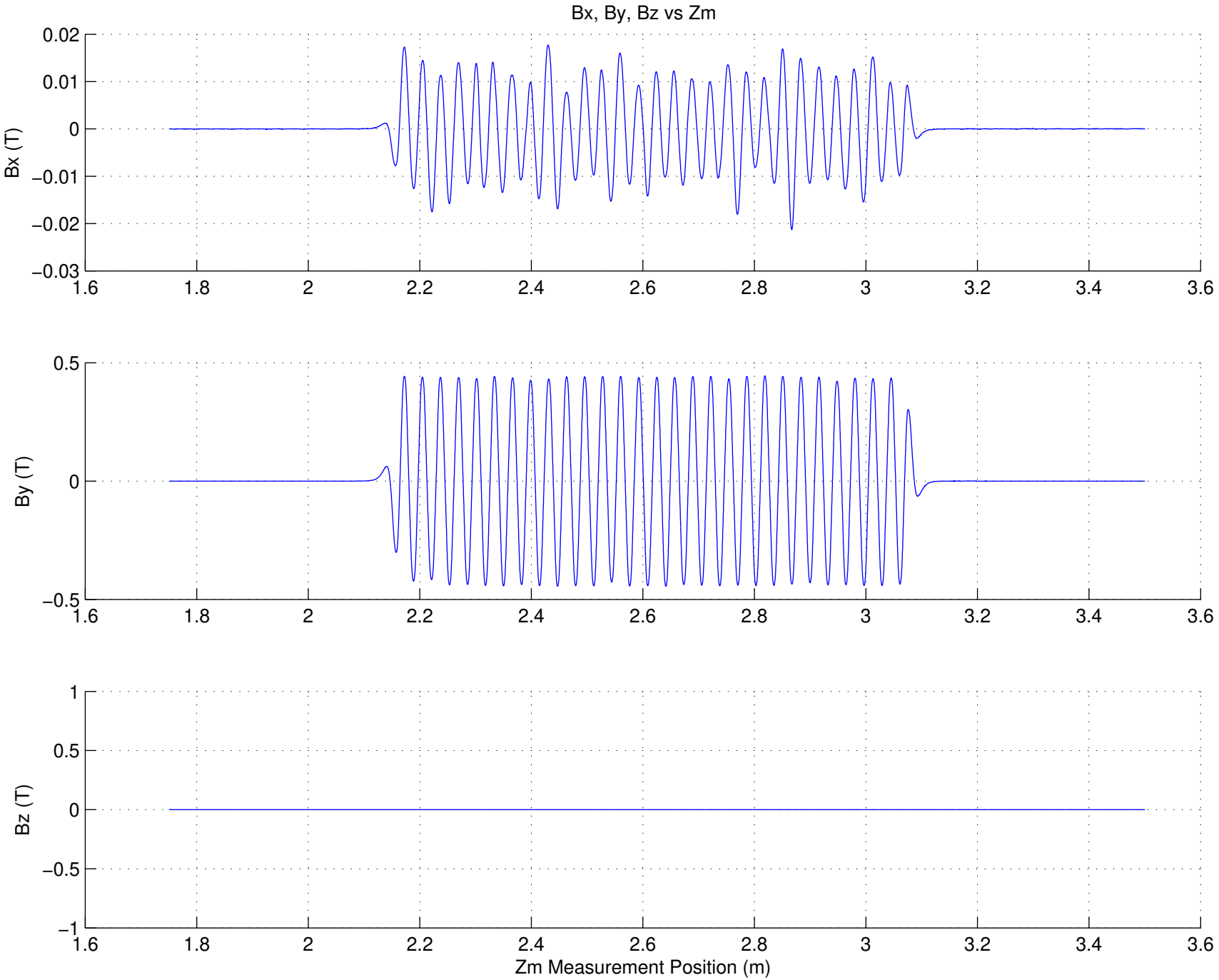
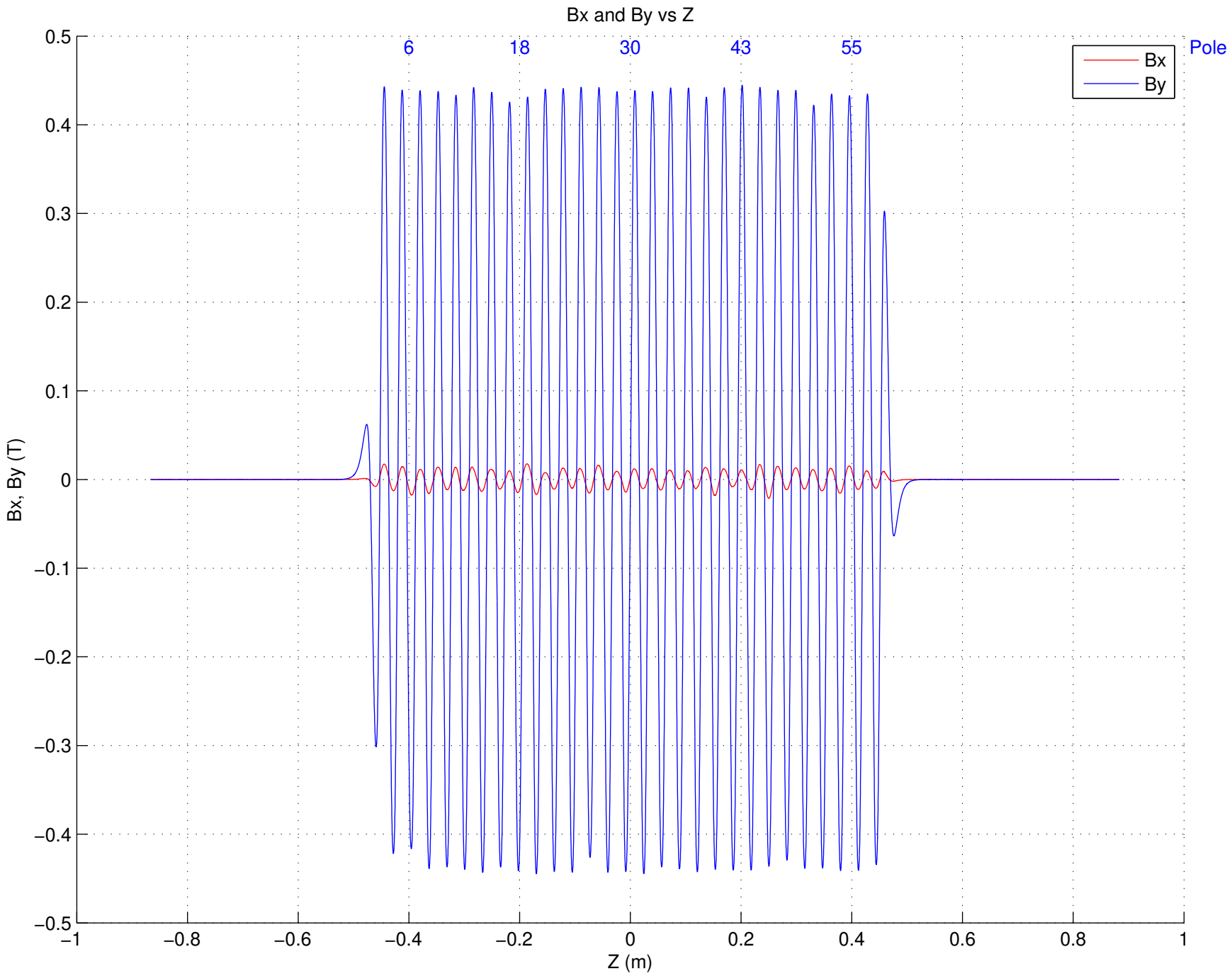
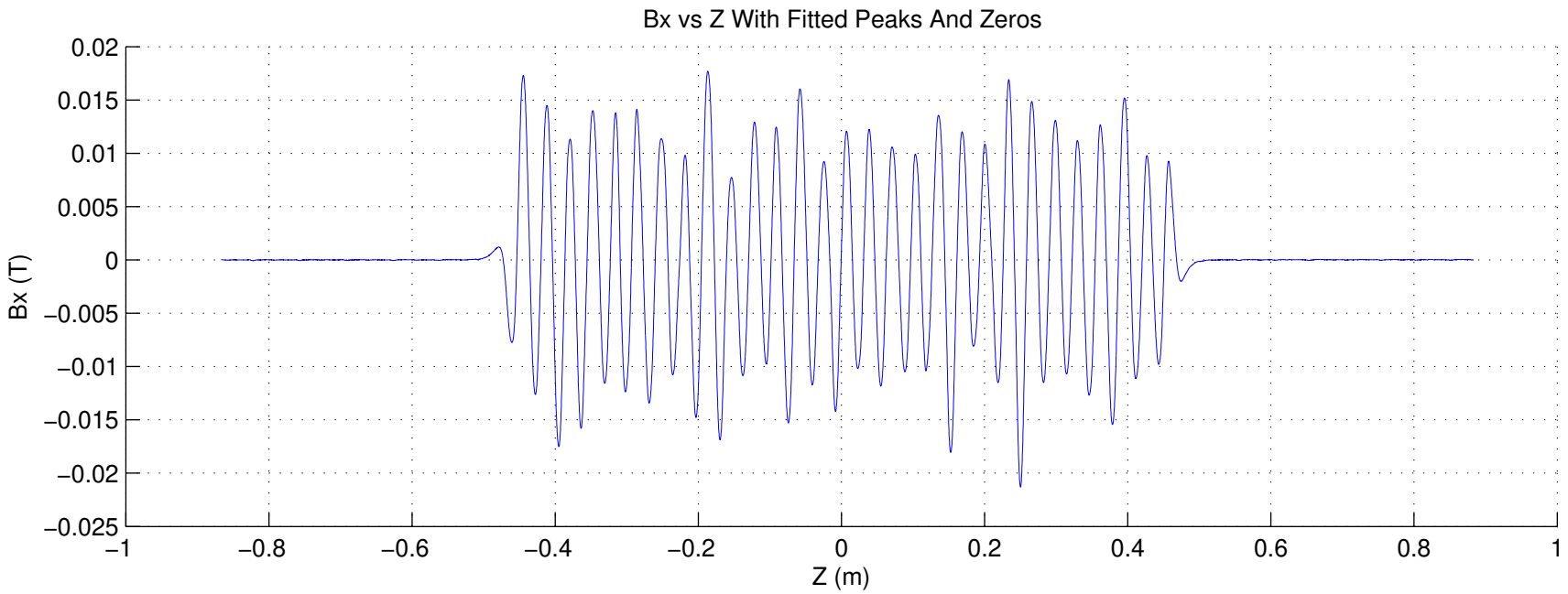
SLAC Magnetic Measurements

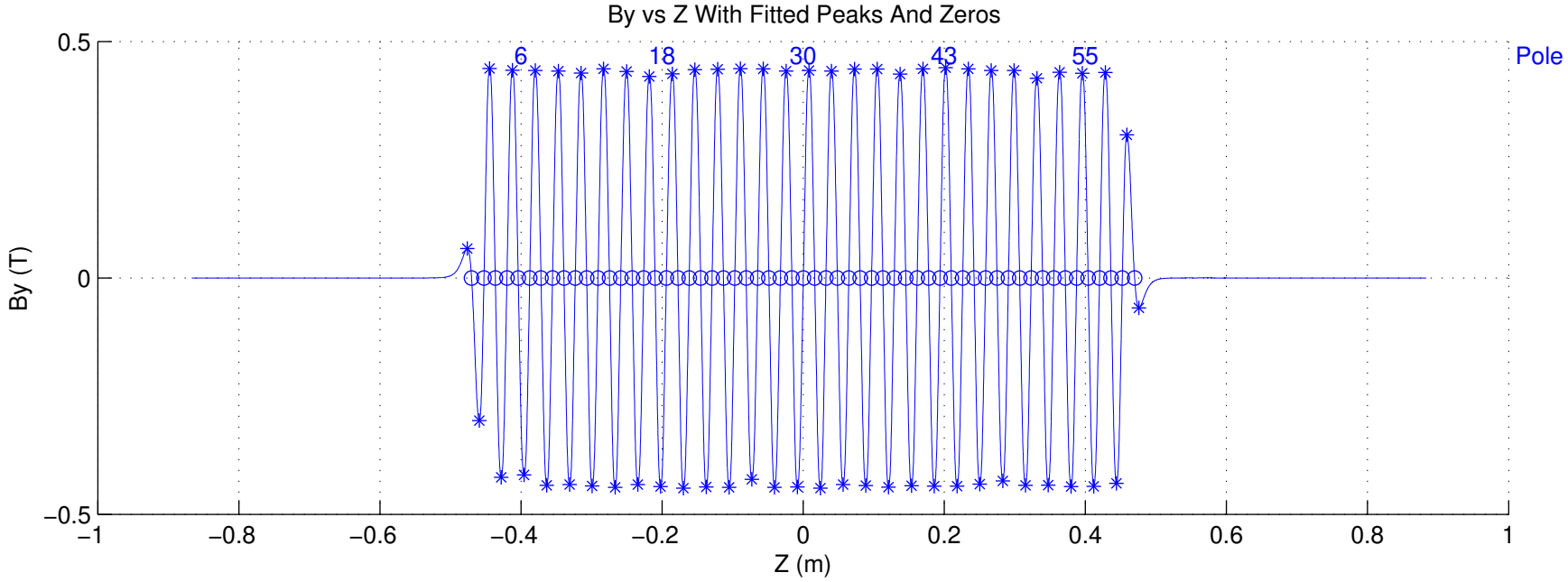
EPU Analysis
––––––––––––

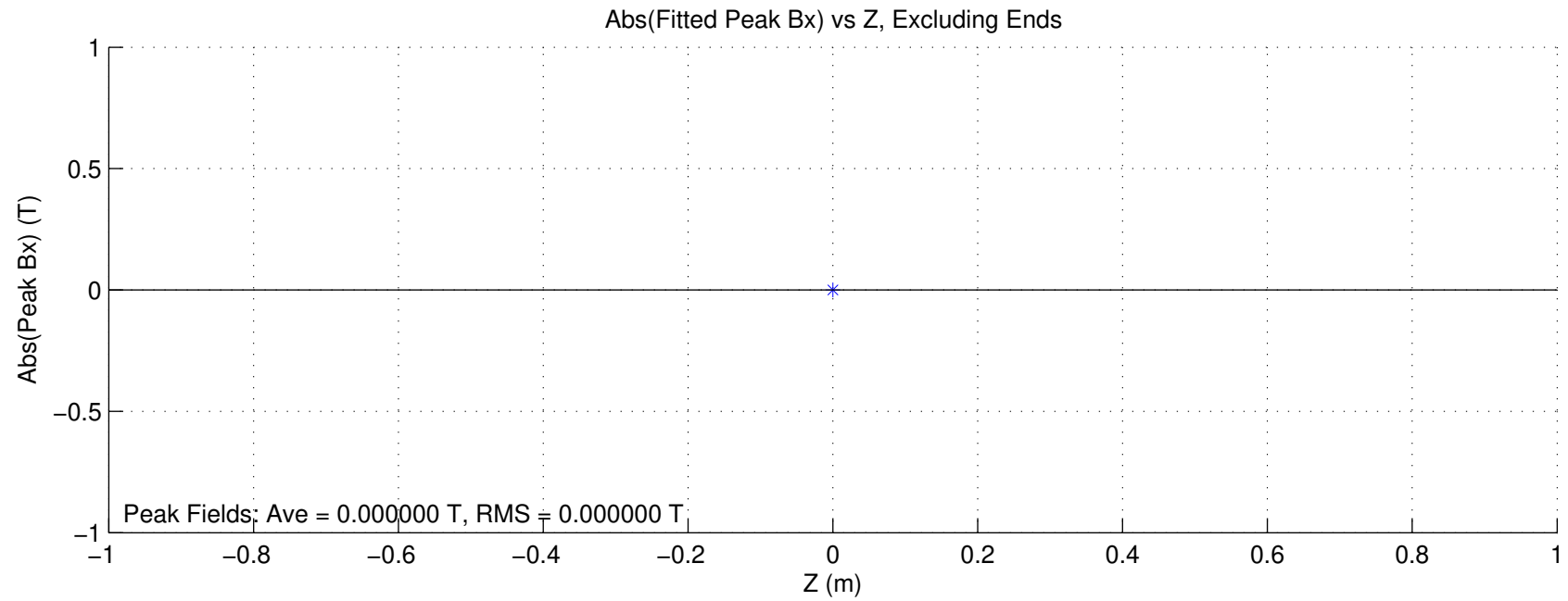
Parameters:
INPUT–FILE–DIR =V:\MET\MagServe\MagData\LCLS\Undulator\DELTA\DATASET0001\Fine Tuning\Z Scans\Run 077\
INPUT–FILE–NAME =x+00000–y+000–bscanz.dat
INPUT–FILE–TYPE =ZVXYBXYH
CORR–REQUIRED =0
GAMMA =26627.1
NOM–LAMBDA–U =0
NOM–K–VALUE =0
NOM–LAMBDA–R =0
NUM–POLES =60
NUM–END–POLES =4
CELL–LENGTH =3.126

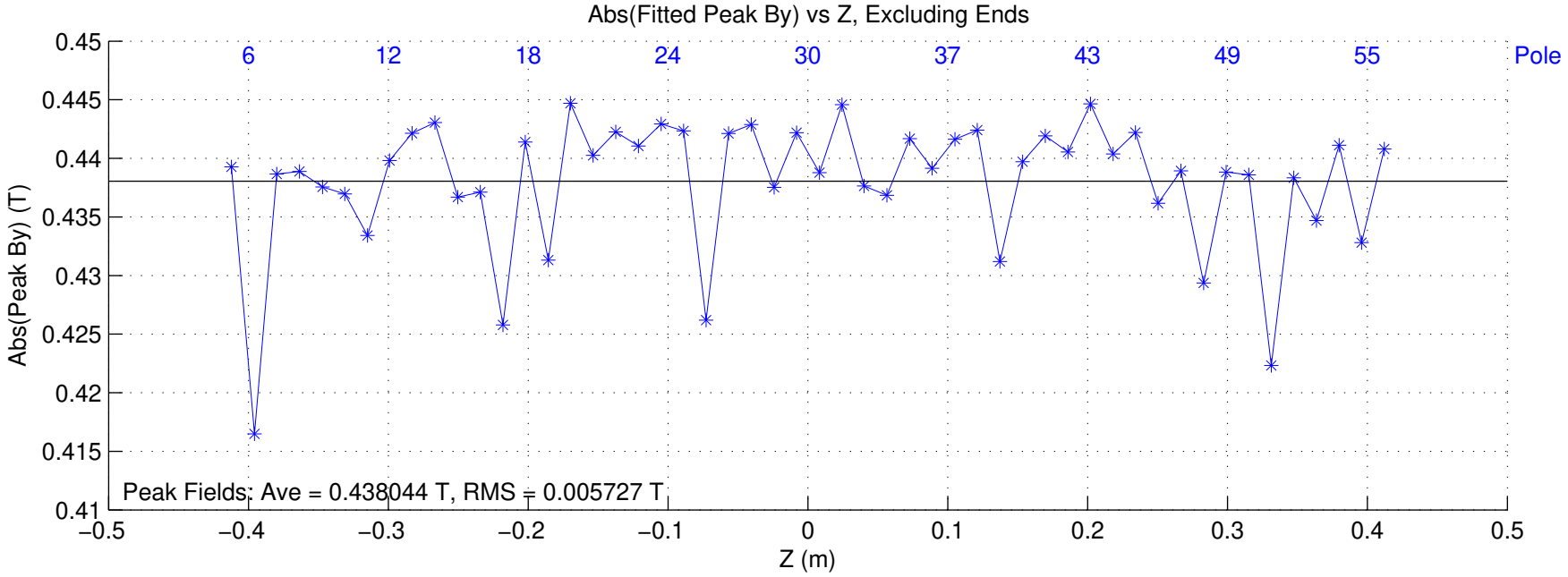

Bx, By, Bz vs Zm
Bx (T)
0.02
0.01
0
−0.01
−0.02
−0.03
By (T)
0.5
0
−0.5
Bz (T)
1
0.5
0
−0.5
−1
1.6
1.8
2
2.2
2.4
2.6
2.8
3
3.2
3.4
3.6
Zm Measurement Position (m)

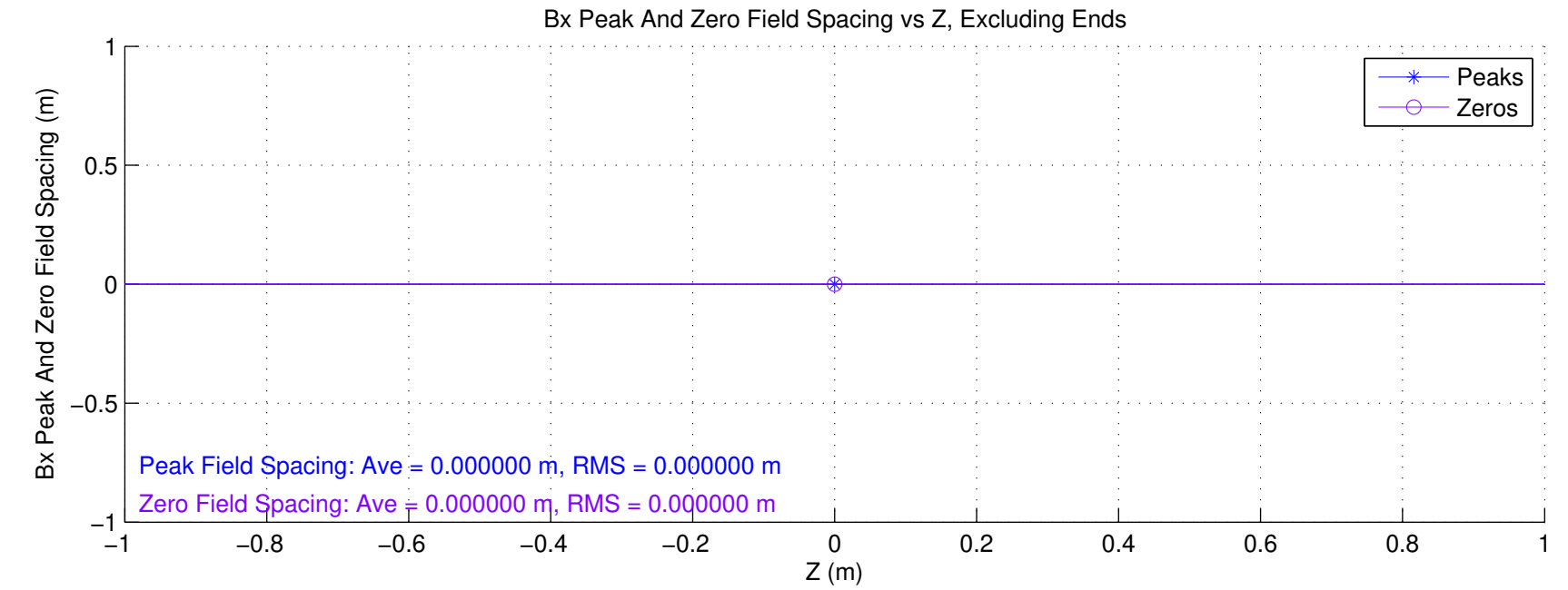

Bx and By vs Z
6
18
30
43
55
Pole
Bx
By
0.5
0.4
0.3
0.2
0.1
0
−0.1
−0.2
−0.3
−0.4
−0.5
Bx, By (T)
−1
−0.8
−0.6
−0.4
−0.2
0
0.2
0.4
0.6
0.8
1
Z (m)

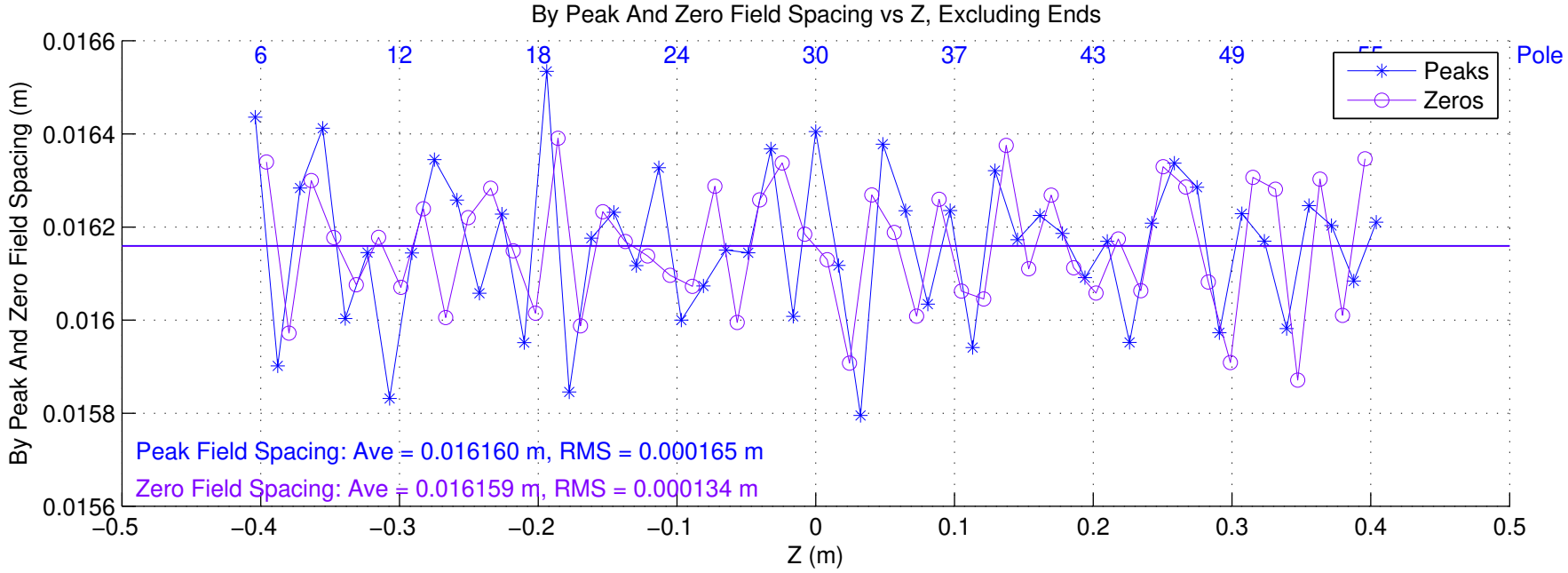

Bx vs Z With Fitted Peaks And Zeros
Bx (T)
Z (m)
0.02
0.015
0.01
0.005
0
−0.005
−0.01
−0.015
−0.02
−0.025
−1
−0.8
−0.6
−0.4
−0.2
0
0.2
0.4
0.6
0.8
1

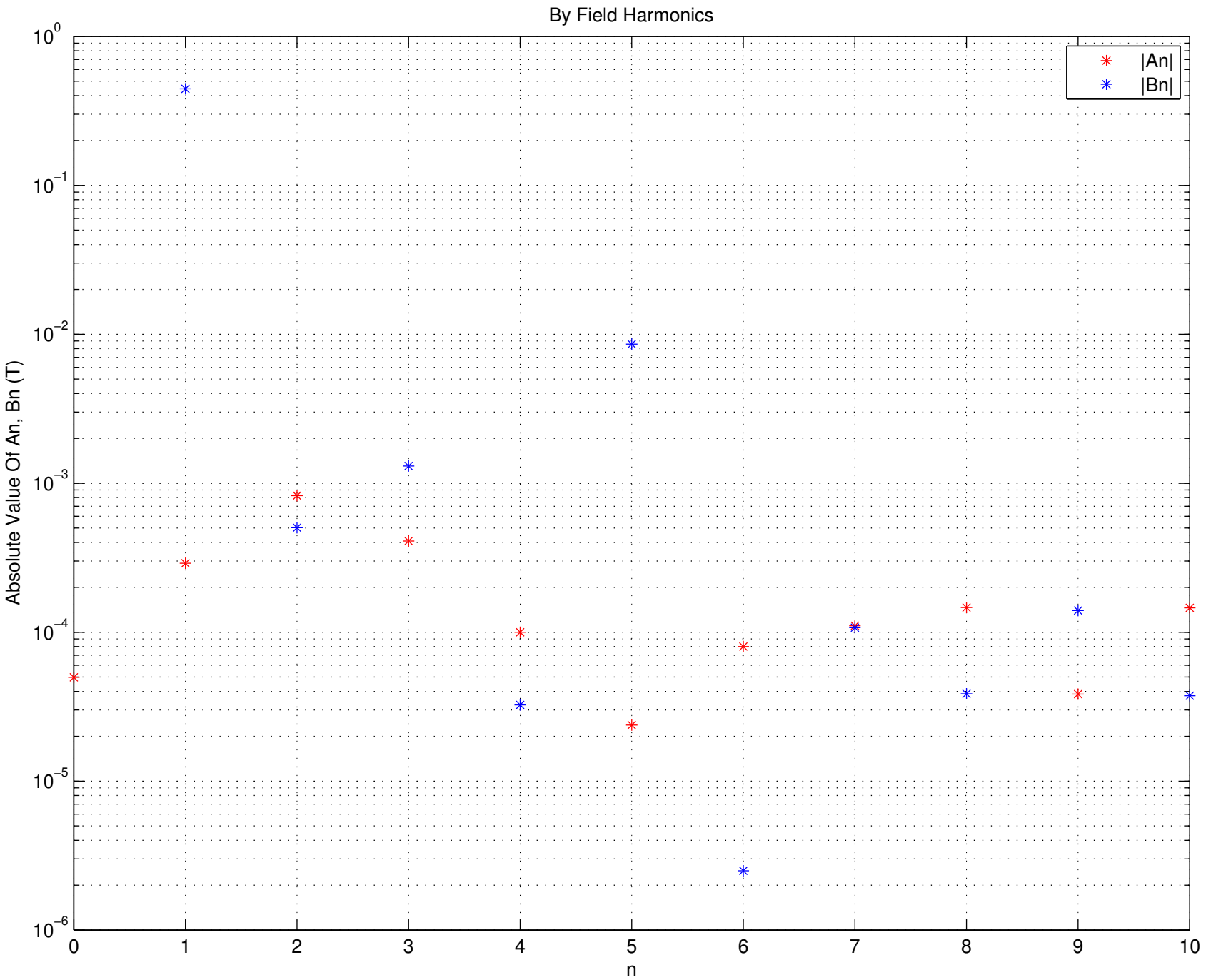

By vs Z With Fitted Peaks And Zeros
By (T)
Z (m)
Pole
6
18
30
43
55
0.5
0
−0.5
−1
−0.8
−0.6
−0.4
−0.2
0
0.2
0.4
0.6
0.8
1

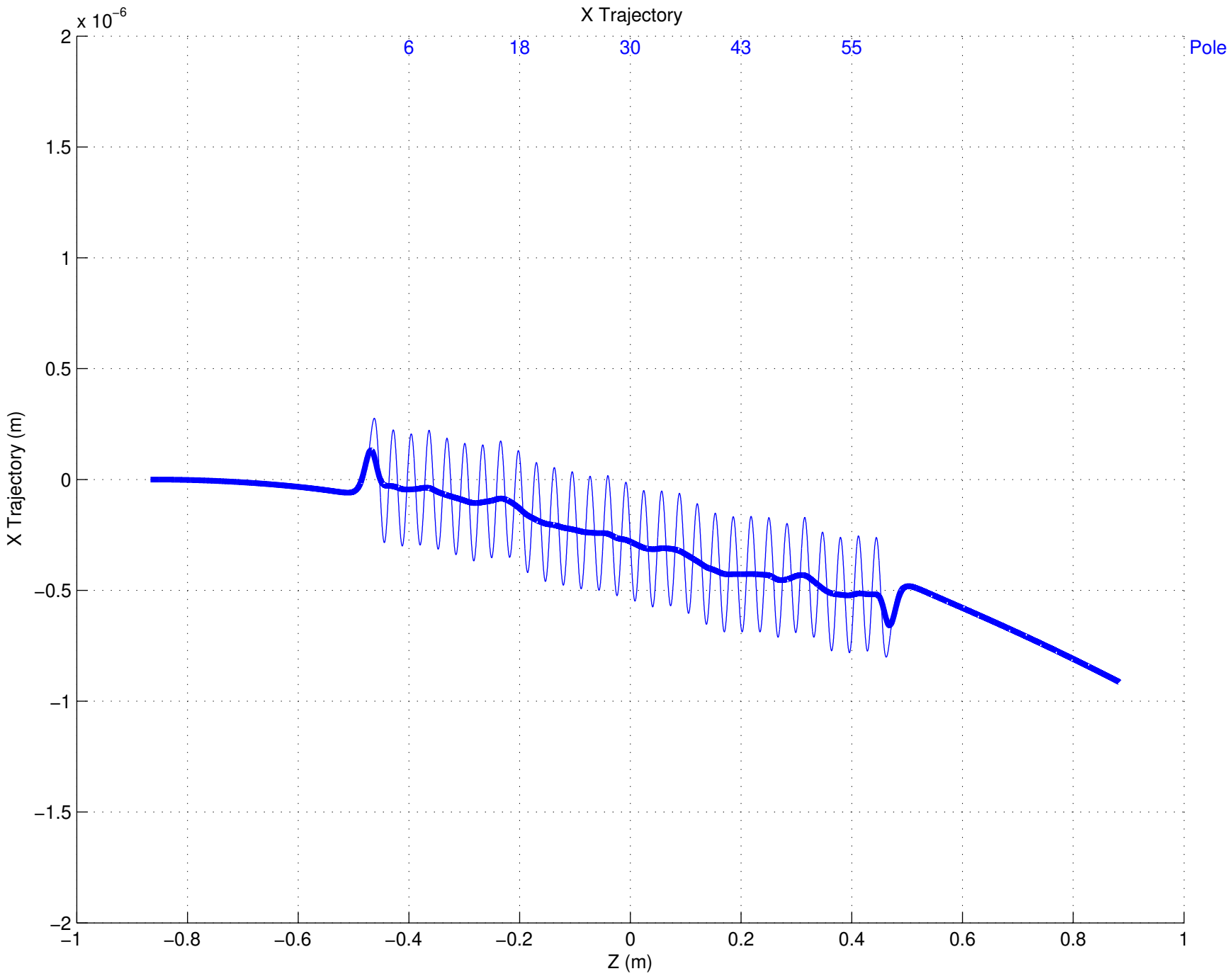

Abs(Fitted Peak Bx) vs Z, Excluding Ends
Abs(Peak Bx) (T)
Z (m)
Peak Fields: Ave = 0.000000 T, RMS = 0.000000 T
1
0.5
0
−0.5
−1
−1
−0.8
−0.6
−0.4
−0.2
0
0.2
0.4
0.6
0.8
1

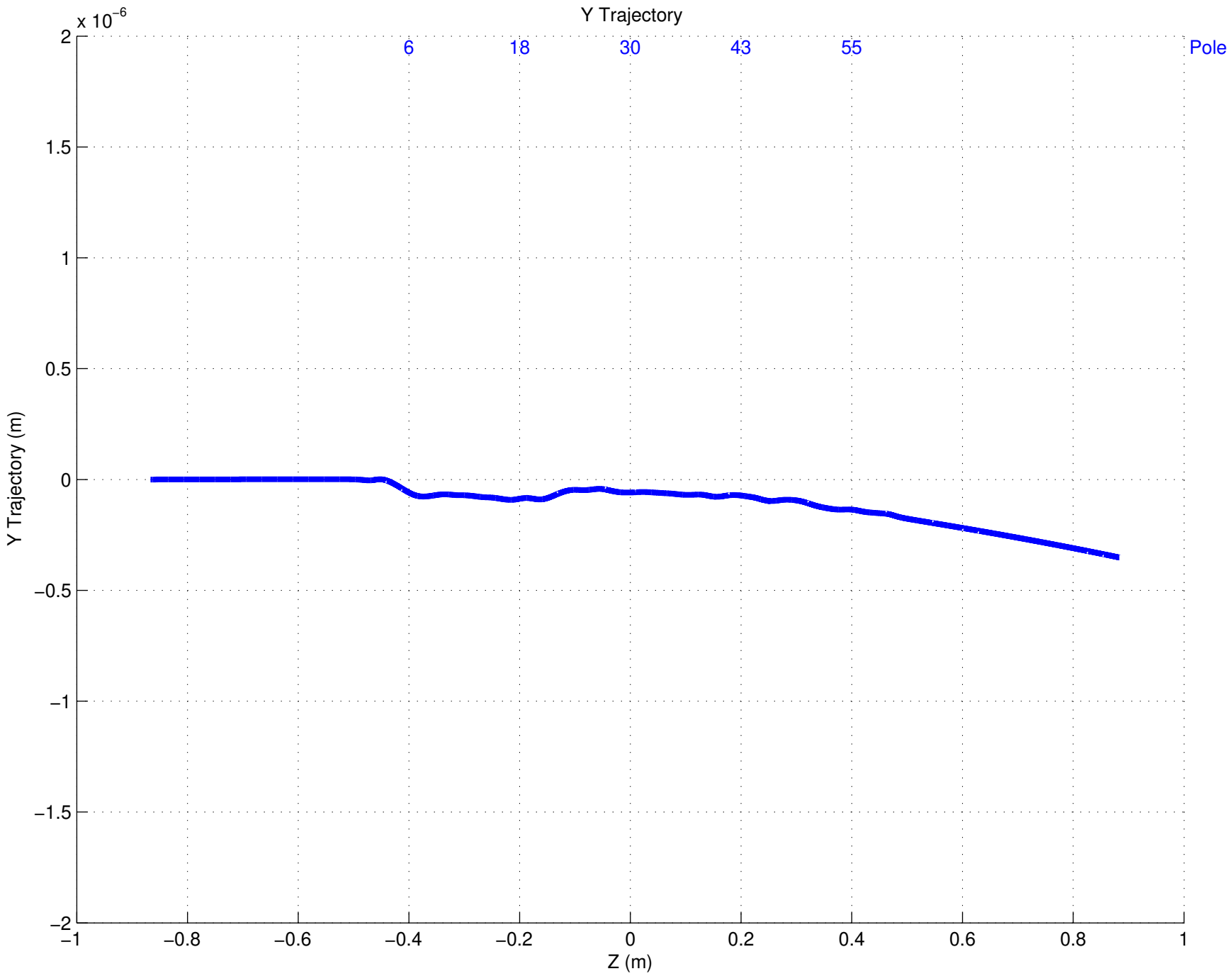

Abs(Fitted Peak By) vs Z, Excluding Ends
Abs(Peak By) (T)
Z (m)
Peak Fields: Ave = 0.438044 T, RMS = 0.005727 T
6
12
18
24
30
37
43
49
55
Pole
0.45
0.445
0.44
0.435
0.43
0.425
0.42
0.415
0.41
−0.5
−0.4
−0.3
−0.2
−0.1
0
0.1
0.2
0.3
0.4
0.5

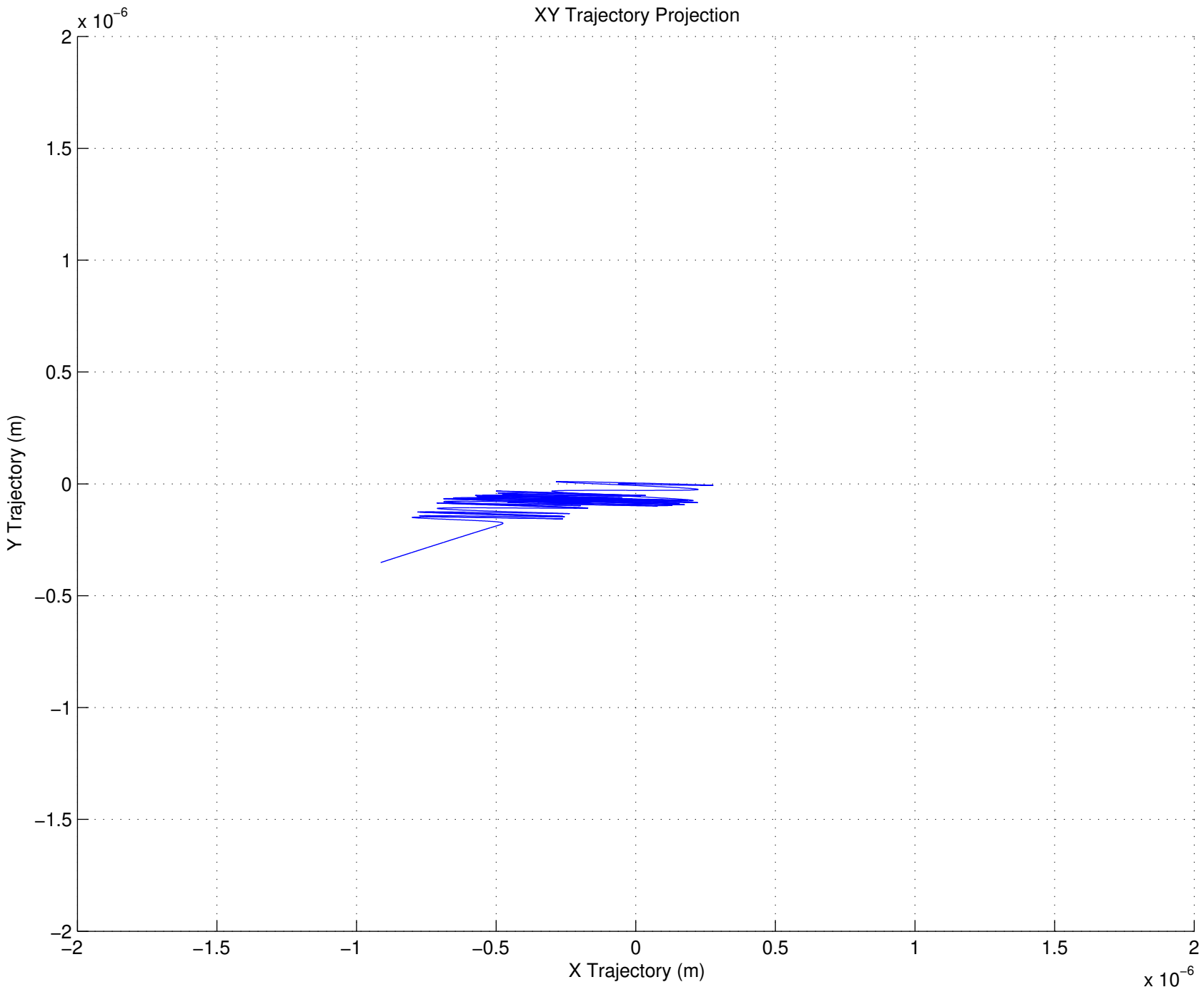

Bx Peak And Zero Field Spacing vs Z, Excluding Ends
Bx Peak And Zero Field Spacing (m)
Z (m)
Peaks
Zeros
Peak Field Spacing: Ave = 0.000000 m, RMS = 0.000000 m
Zero Field Spacing: Ave = 0.000000 m, RMS = 0.000000 m
1
0.5
0
−0.5
−1
−1
−0.8
−0.6
−0.4
−0.2
0
0.2
0.4
0.6
0.8
1

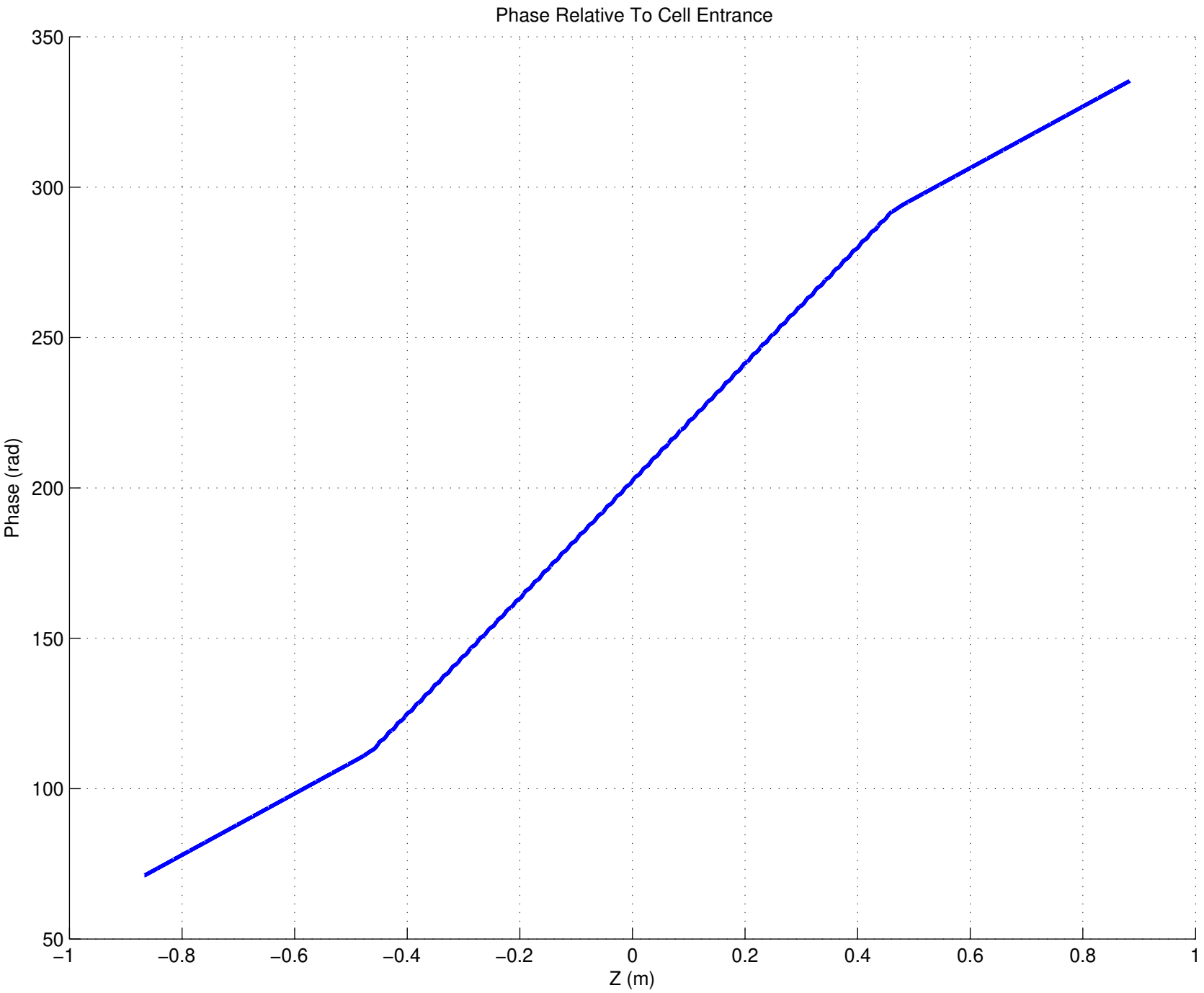

By Peak And Zero Field Spacing vs Z, Excluding Ends
By Peak And Zero Field Spacing (m)
Z (m)
Peaks
Zeros
Pole
6
12
18
24
30
37
43
49
Peak Field Spacing: Ave = 0.016160 m, RMS = 0.000165 m
Zero Field Spacing: Ave = 0.016159 m, RMS = 0.000134 m
0.0166
0.0164
0.0162
0.016
0.0158
0.0156
−0.5
−0.4
−0.3
−0.2
−0.1
0
0.1
0.2
0.3
0.4
0.5

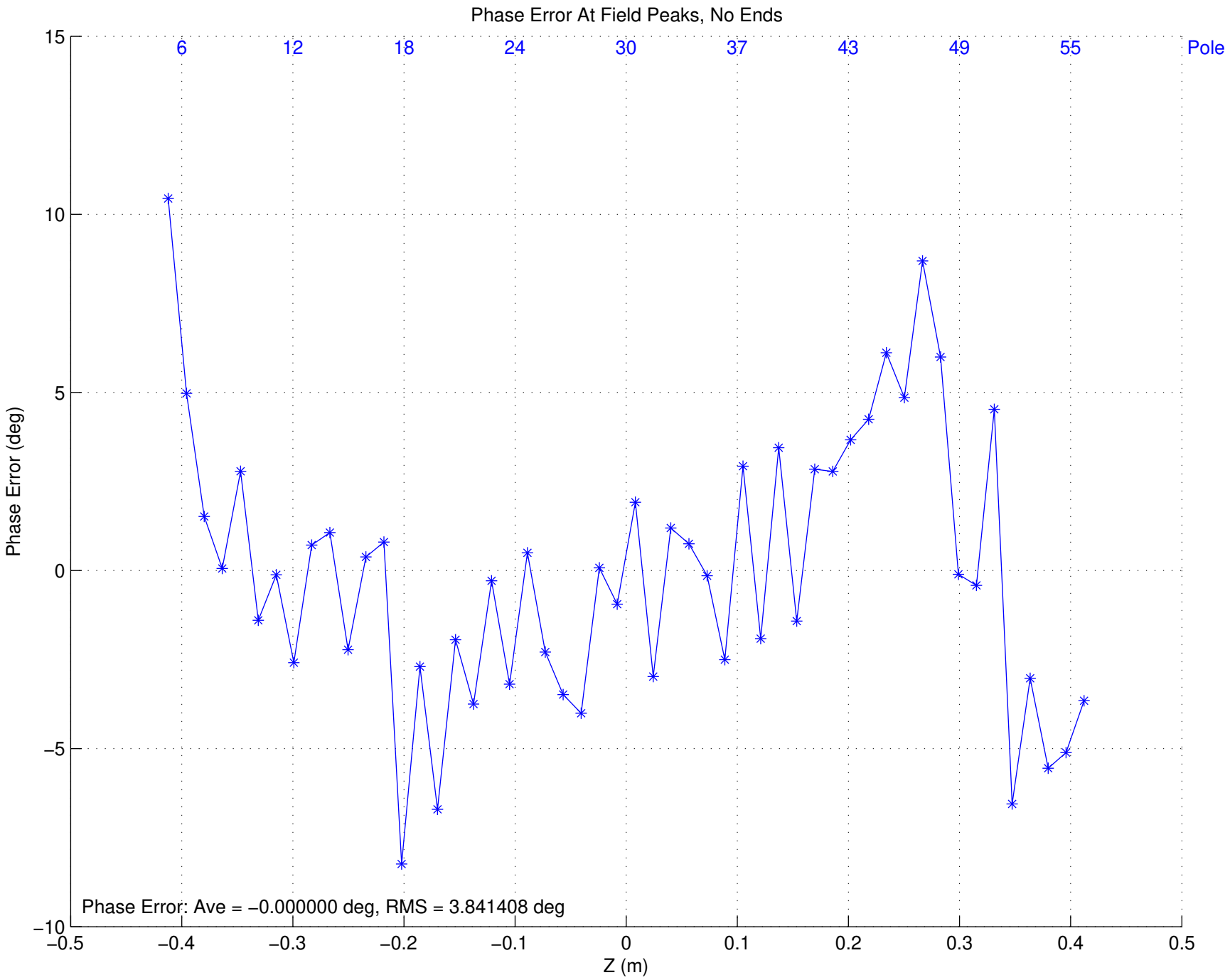

By Field Harmonics
|An|
|Bn|
Absolute Value Of An, Bn (T)
n
10^{0}
10^{-1}
10^{-2}
10^{-3}
10^{-4}
10^{-5}
10^{-6}
0
1
2
3
4
5
6
7
8
9
10

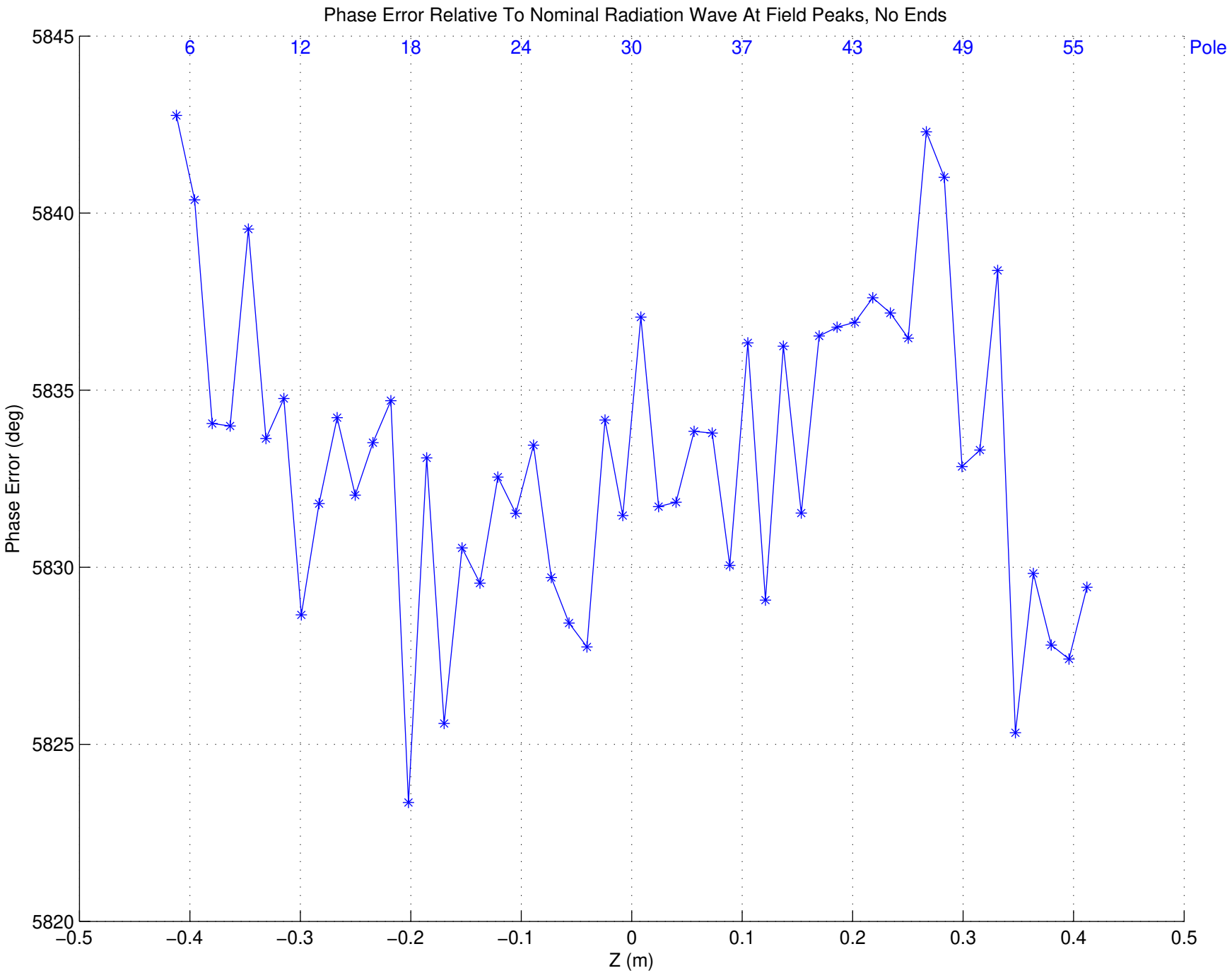

X Trajectory
x 10^-6
6
18
30
43
55
Pole
2
1.5
1
0.5
0
−0.5
−1
−1.5
−2
X Trajectory (m)
−1
−0.8
−0.6
−0.4
−0.2
0
0.2
0.4
0.6
0.8
1
Z (m)

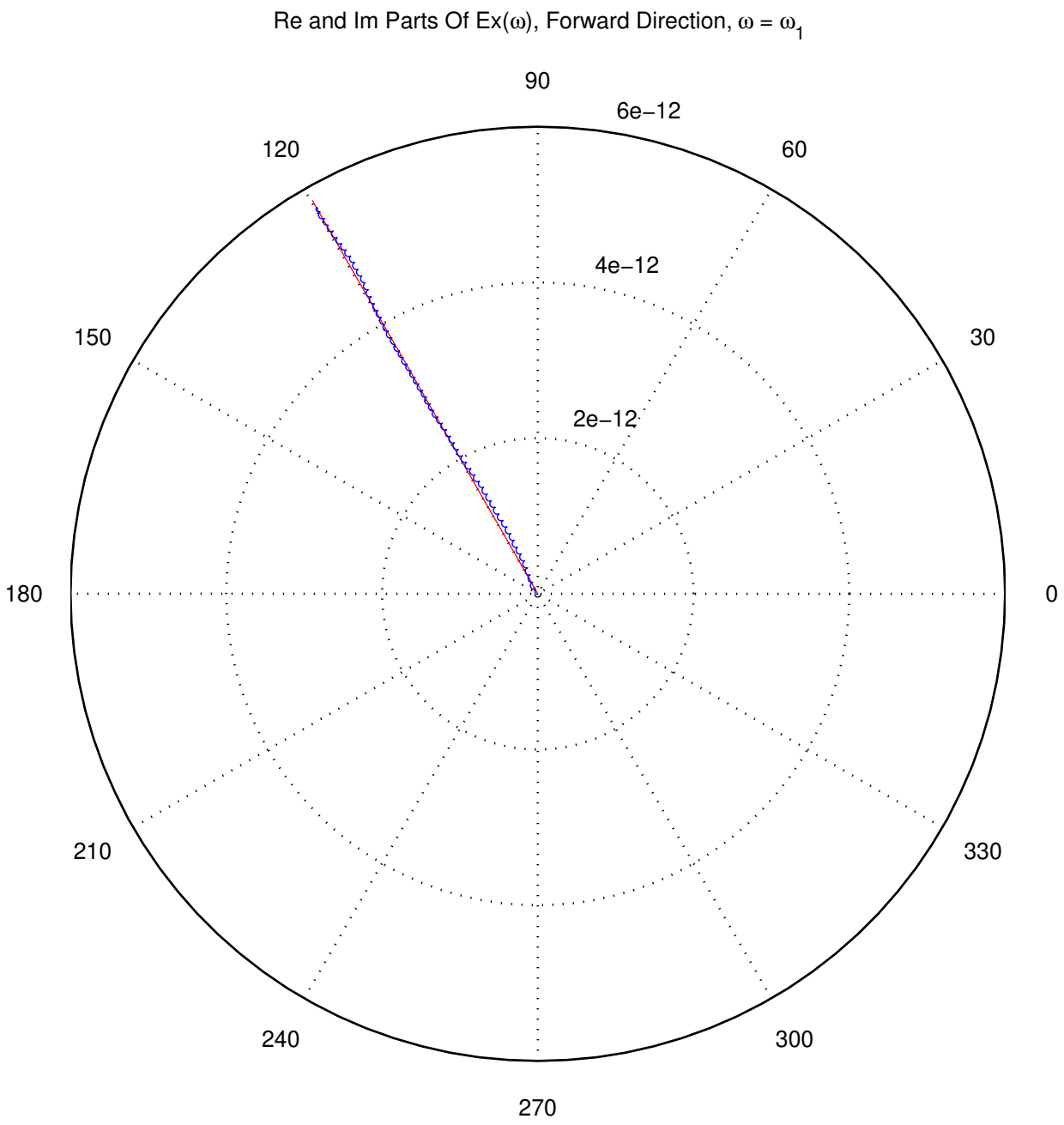

Y Trajectory
x 10^-6
6
18
30
43
55
Pole
2
1.5
1
0.5
0
−0.5
−1
−1.5
−2
Y Trajectory (m)
−1
−0.8
−0.6
−0.4
−0.2
0
0.2
0.4
0.6
0.8
1
Z (m)

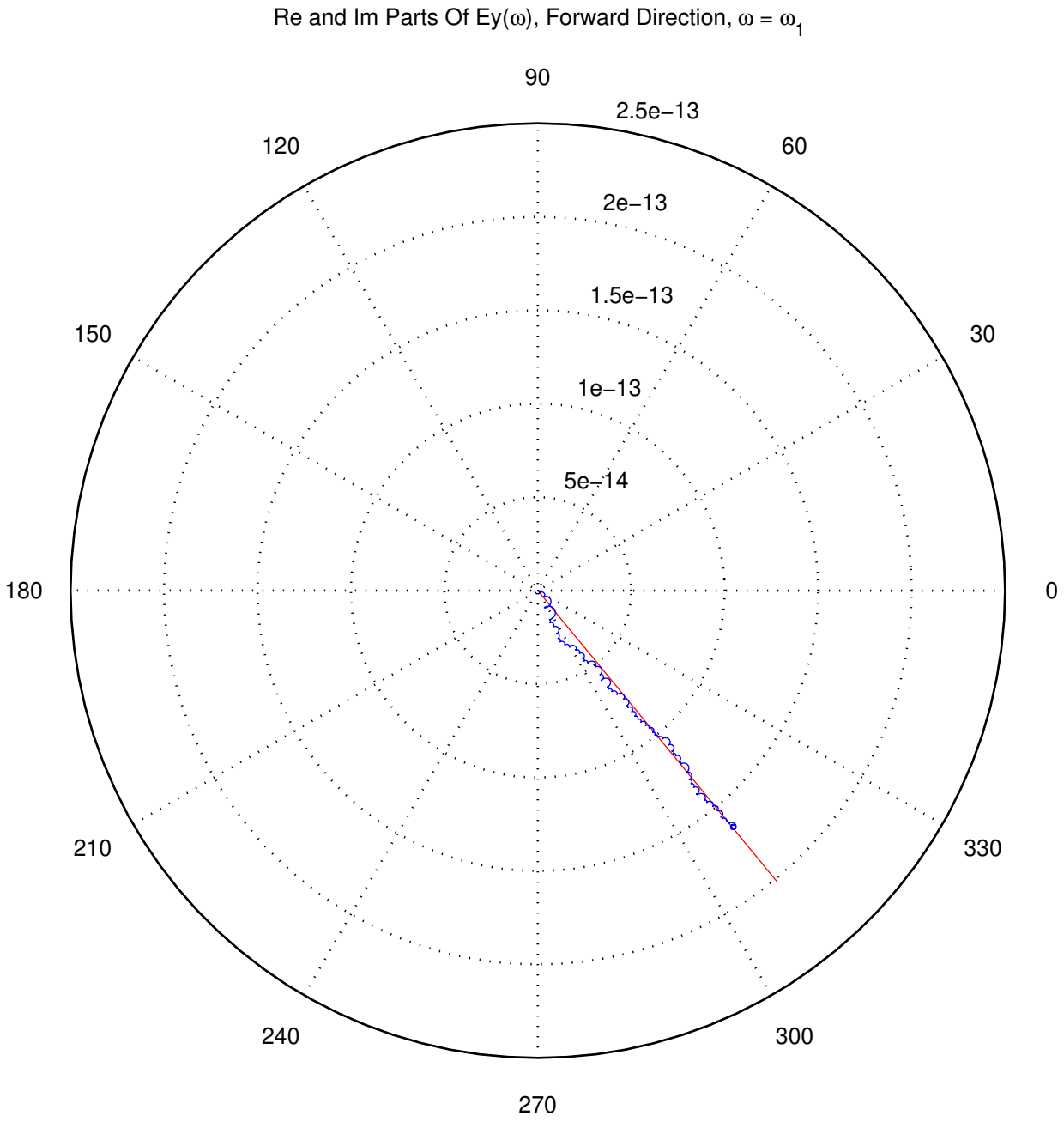

XY Trajectory Projection
x 10^-6
2
1.5
1
0.5
0
−0.5
−1
−1.5
−2
Y Trajectory (m)
−2
−1.5
−1
−0.5
0
0.5
1
1.5
2
X Trajectory (m)
x 10^-6

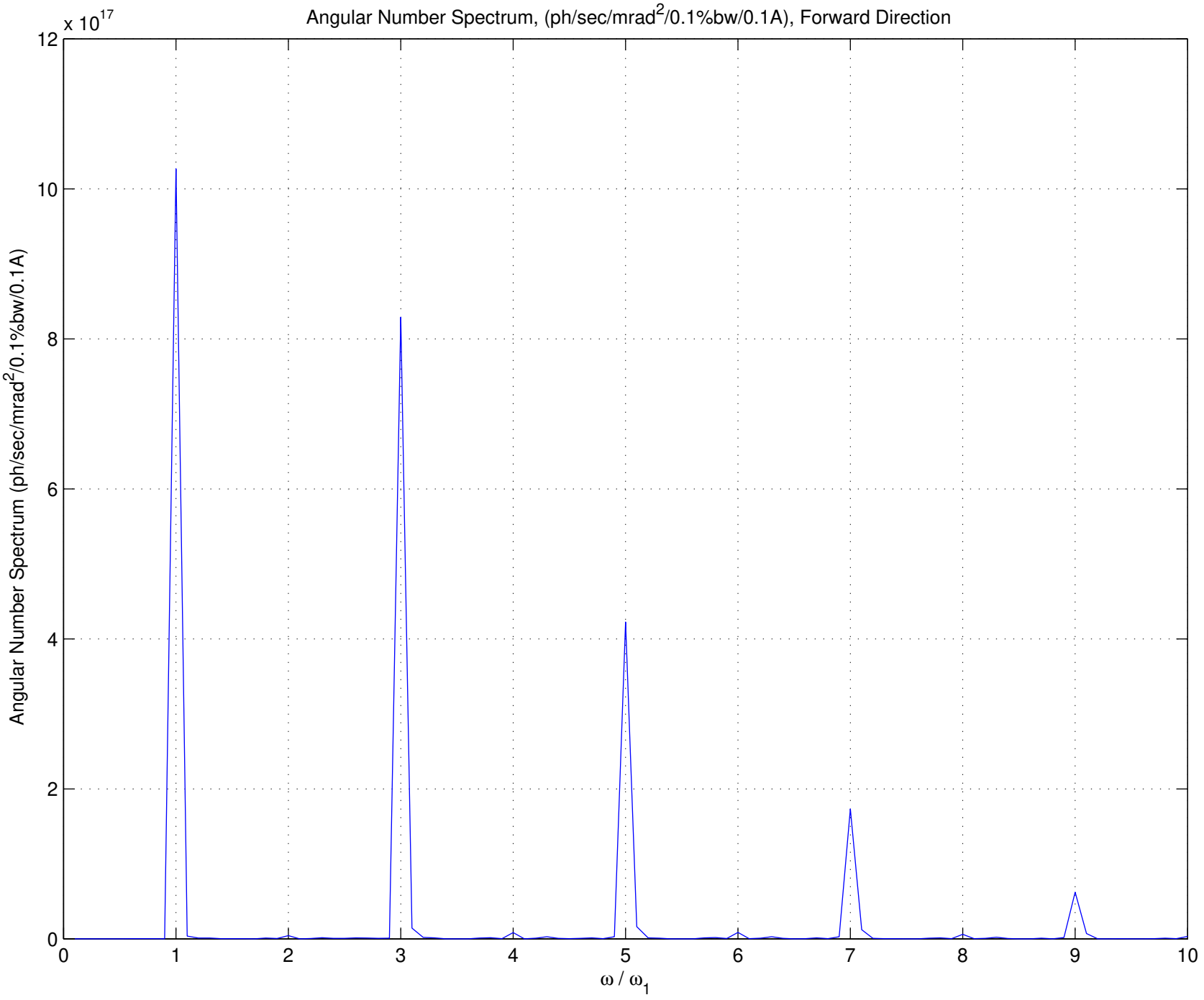

Phase Relative To Cell Entrance
Phase (rad)
Z (m)
350
300
250
200
150
100
50
−1
−0.8
−0.6
−0.4
−0.2
0
0.2
0.4
0.6
0.8
1

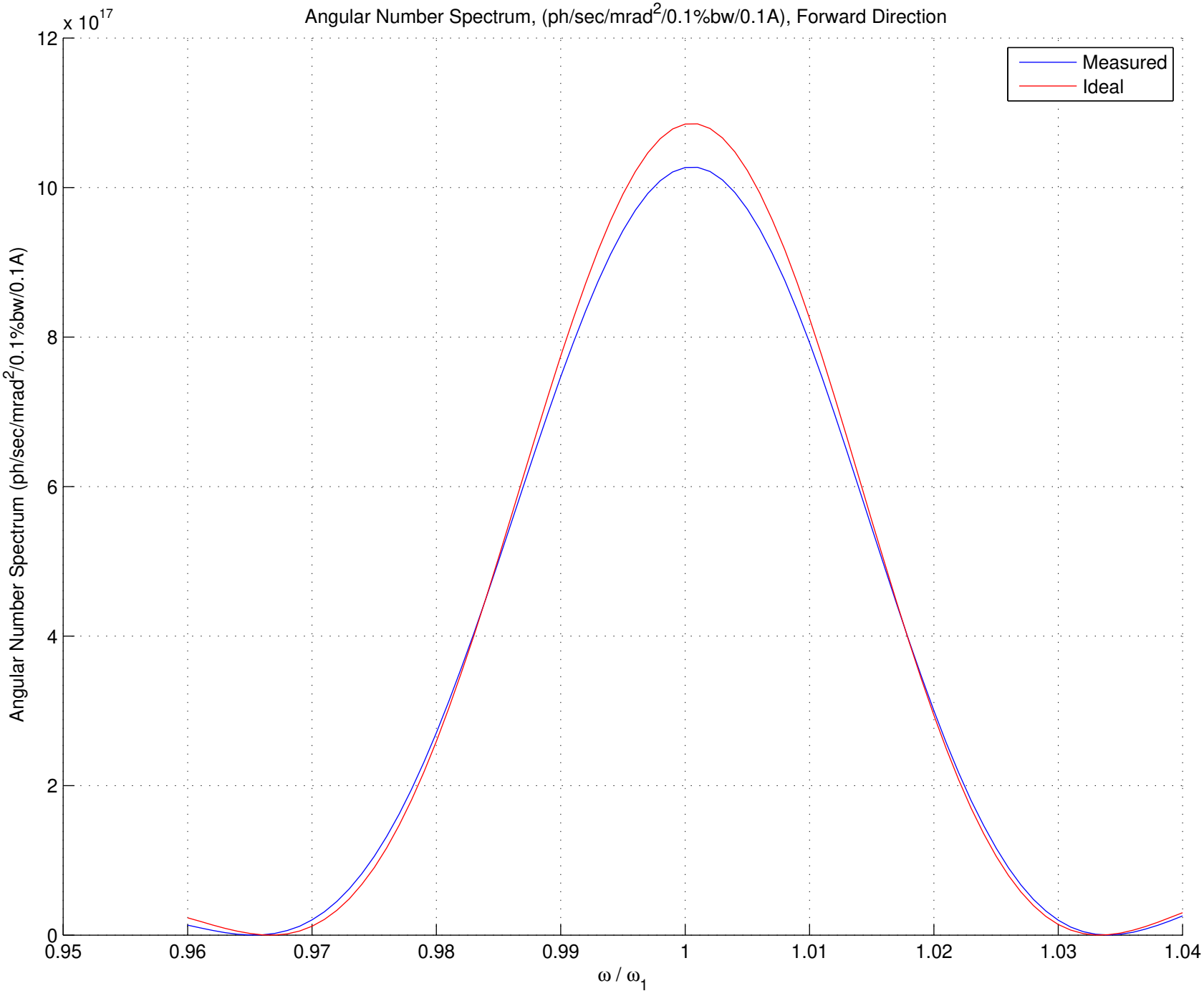

Phase Error At Field Peaks, No Ends
6
12
18
24
30
37
43
49
55
Pole
15
10
5
0
−5
−10
Phase Error (deg)
−0.5
−0.4
−0.3
−0.2
−0.1
0
0.1
0.2
0.3
0.4
0.5
Z (m)
Phase Error: Ave = −0.000000 deg, RMS = 3.841408 deg

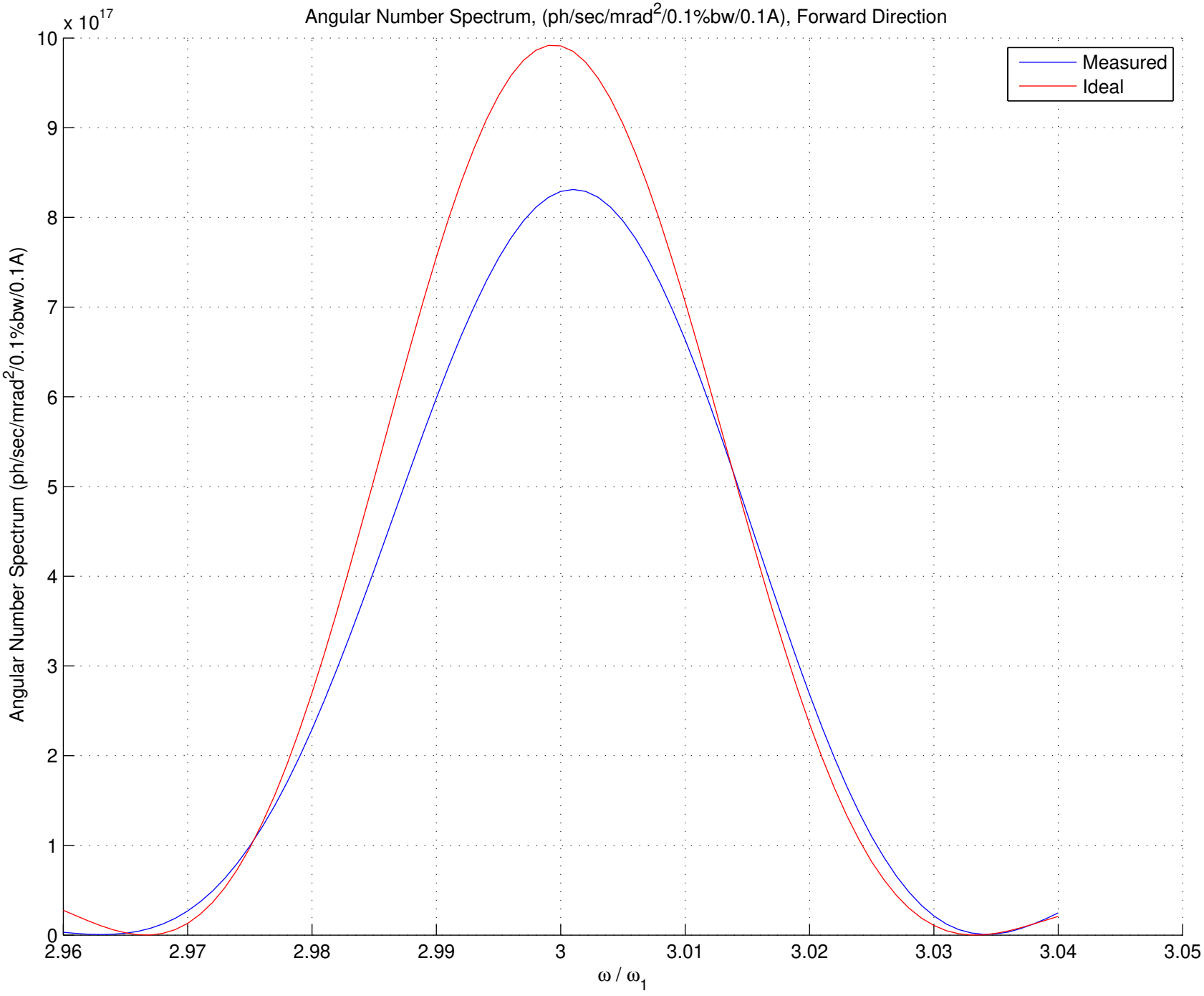

Phase Error Relative To Nominal Radiation Wave At Field Peaks, No Ends
6
12
18
24
30
37
43
49
55
Pole
5845
5840
5835
5830
5825
5820
Phase Error (deg)
−0.5
−0.4
−0.3
−0.2
−0.1
0
0.1
0.2
0.3
0.4
0.5
Z (m)

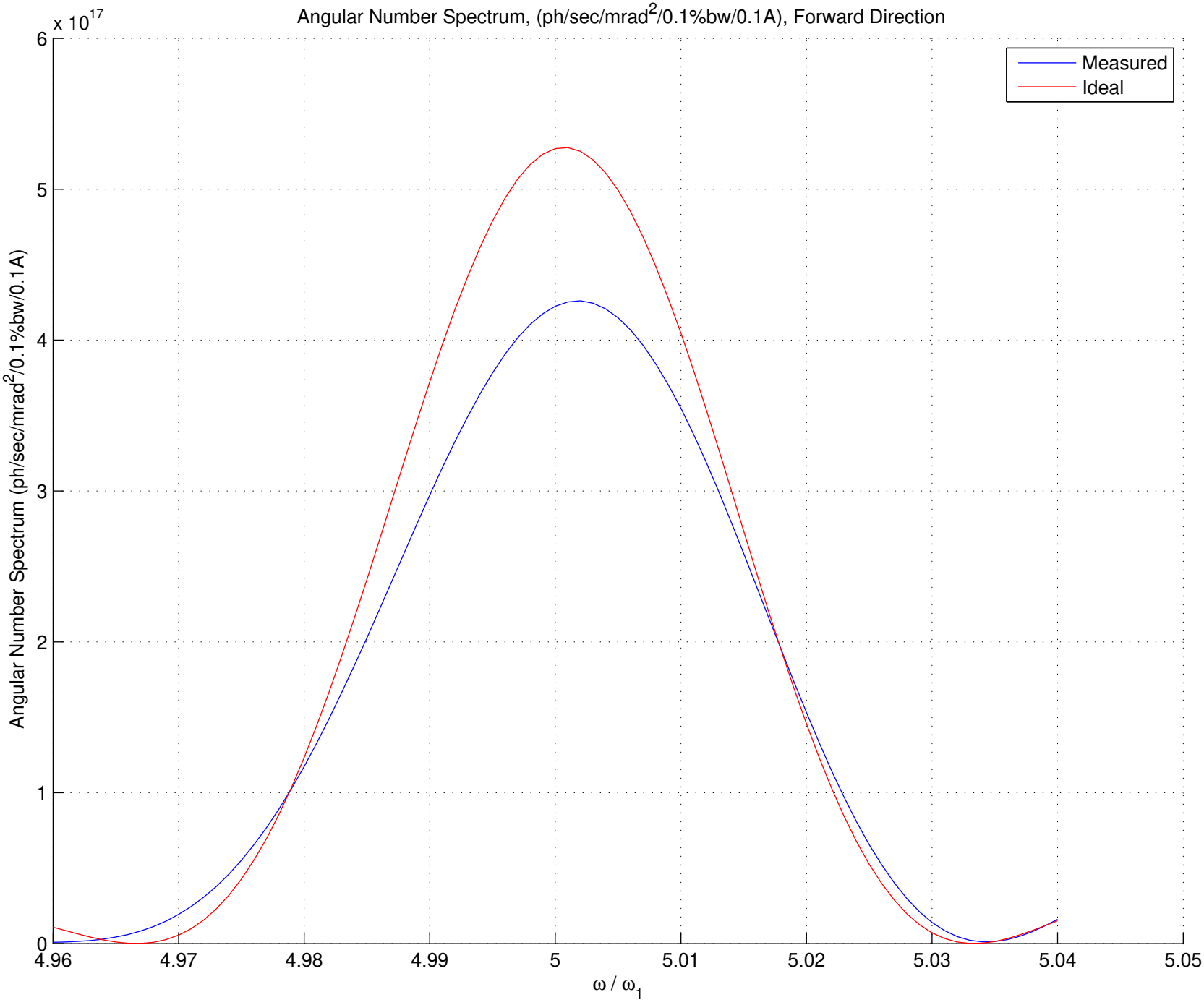

Re and Im Parts Of Ex(ω), Forward Direction, ω = ω1
90
6e−12
120
60
4e−12
150
30
2e−12
180
0
210
330
240
300
270


Re and Im Parts Of Ey(ω), Forward Direction, ω = ω1
90
2.5e−13
120
60
2e−13
1.5e−13
150
30
1e−13
5e−14
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
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^{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
0.95
0.96
0.97
0.98
0.99
1
1.01
1.02
1.03
1.04


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
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/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 / $ω_1$
Measured
Ideal
0
1
2
3
4
5
6
4.96
4.97
4.98
4.99
5
5.01
5.02
5.03
5.04
5.05