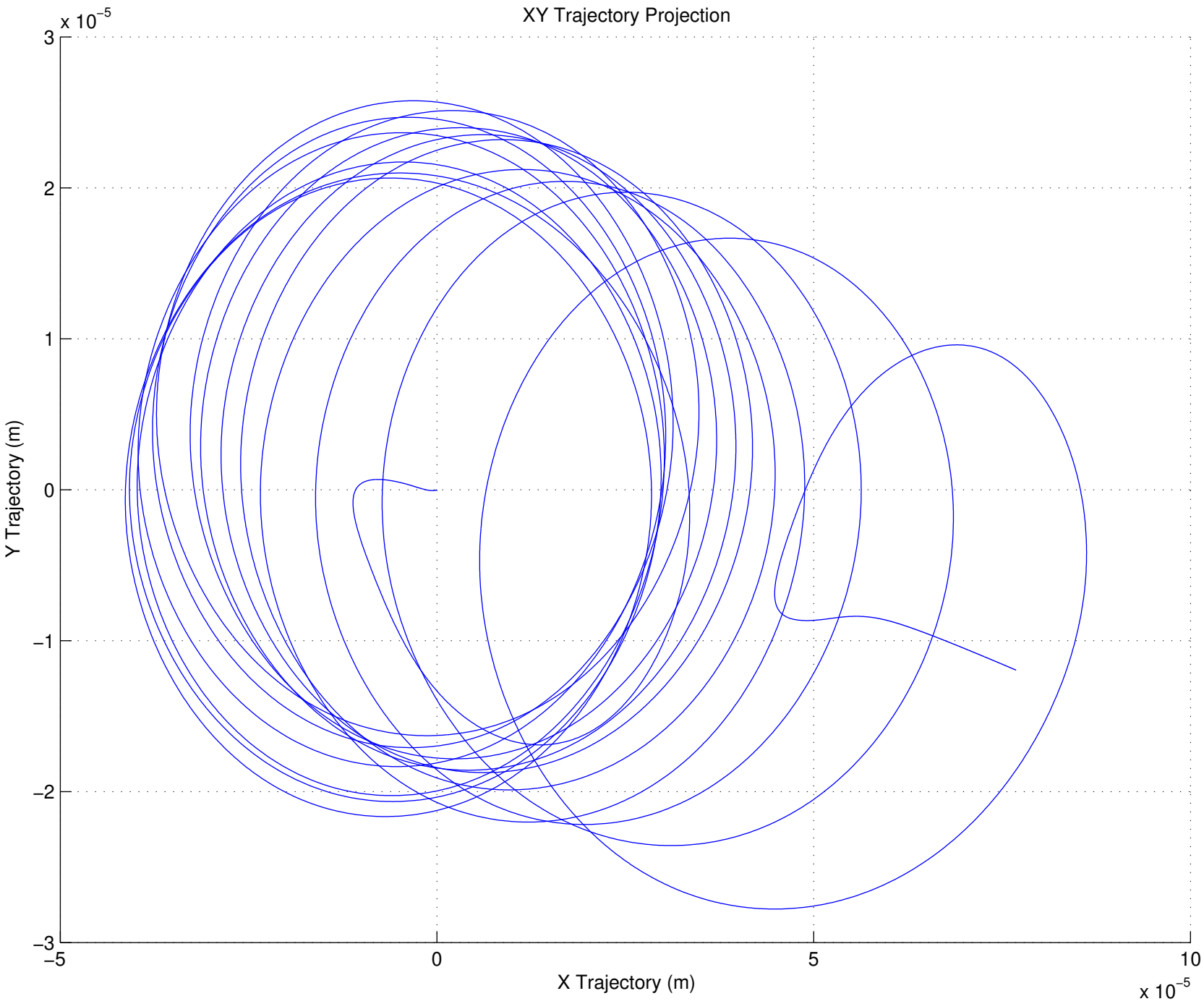

By Peak And Zero Field Spacing vs Z, Excluding Ends
By Peak And Zero Field Spacing (m)
Z (m)
Pole
Peaks
Zeros
Peak Field Spacing: Ave = 0.070031 m, RMS = 0.000182 m
Zero Field Spacing: Ave = 0.070035 m, RMS = 0.000144 m

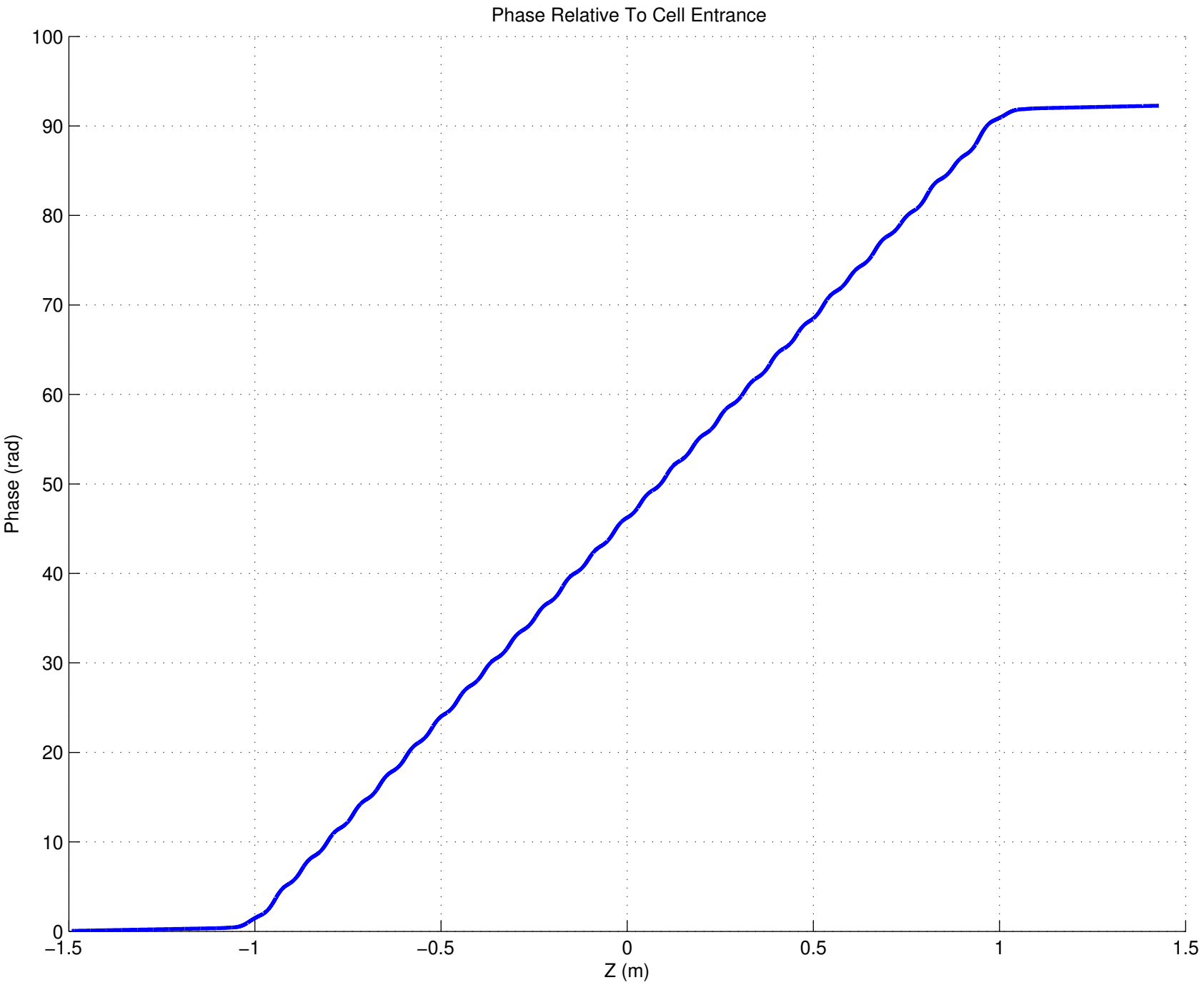

Bx Field Harmonics
|An|
|Bn|
Absolute Value Of An, Bn (T)
n
10^{0}
10^{-1}
10^{-2}
10^{-3}
10^{-4}
10^{-5}
10^{-6}
0
1
2
3
4
5
6
7
8
9
10

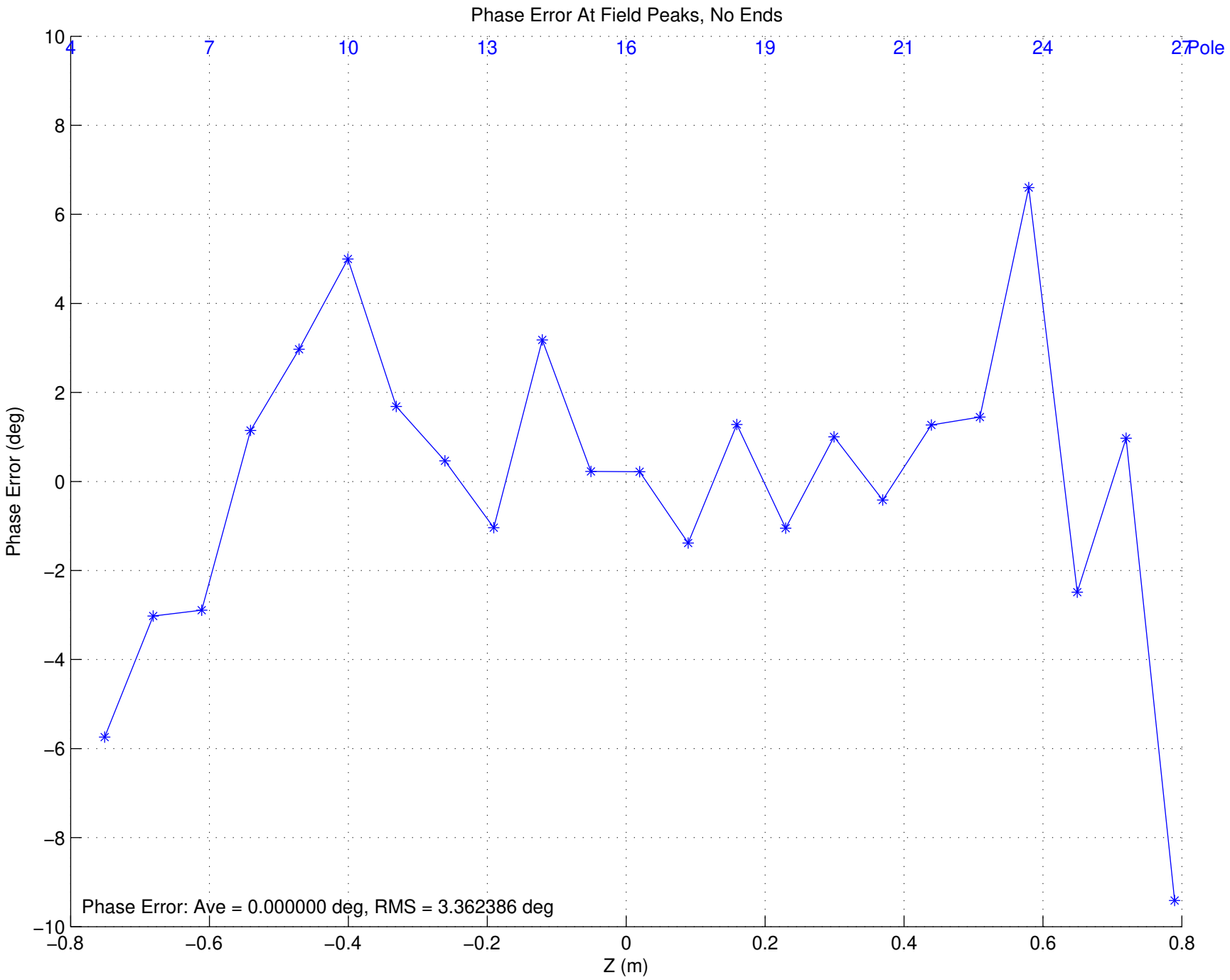

By Field Harmonics
|An|
|Bn|
Absolute Value Of An, Bn (T)
n
10^{0}
10^{-1}
10^{-2}
10^{-3}
10^{-4}
10^{-5}
10^{-6}
0
1
2
3
4
5
6
7
8
9
10

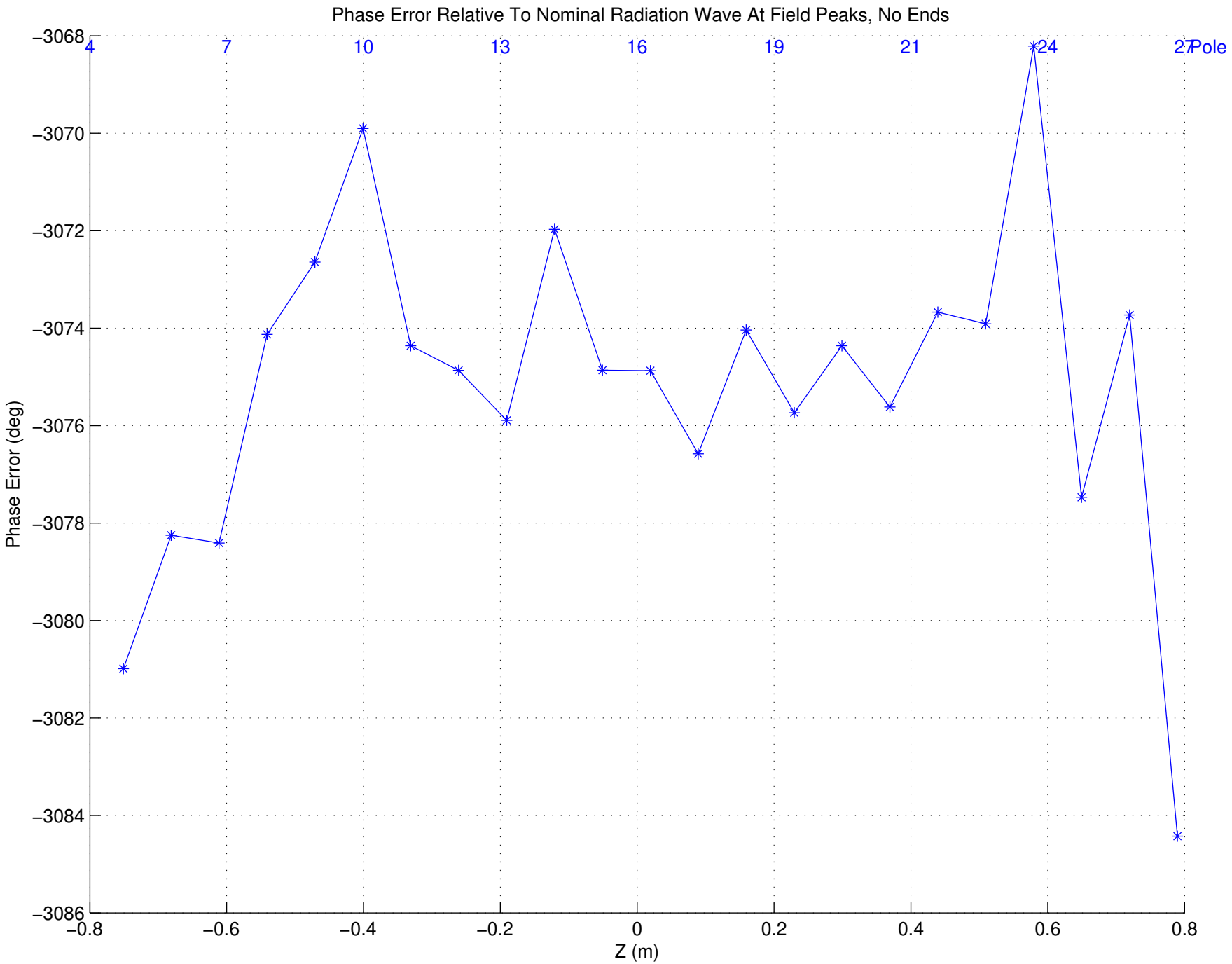

X Trajectory
x 10^-5
10
5
0
−5
1
9
16
23
30
Pole
X Trajectory (m)
−1.5
−1
−0.5
0
0.5
1
1.5
Z (m)

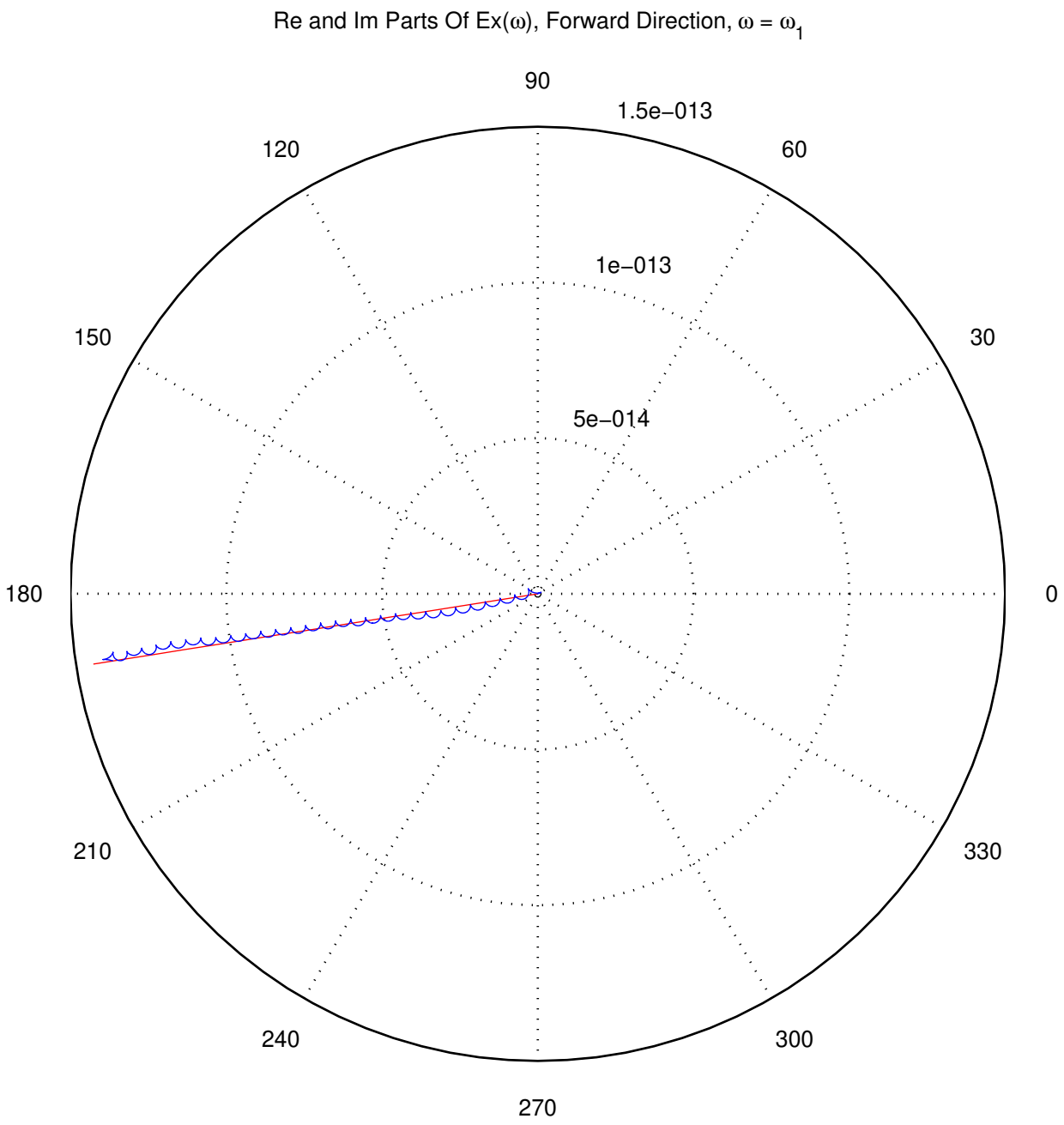

Y Trajectory
x 10^-5
3
2
1
0
−1
−2
−3
1
9
16
23
30
Pole
−1.5
−1
−0.5
0
0.5
1
1.5
Y Trajectory (m)
Z (m)

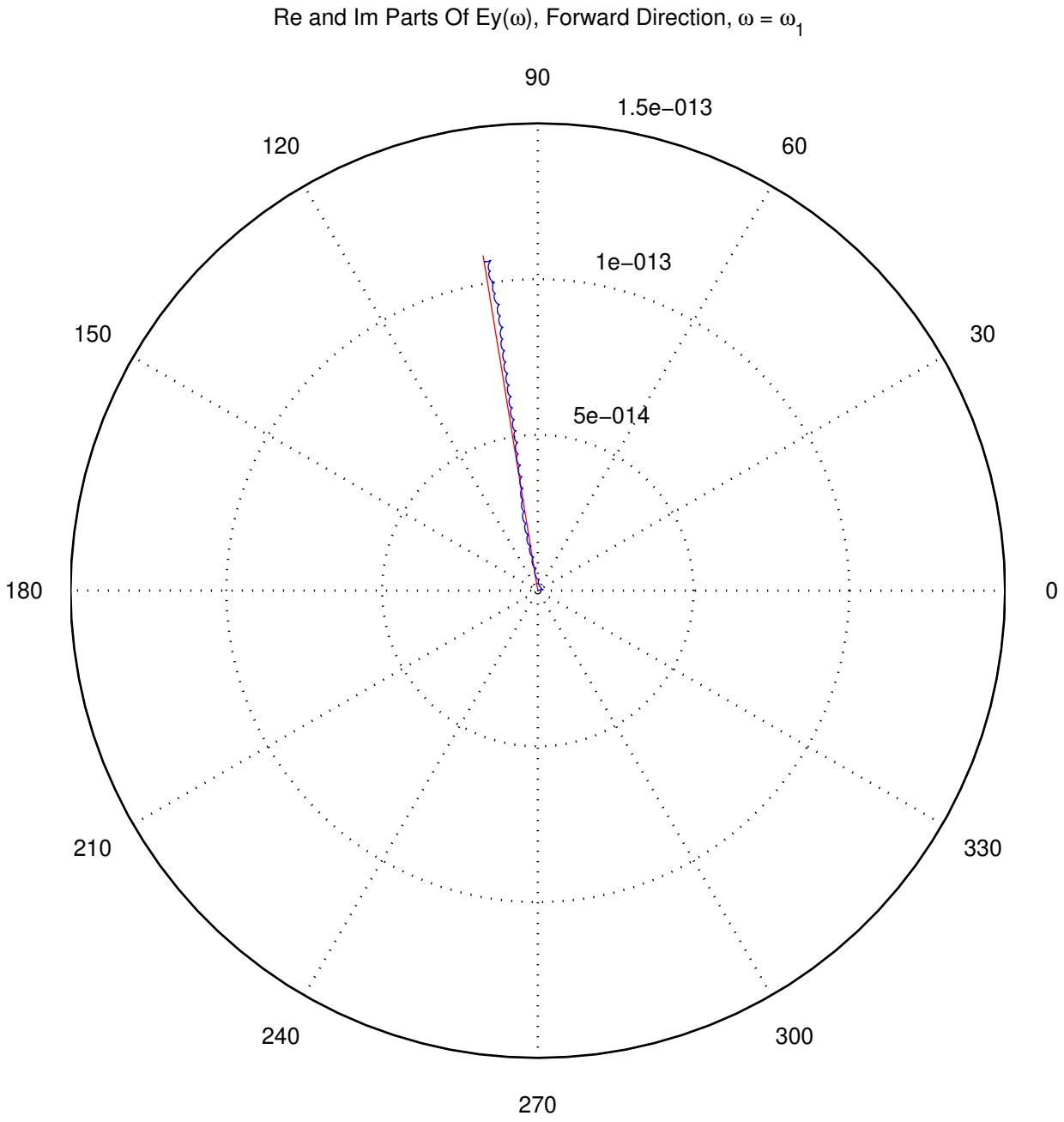

XY Trajectory Projection
x 10^-5
3
2
1
0
−1
−2
−3
Y Trajectory (m)
−5
0
5
10
X Trajectory (m)
x 10^-5

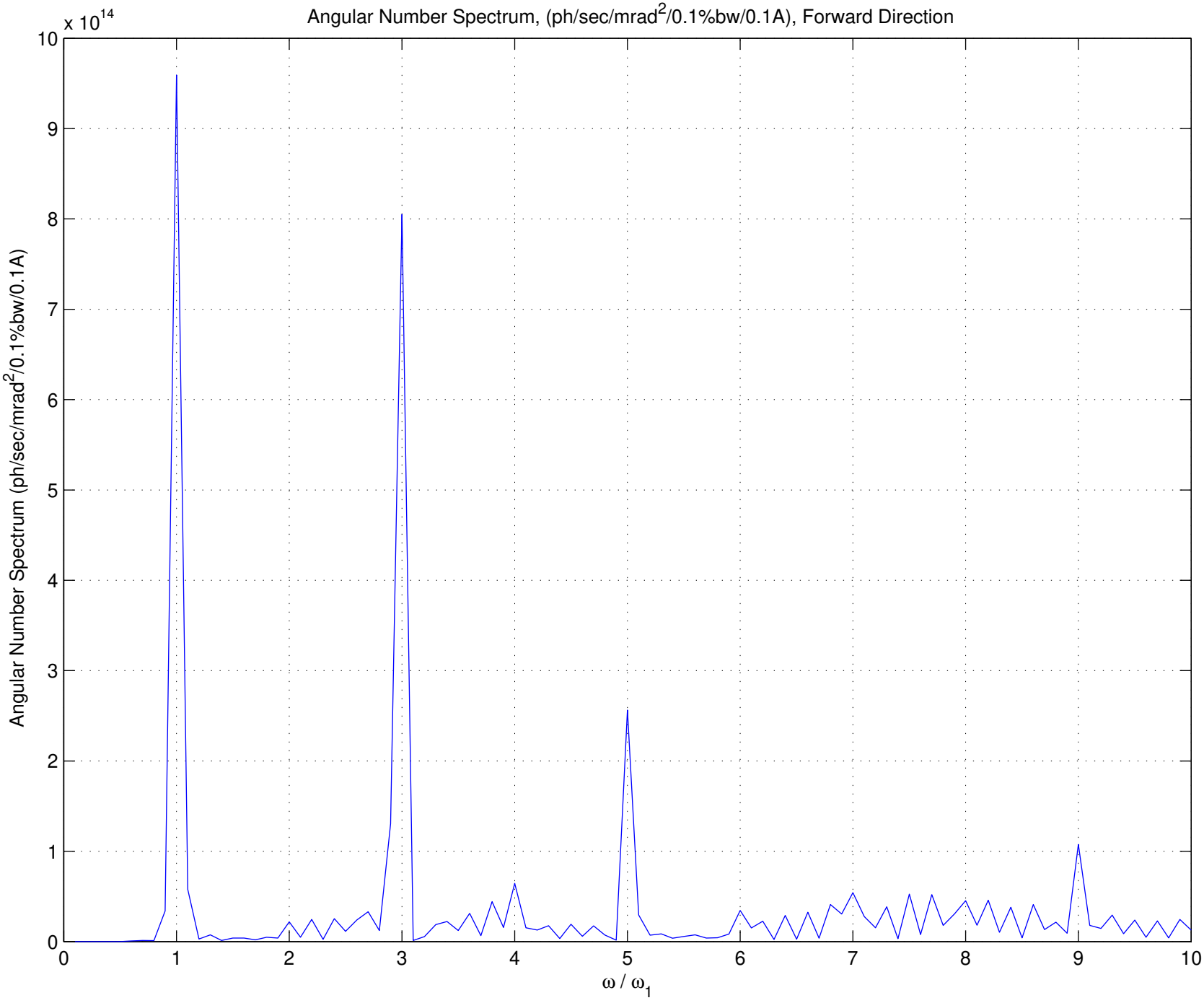

Phase Relative To Cell Entrance
Phase (rad)
Z (m)
100
90
80
70
60
50
40
30
20
10
0
−1.5
−1
−0.5
0
0.5
1
1.5

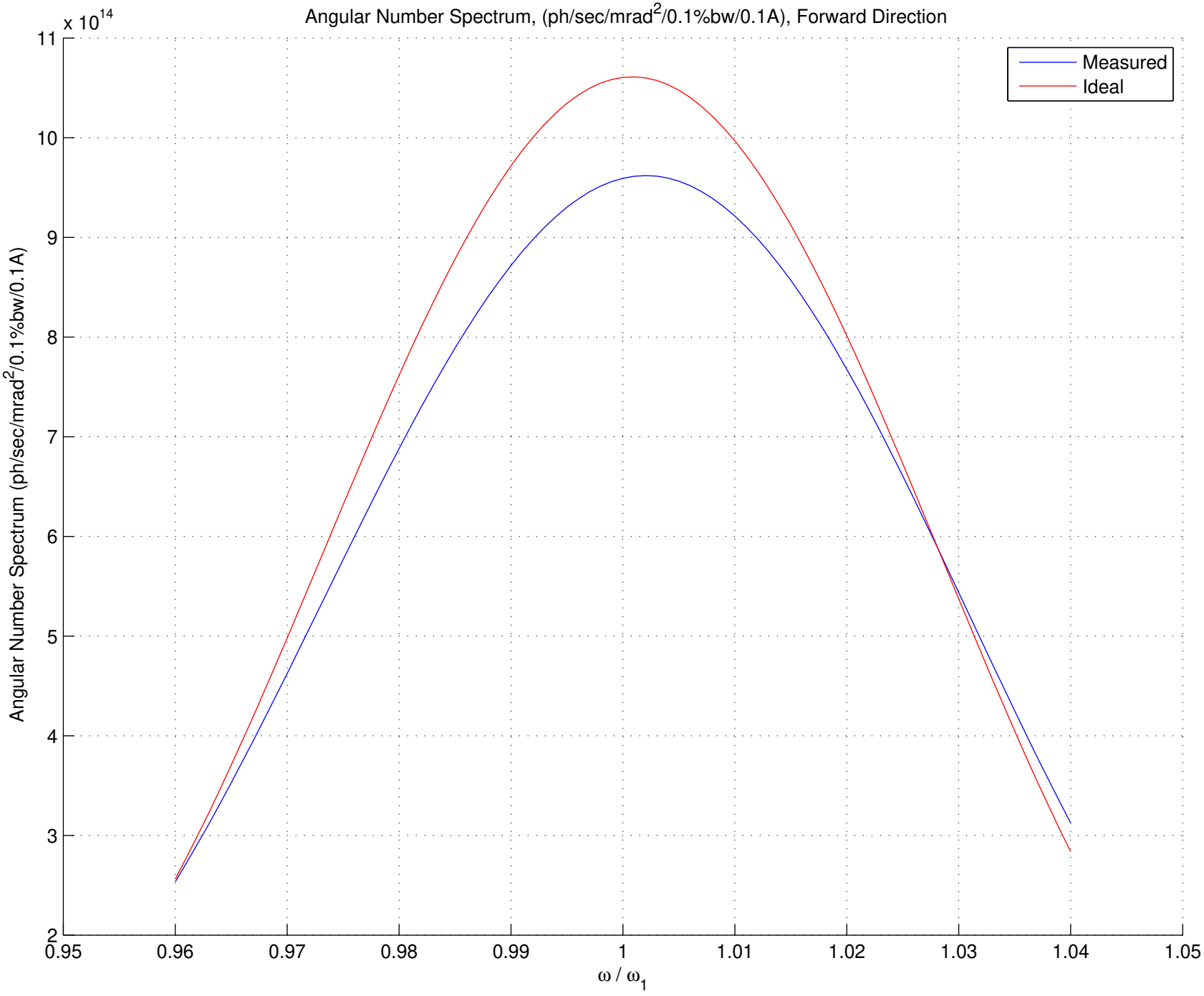

Phase Error At Field Peaks, No Ends
4
7
10
13
16
19
21
24
27
Pole
10
8
6
4
2
0
−2
−4
−6
−8
−10
Phase Error (deg)
Phase Error: Ave = 0.000000 deg, RMS = 3.362386 deg
−0.8
−0.6
−0.4
−0.2
0
0.2
0.4
0.6
0.8
Z (m)

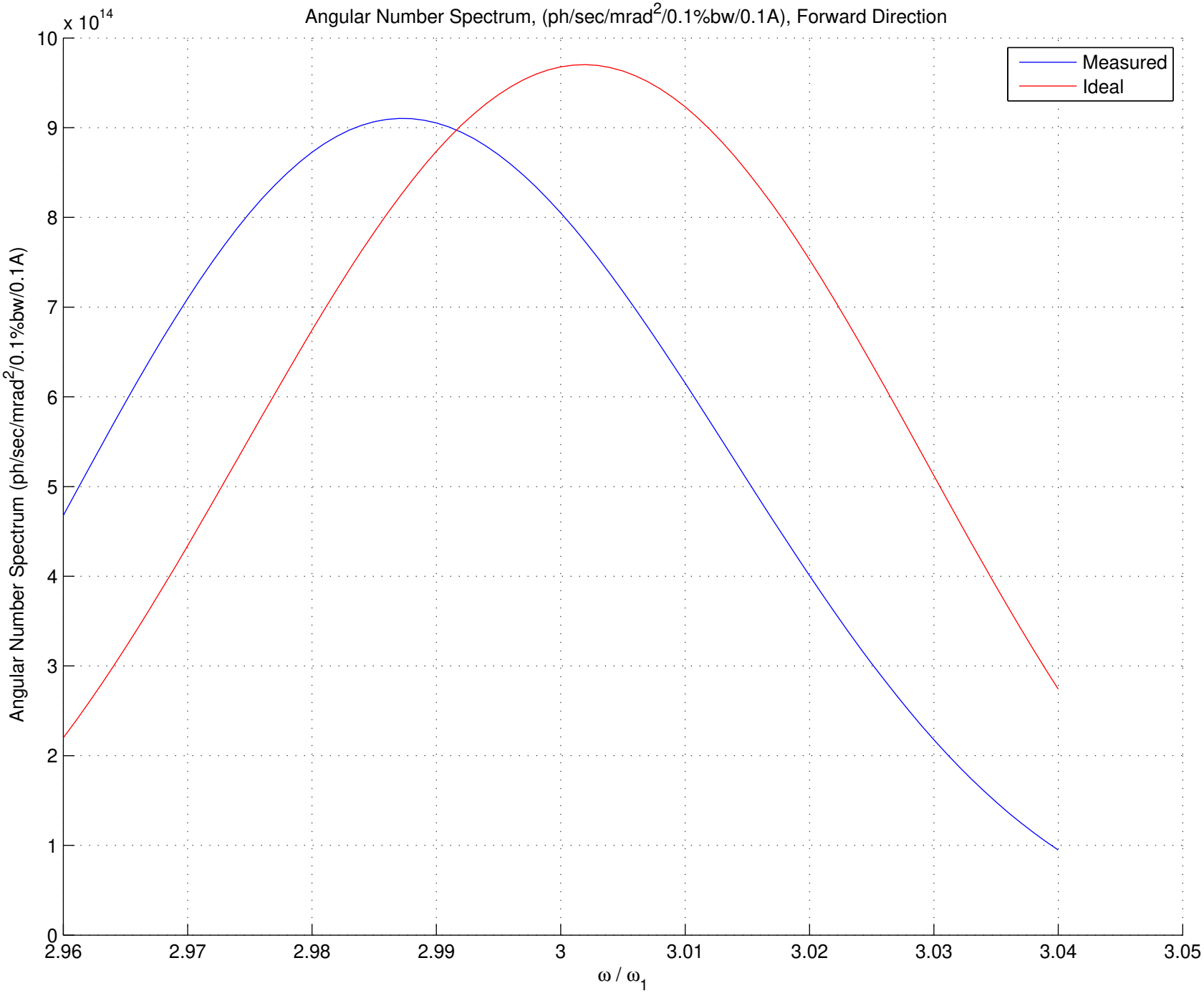

Phase Error Relative To Nominal Radiation Wave At Field Peaks, No Ends
4
7
10
13
16
19
21
24
27
Pole
−3068
−3070
−3072
−3074
−3076
−3078
−3080
−3082
−3084
−3086
Phase Error (deg)
−0.8
−0.6
−0.4
−0.2
0
0.2
0.4
0.6
0.8
Z (m)

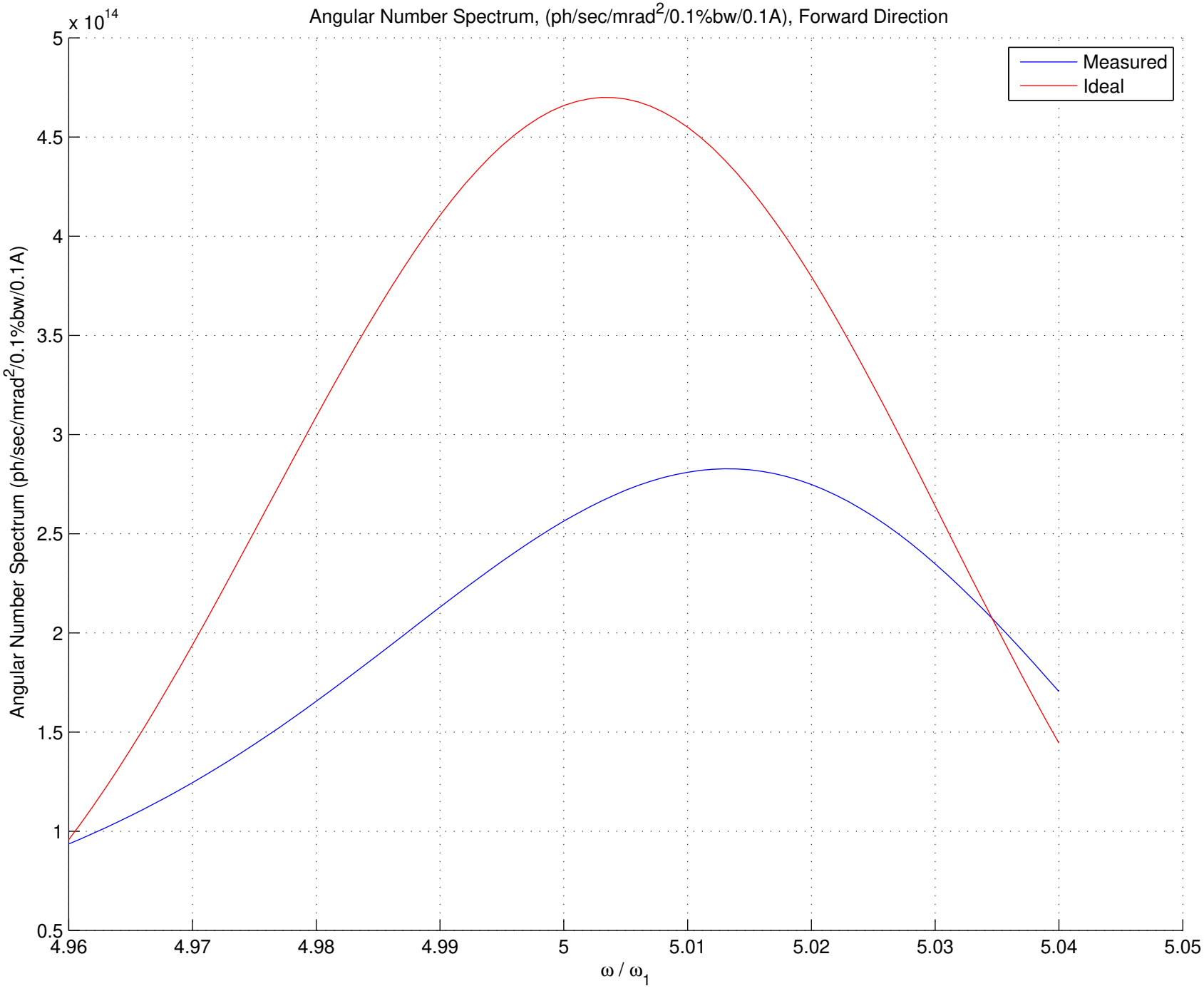

Re and Im Parts Of Ex(ω), Forward Direction, ω = ω1
90
1.5e−013
120
60
1e−013
150
30
5e−014
180
0
210
330
240
300
270


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


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
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 10^14
11
10
9
8
7
6
5
4
3
2
Angular Number Spectrum (ph/sec/mrad2/0.1%bw/0.1A)
0.95
0.96
0.97
0.98
0.99
1
1.01
1.02
1.03
1.04
1.05
ω / ω1
Measured
Ideal


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
Measured
Ideal
0
1
2
3
4
5
6
7
8
9
10
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 10^14
Angular Number Spectrum (ph/sec/mrad2/0.1%bw/0.1A)
ω / ω1
Measured
Ideal
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
4.96
4.97
4.98
4.99
5
5.01
5.02
5.03
5.04
5.05