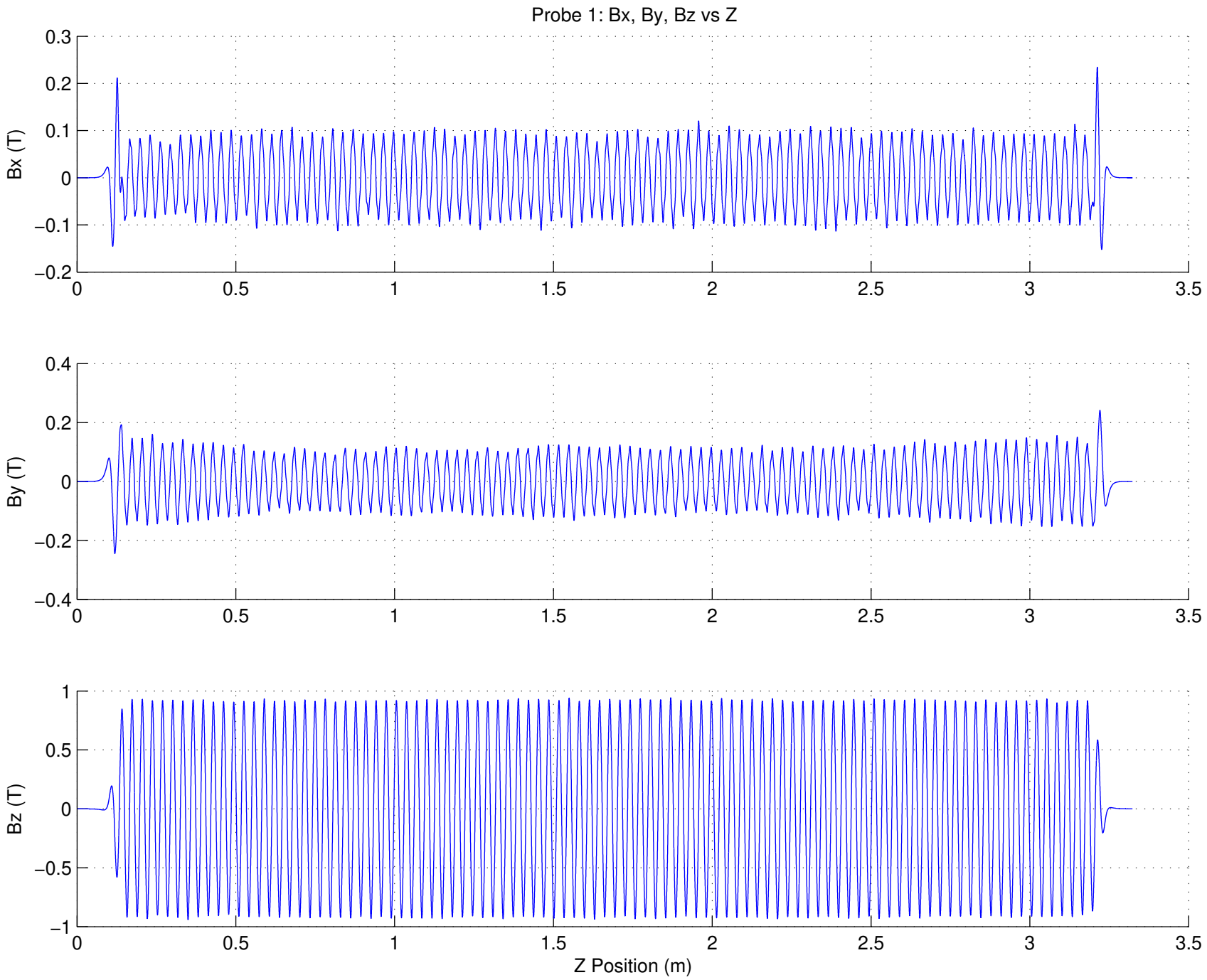
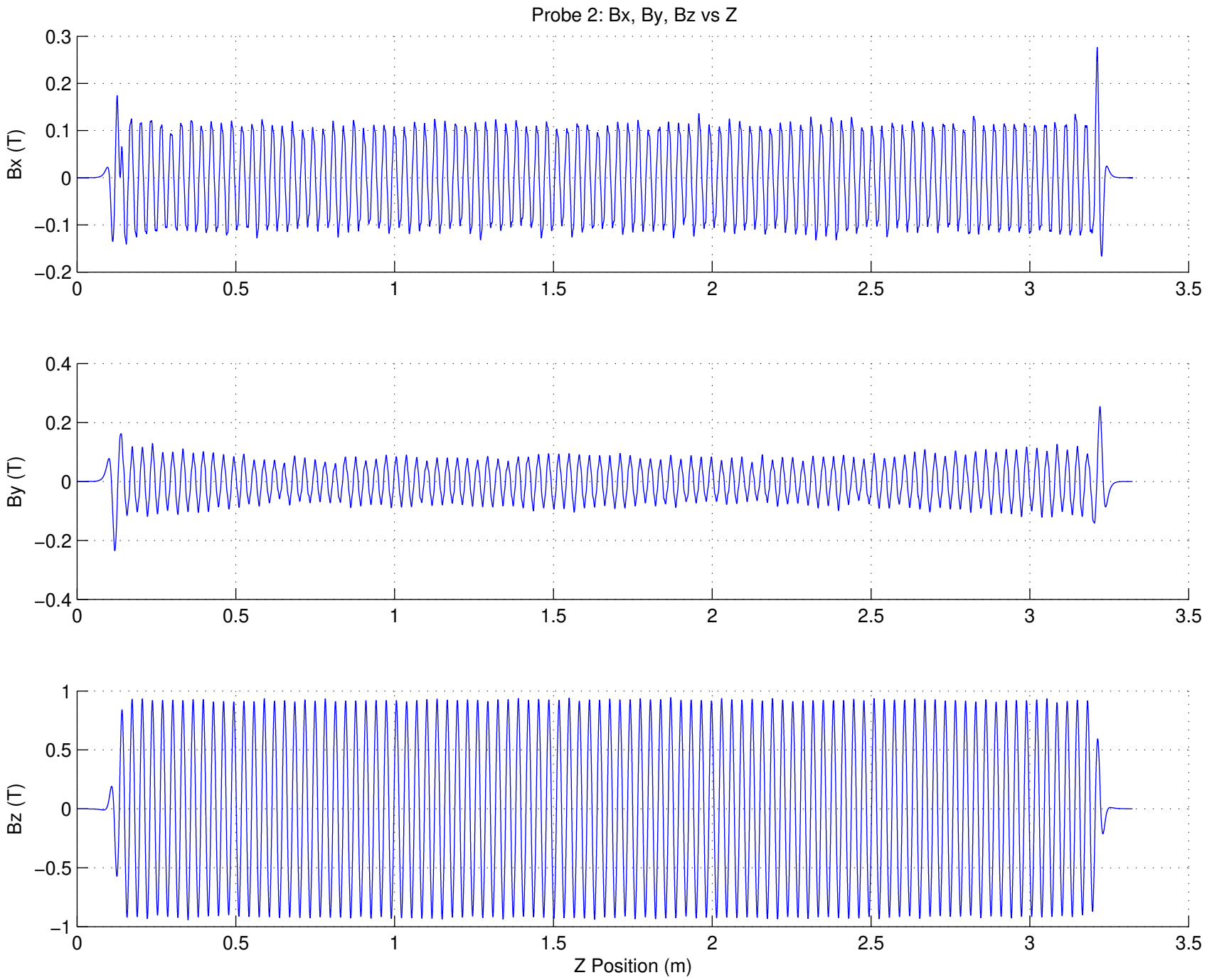
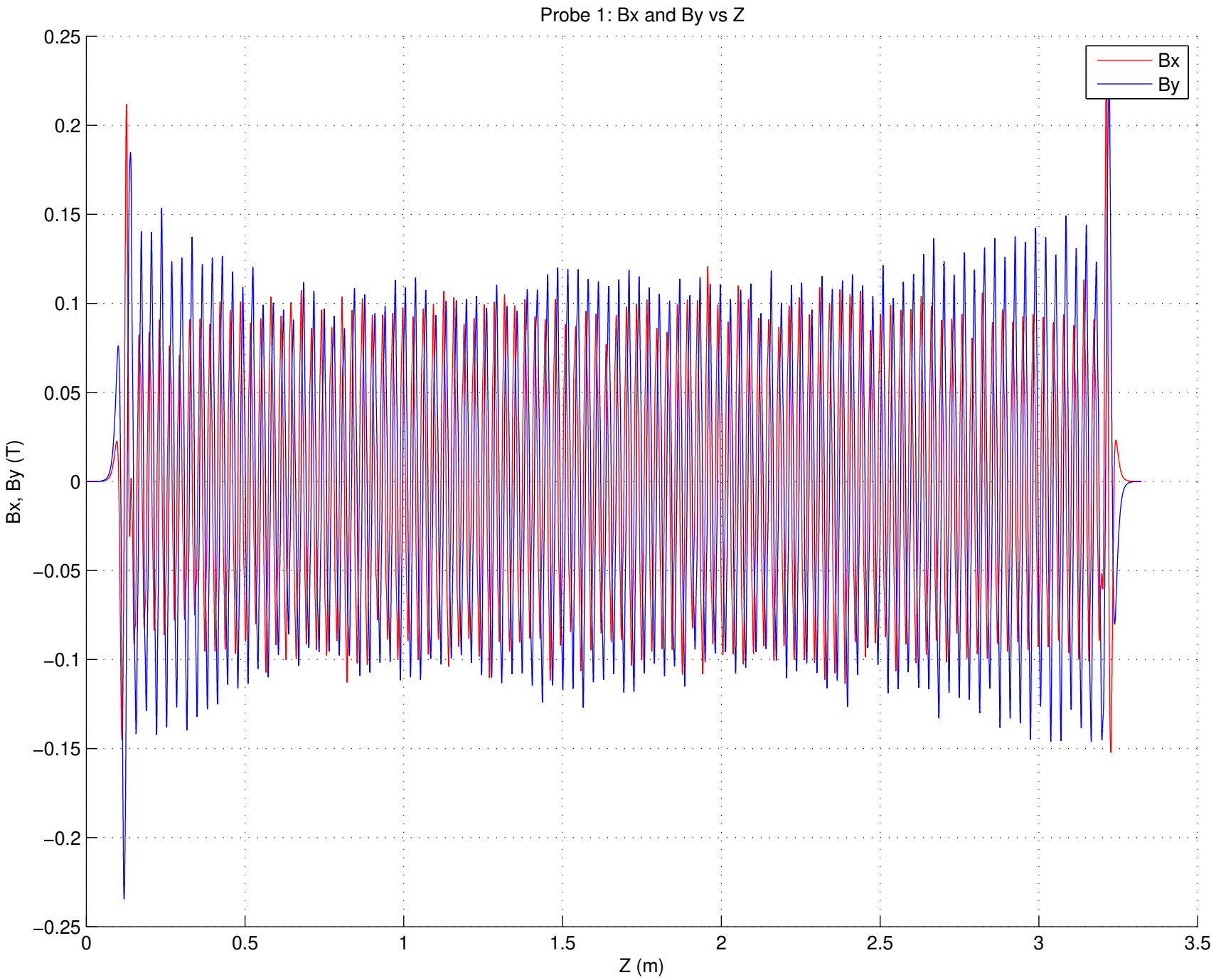
SLAC Magnetic Measurements

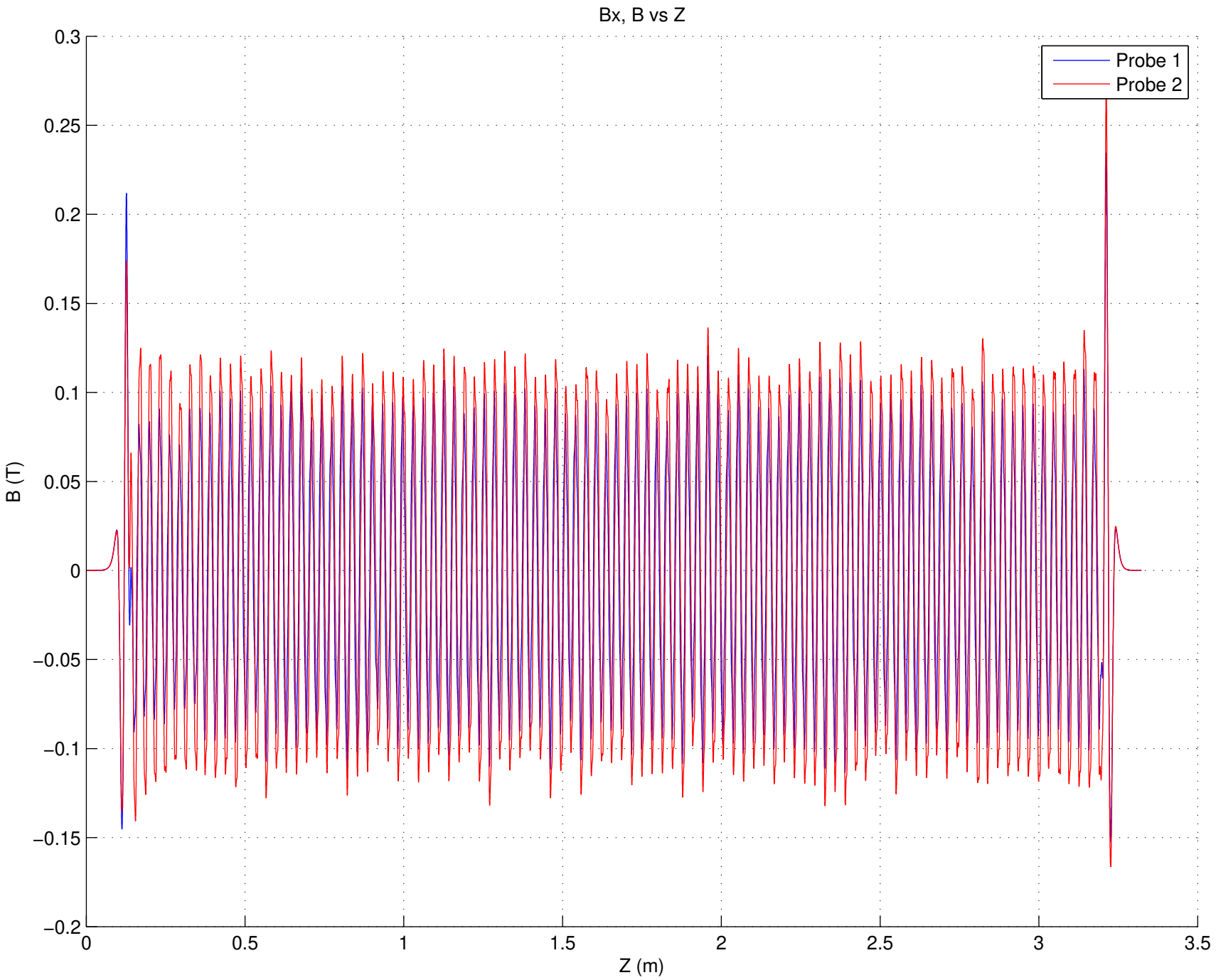
Hall Probe Array Analysis
****

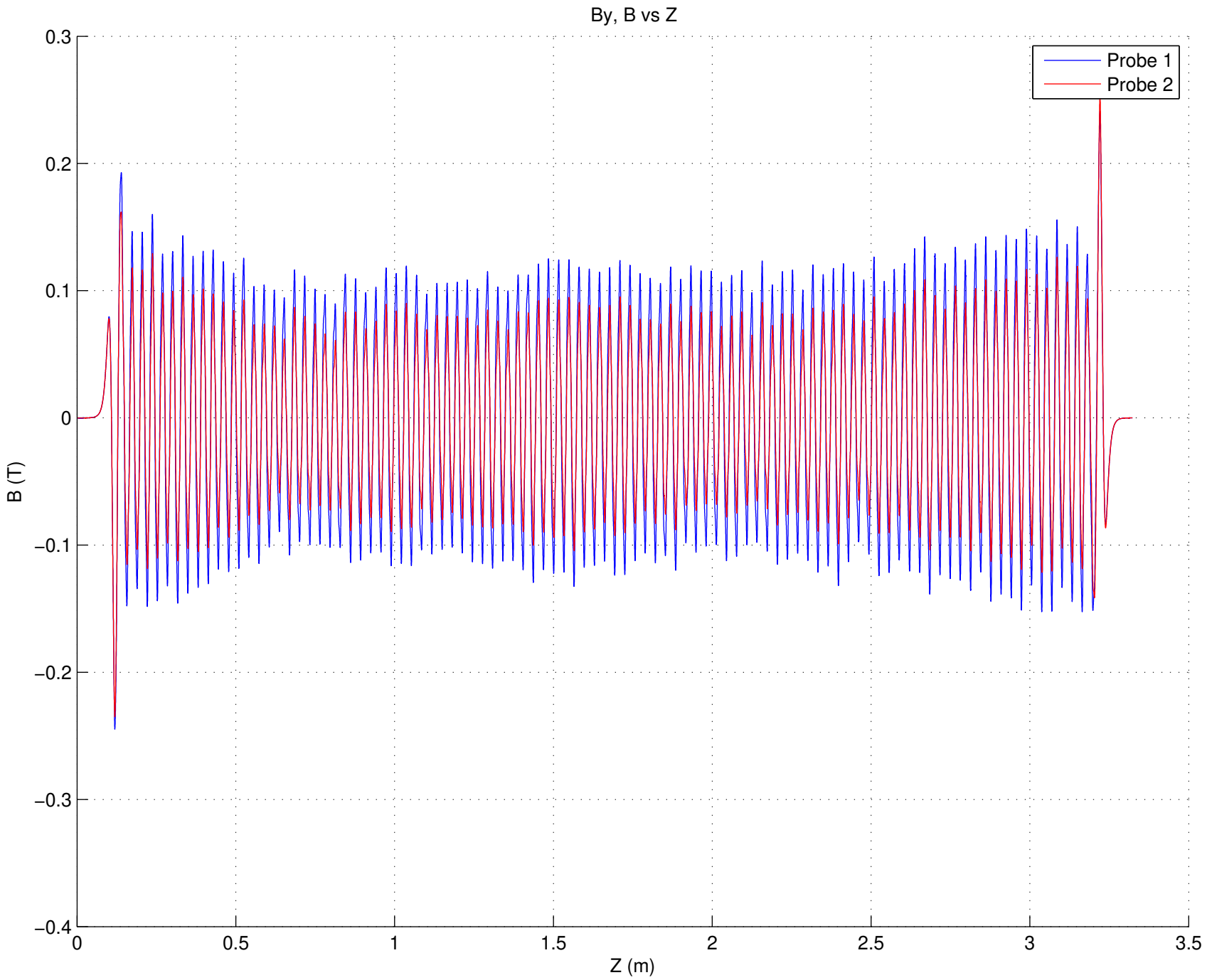
Parameters:
INPUT−FILE−DIR =s:\MagData\LCLS\Undulator\DELTA\Data\Assembled Measurements\Run 015\CPRMF\KR0100\
INPUT−FILE−NAME =DUTestOutput.dat
INPUT−FILE−TYPE =ZVXYZVXYZH
UND−POL−MODE =LIN−POL−VERT−FIELD
PROBE1−BX−CALIB−FILE =v:\MET\MagServe\MagData\LCLS\Hall probe\SENIS−119−12\SENIS−119−12−X.ini
PROBE1−BY−CALIB−FILE =v:\MET\MagServe\MagData\LCLS\Hall probe\SENIS−119−12\SENIS−119−12−Y.ini
PROBE2−BX−CALIB−FILE =v:\MET\MagServe\MagData\LCLS\Hall probe\SENIS−120−12\SENIS−120−12−X.ini
PROBE2−BY−CALIB−FILE =v:\MET\MagServe\MagData\LCLS\Hall probe\SENIS−120−12\SENIS−120−12−Y.ini
NUM−ZERO−GAUSS−MEAS =200
PROBE2−OFFSET−DIR =Y

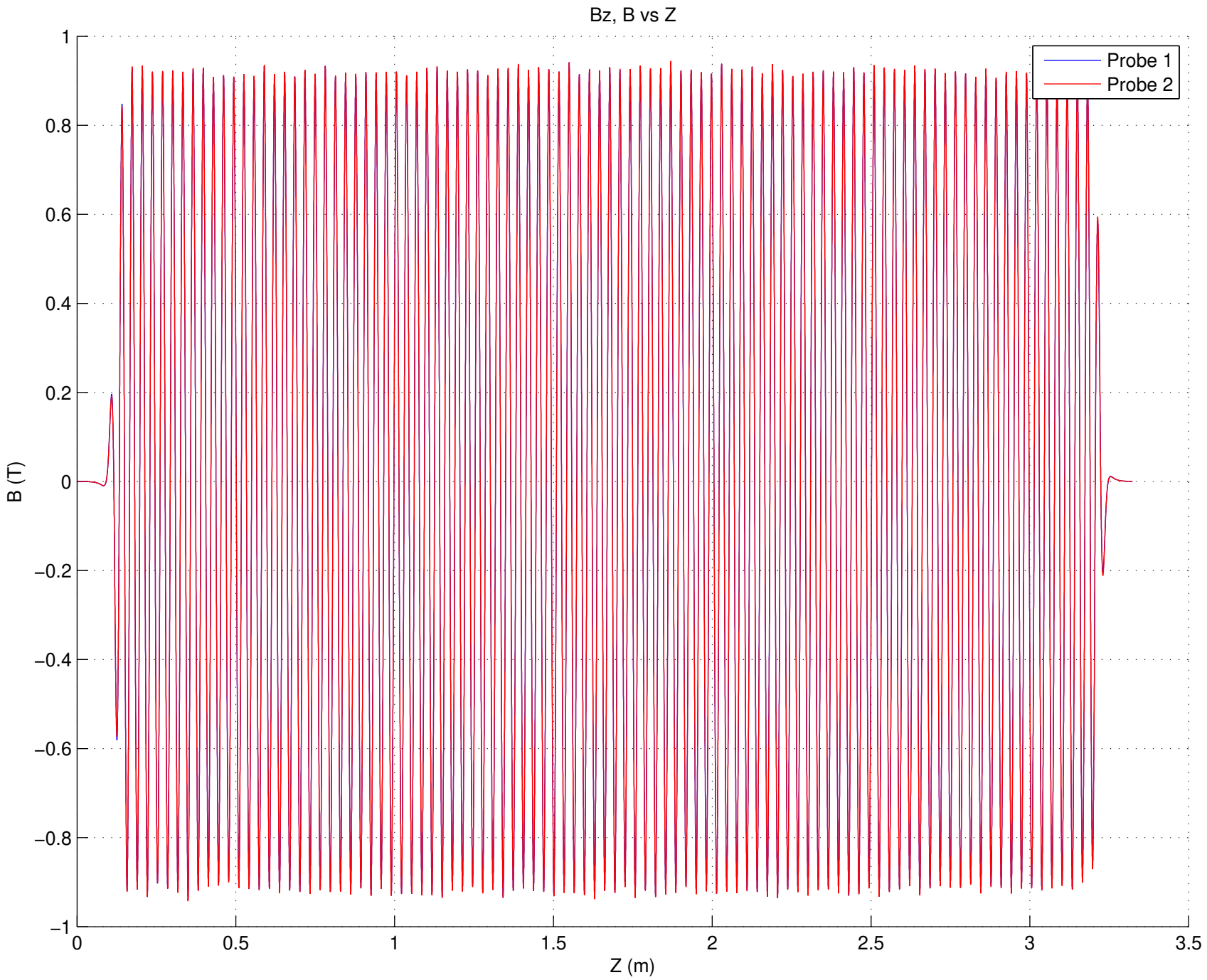

Probe 1: Bx, By, Bz vs Z
Bx (T)
0.3
0.2
0.1
0
−0.1
−0.2
By (T)
0.4
0.2
0
−0.2
−0.4
Bz (T)
1
0.5
0
−0.5
−1
0
0.5
1
1.5
2
2.5
3
3.5
Z Position (m)

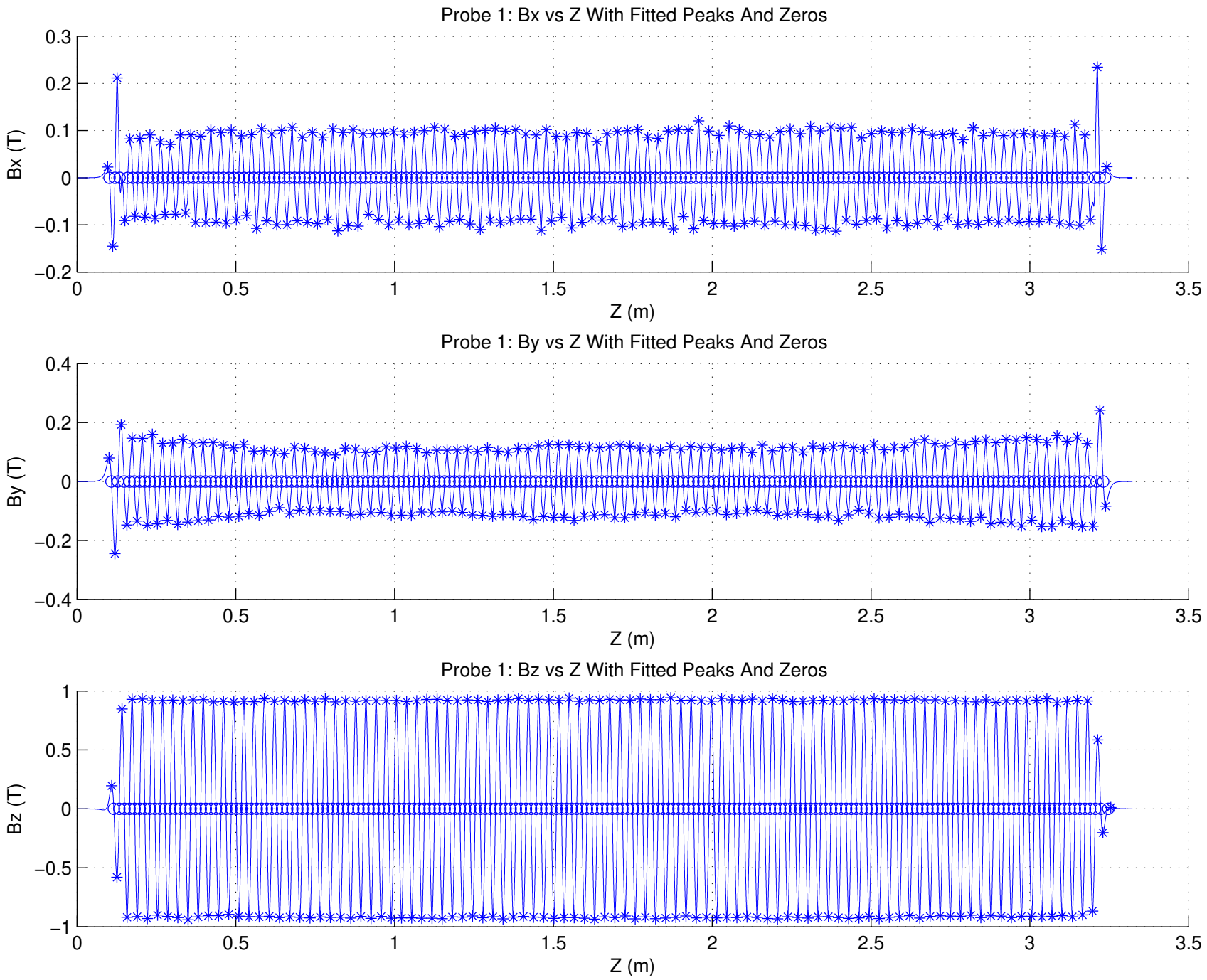

Probe 2: Bx, By, Bz vs Z
Bx (T)
0.3
0.2
0.1
0
−0.1
−0.2
By (T)
0.4
0.2
0
−0.2
−0.4
Bz (T)
1
0.5
0
−0.5
−1
0
0.5
1
1.5
2
2.5
3
3.5
Z Position (m)

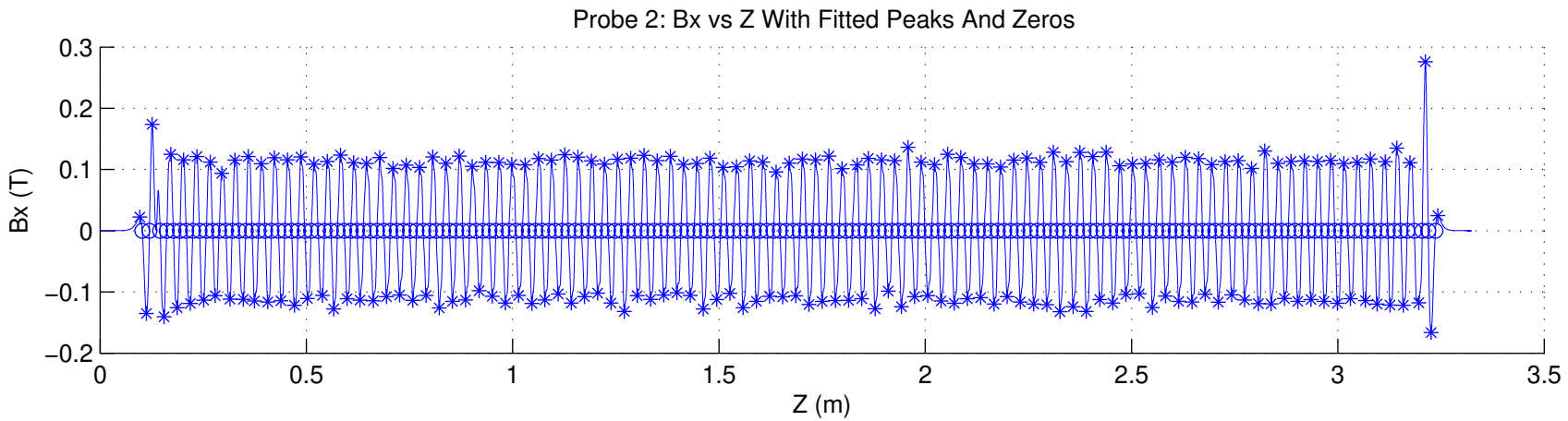

Probe 1: Bx and By vs Z
Bx
By
Bx, By (T)
Z (m)
0.25
0.2
0.15
0.1
0.05
0
−0.05
−0.1
−0.15
−0.2
−0.25
0
0.5
1
1.5
2
2.5
3
3.5

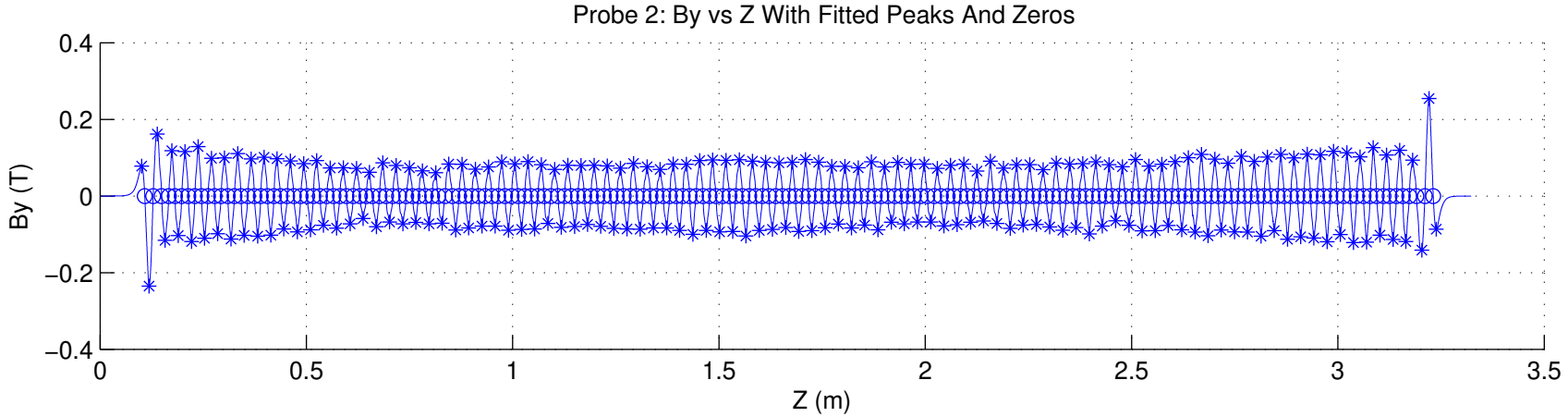

Bx, B vs Z
Probe 1
Probe 2
B (T)
Z (m)
0.3
0.25
0.2
0.15
0.1
0.05
0
−0.05
−0.1
−0.15
−0.2
0
0.5
1
1.5
2
2.5
3
3.5

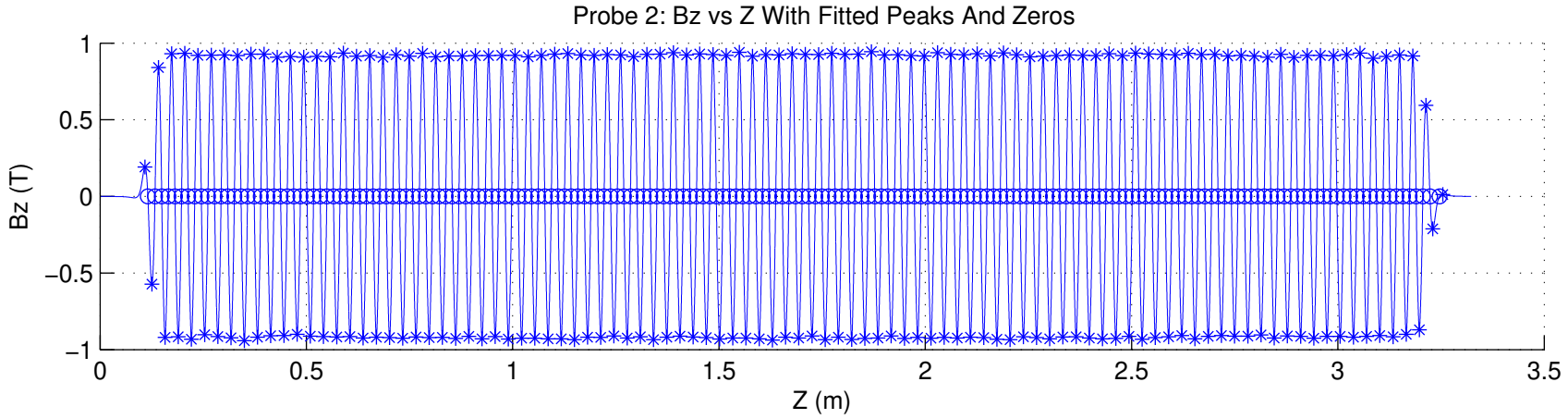

By, B vs Z
Probe 1
Probe 2
B (T)
Z (m)
0.3
0.2
0.1
0
−0.1
−0.2
−0.3
−0.4
0
0.5
1
1.5
2
2.5
3
3.5

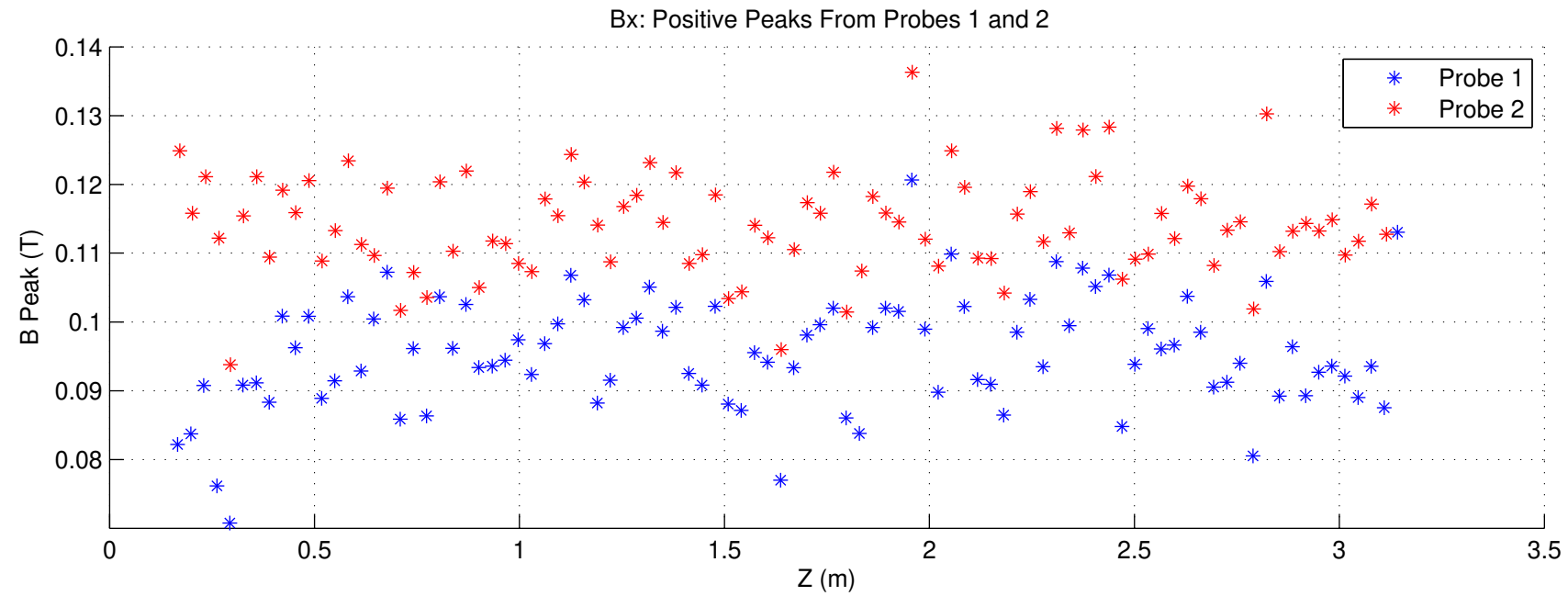

Bz, B vs Z
Probe 1
Probe 2
B (T)
Z (m)
1
0.8
0.6
0.4
0.2
0
−0.2
−0.4
−0.6
−0.8
−1
0
0.5
1
1.5
2
2.5
3
3.5

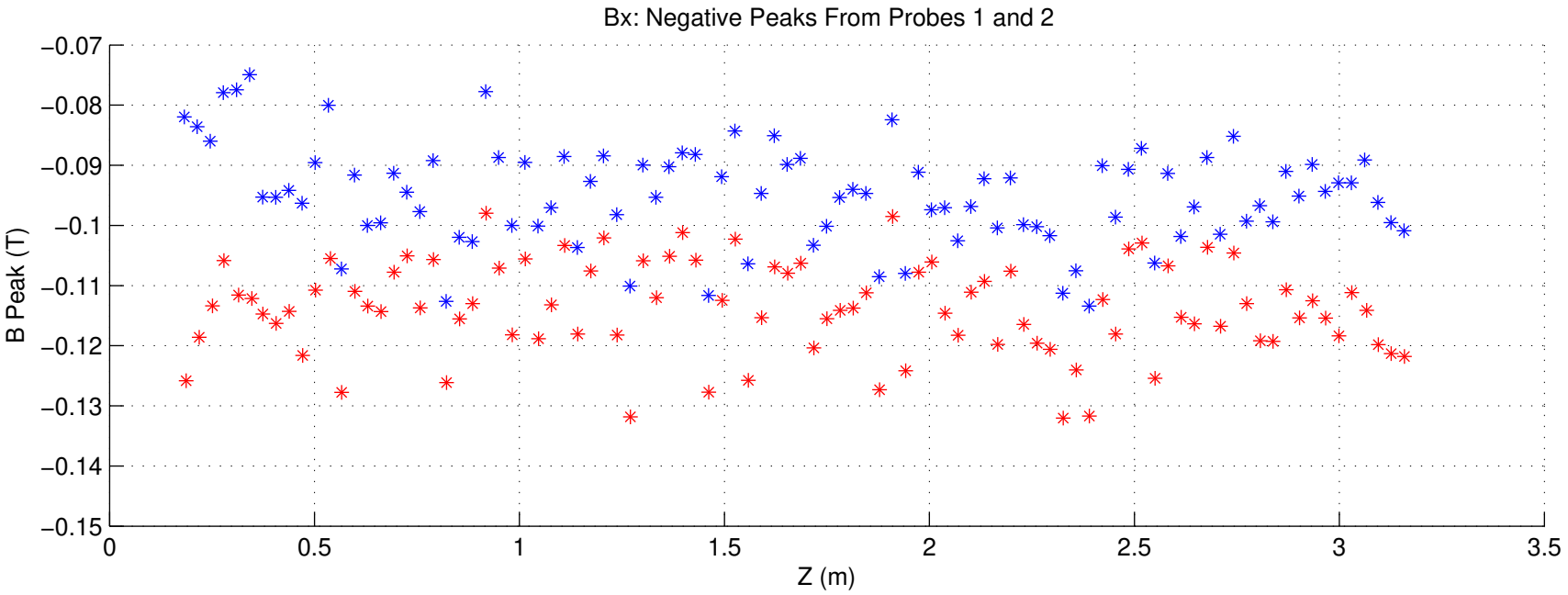

Probe 1: Bx vs Z With Fitted Peaks And Zeros
Bx (T)
Z (m)
Probe 1: By vs Z With Fitted Peaks And Zeros
By (T)
Z (m)
Probe 1: Bz vs Z With Fitted Peaks And Zeros
Bz (T)
Z (m)

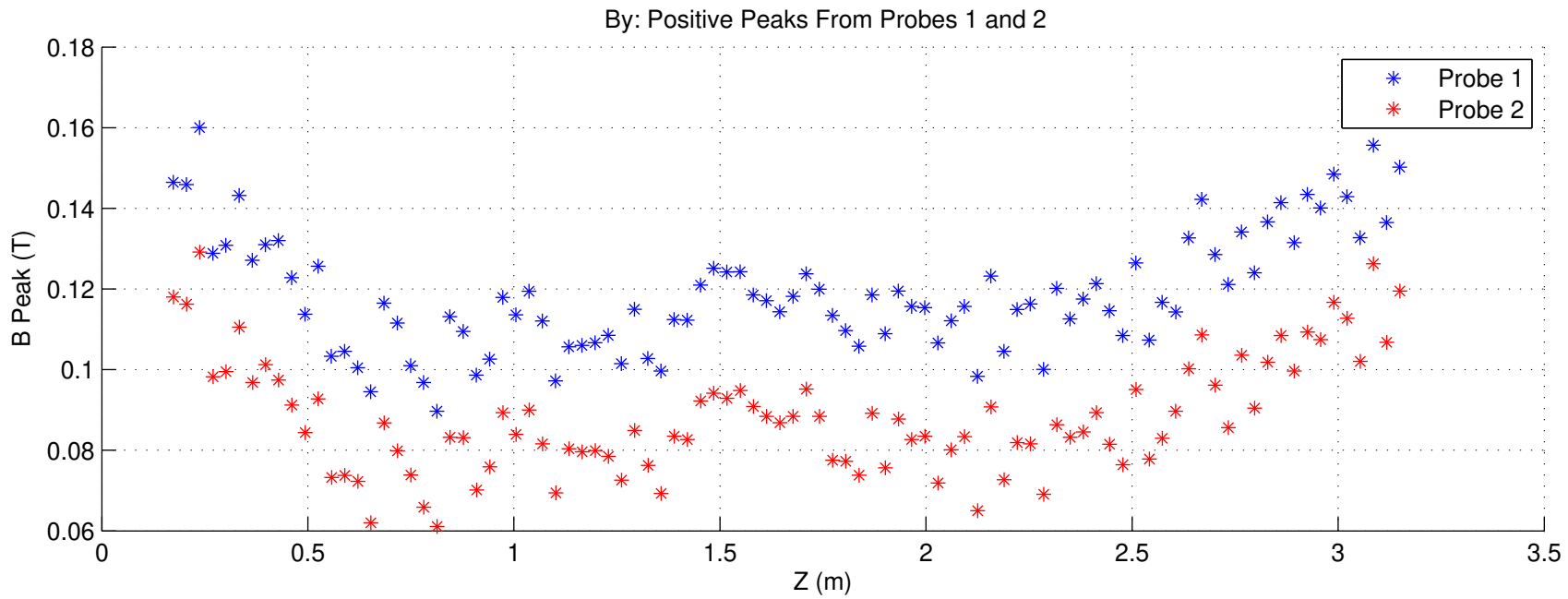

Probe 2: Bx vs Z With Fitted Peaks And Zeros
Bx (T)
Z (m)
0.3
0.2
0.1
0
−0.1
−0.2
0
0.5
1
1.5
2
2.5
3
3.5

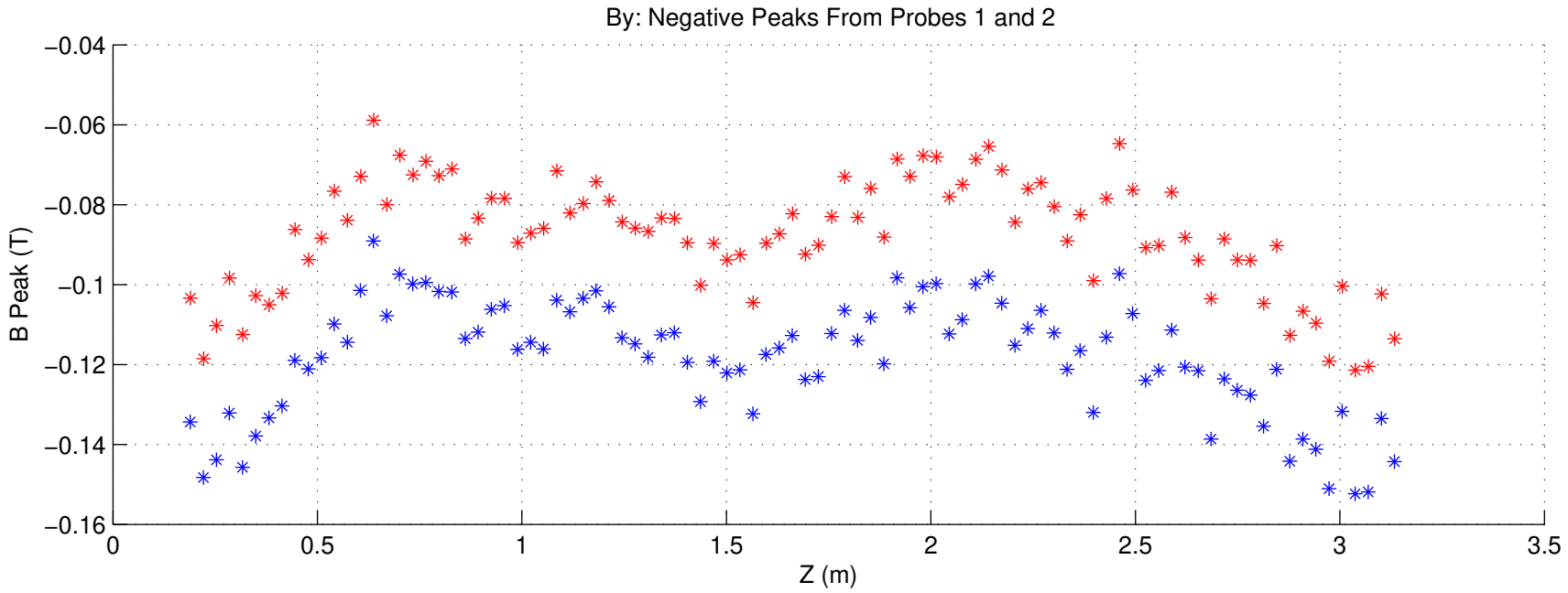

Probe 2: By vs Z With Fitted Peaks And Zeros
By (T)
Z (m)
0.4
0.2
0
−0.2
−0.4
0
0.5
1
1.5
2
2.5
3
3.5

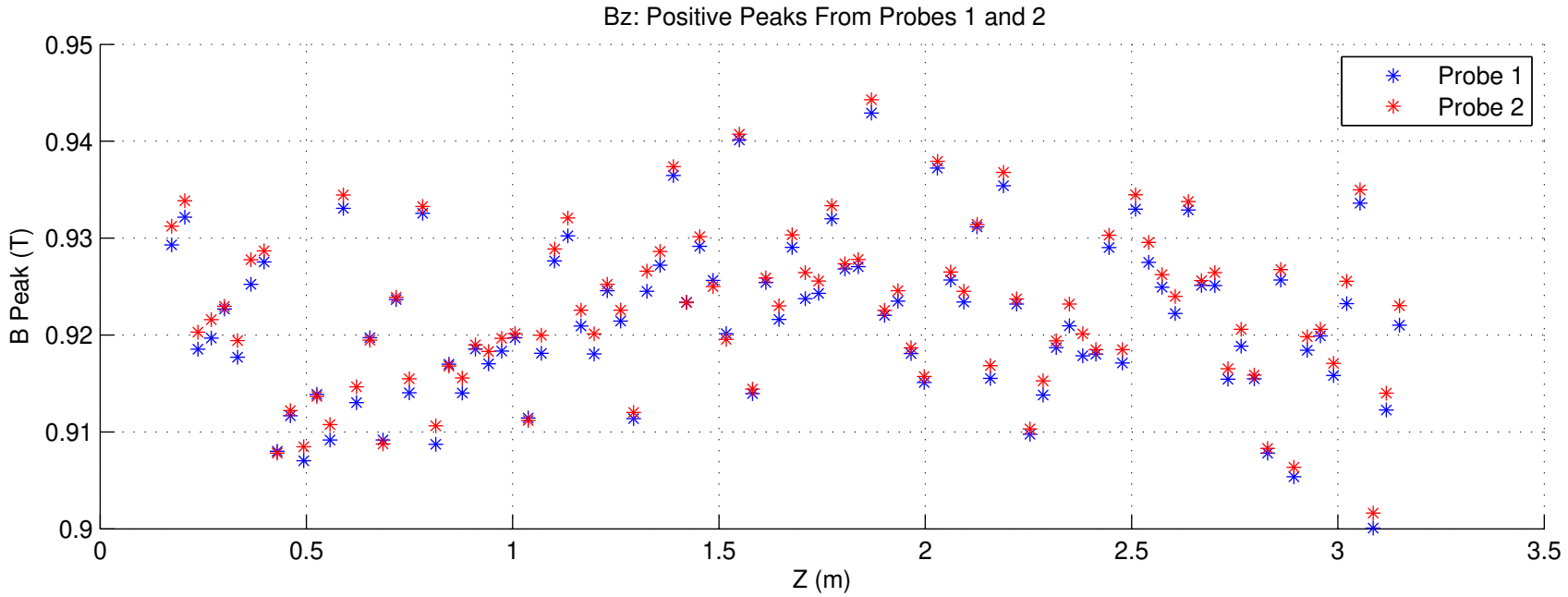

Probe 2: Bz vs Z With Fitted Peaks And Zeros
Bz (T)
Z (m)
1
0.5
0
−0.5
−1
0
0.5
1
1.5
2
2.5
3
3.5

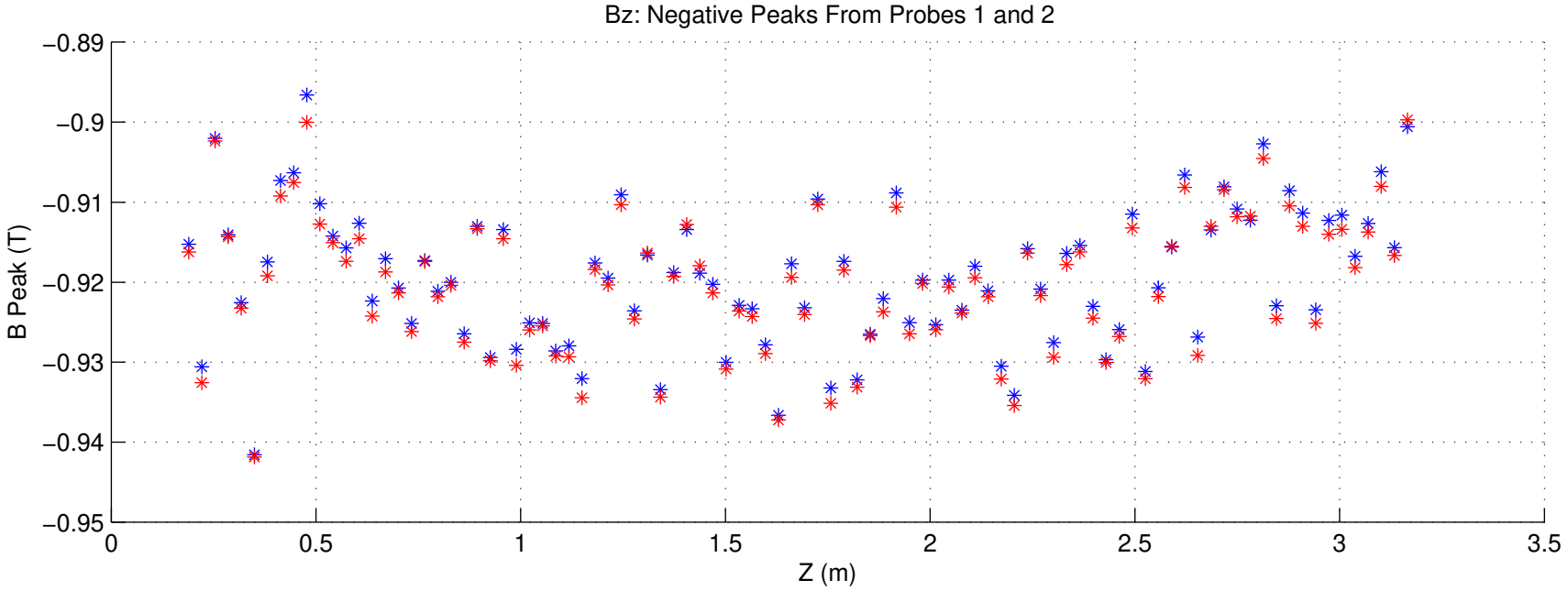

Bx: Positive Peaks From Probes 1 and 2
Probe 1
Probe 2
B Peak (T)
Z (m)
0.14
0.13
0.12
0.11
0.1
0.09
0.08
0
0.5
1
1.5
2
2.5
3
3.5

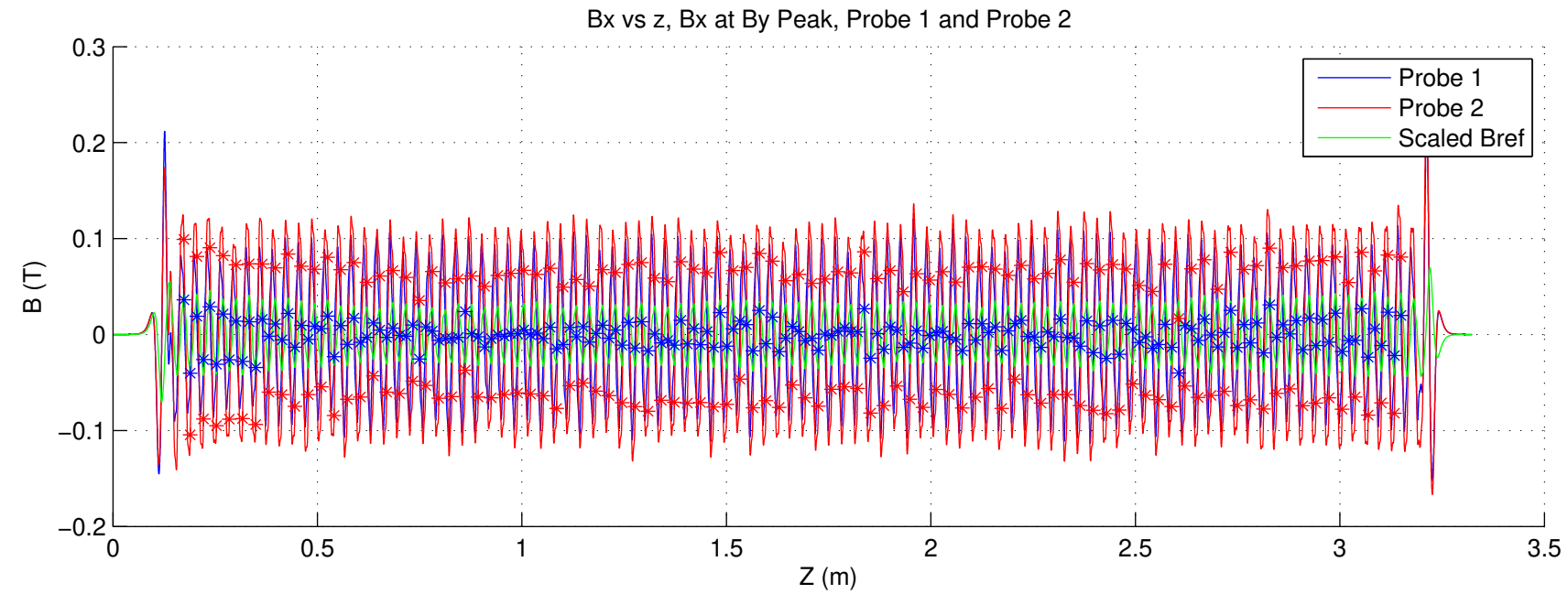

Bx: Negative Peaks From Probes 1 and 2
B Peak (T)
Z (m)
−0.07
−0.08
−0.09
−0.1
−0.11
−0.12
−0.13
−0.14
−0.15
0
0.5
1
1.5
2
2.5
3
3.5

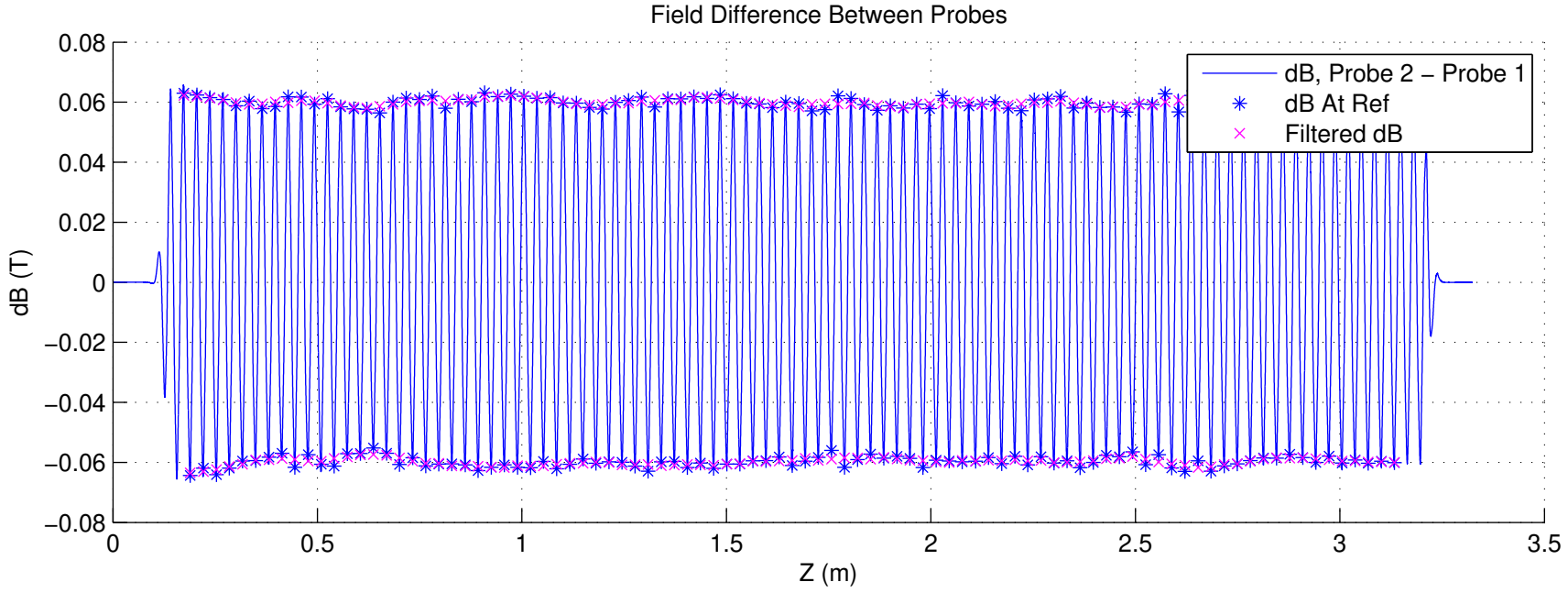

By: Positive Peaks From Probes 1 and 2
Probe 1
Probe 2
B Peak (T)
Z (m)
0.18
0.16
0.14
0.12
0.1
0.08
0.06
0
0.5
1
1.5
2
2.5
3
3.5

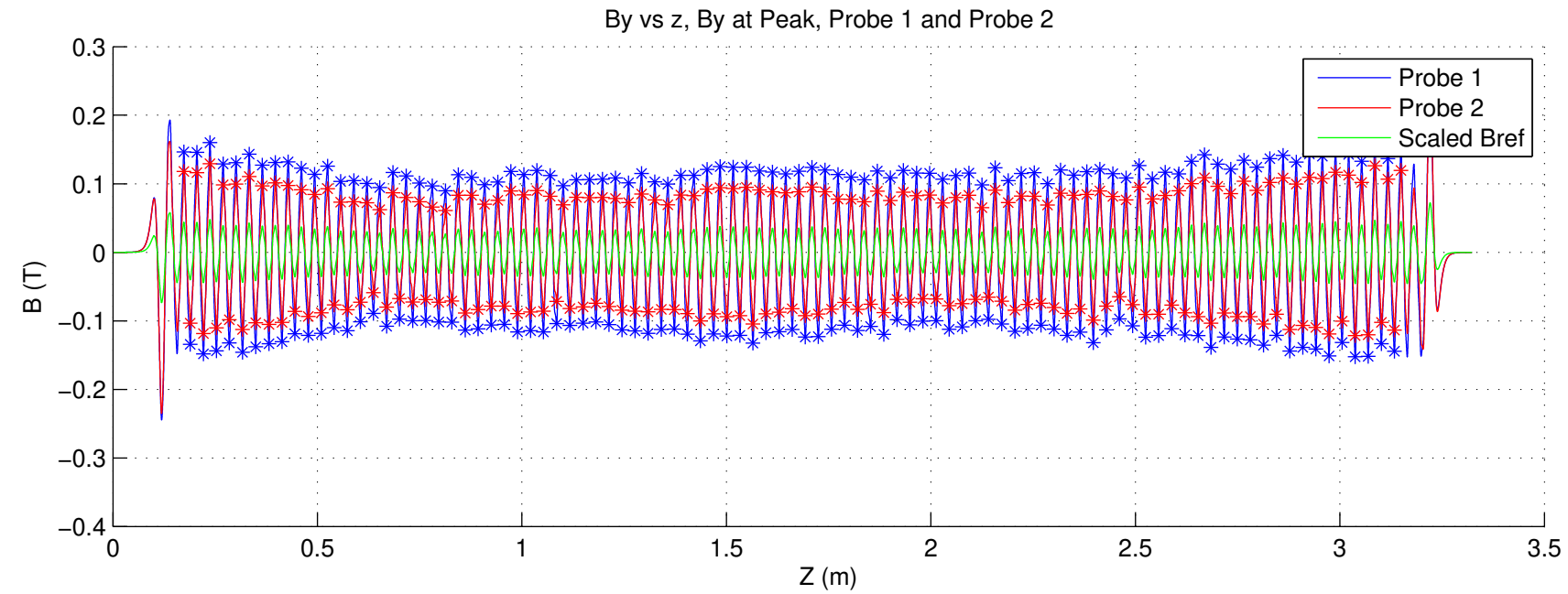

By: Negative Peaks From Probes 1 and 2
B Peak (T)
Z (m)
−0.04
−0.06
−0.08
−0.1
−0.12
−0.14
−0.16
0
0.5
1
1.5
2
2.5
3
3.5

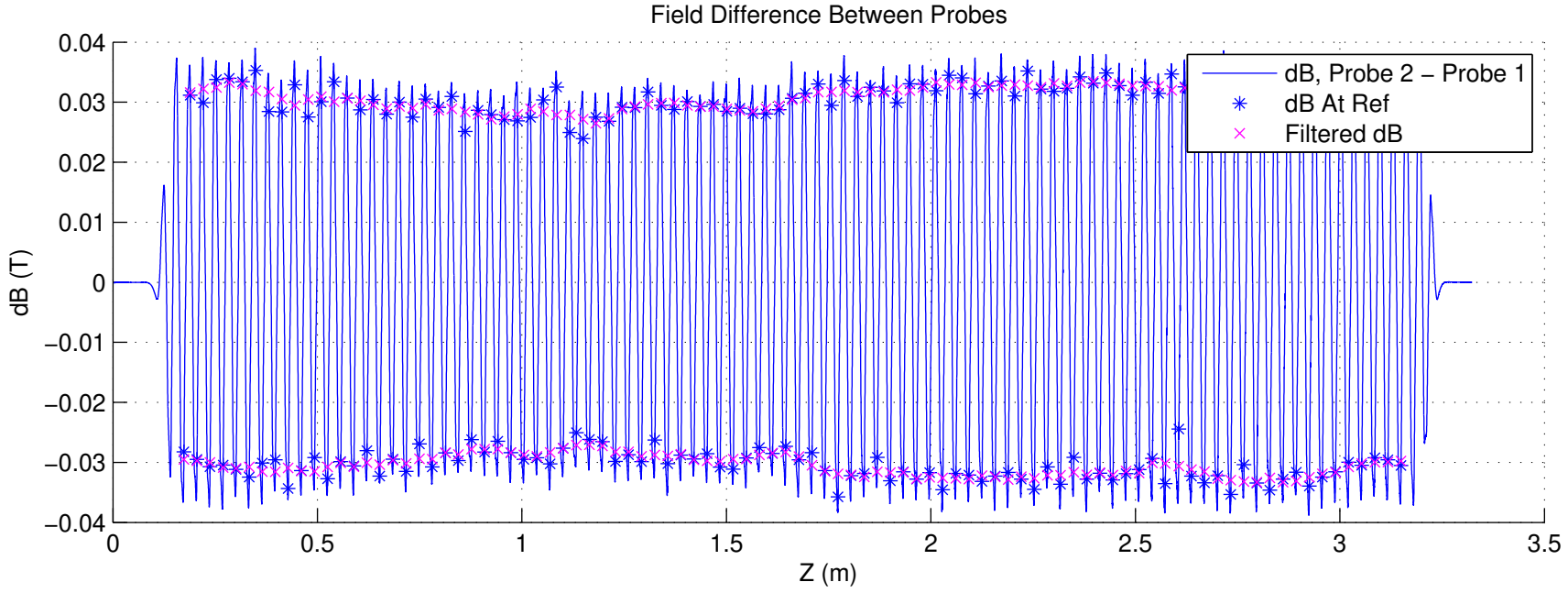

Bz: Positive Peaks From Probes 1 and 2
Probe 1
Probe 2
B Peak (T)
Z (m)
0.95
0.94
0.93
0.92
0.91
0.9
0
0.5
1
1.5
2
2.5
3
3.5

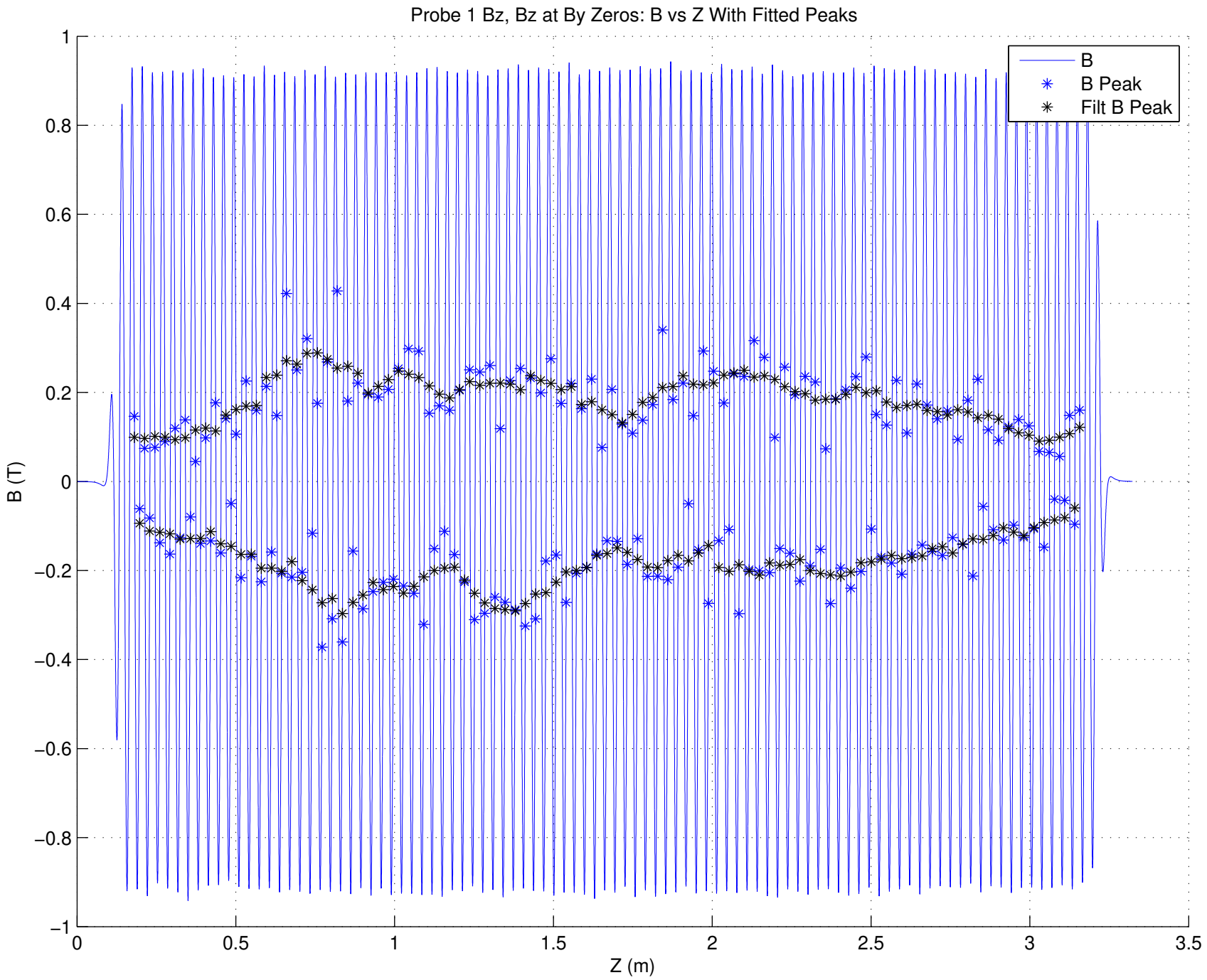

Bz: Negative Peaks From Probes 1 and 2
B Peak (T)
Z (m)
−0.89
−0.9
−0.91
−0.92
−0.93
−0.94
−0.95
0
0.5
1
1.5
2
2.5
3
3.5

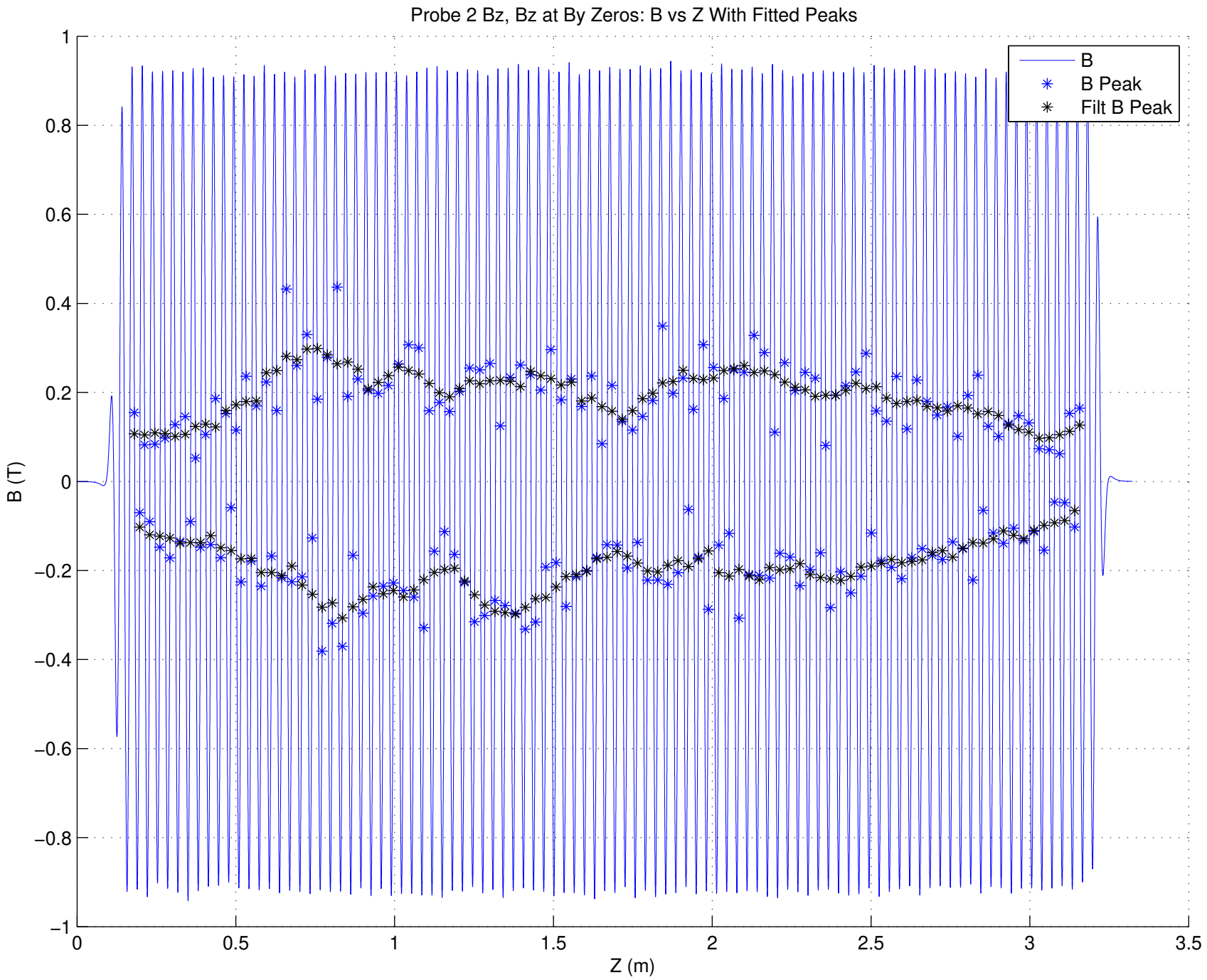

Bx vs z, Bx at By Peak, Probe 1 and Probe 2
Probe 1
Probe 2
Scaled Bref
B (T)
Z (m)
0.3
0.2
0.1
0
−0.1
−0.2
0
0.5
1
1.5
2
2.5
3
3.5

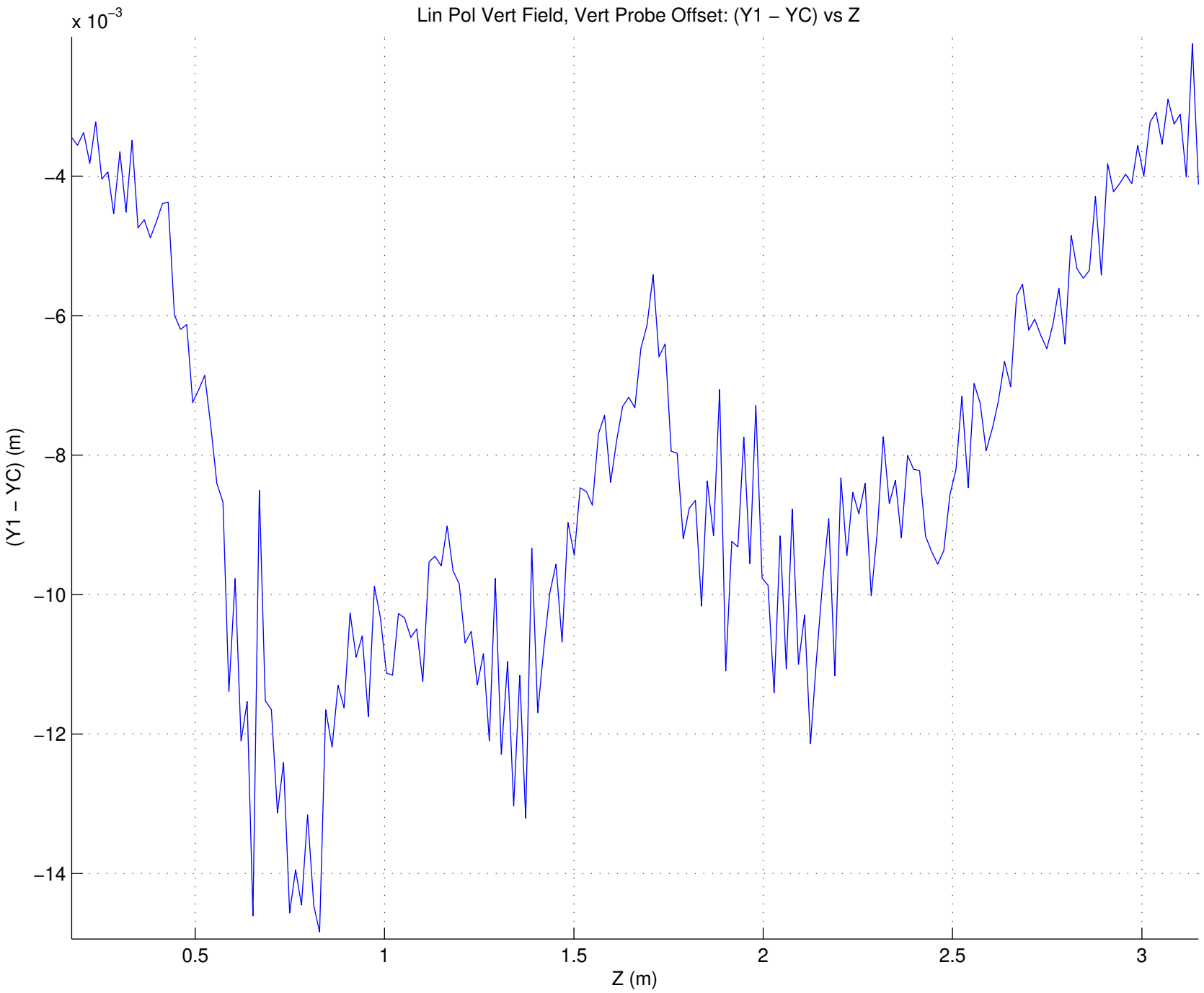

Field Difference Between Probes
dB, Probe 2 – Probe 1
dB At Ref
Filtered dB
dB (T)
Z (m)
0.08
0.06
0.04
0.02
0
−0.02
−0.04
−0.06
−0.08
0
0.5
1
1.5
2
2.5
3
3.5

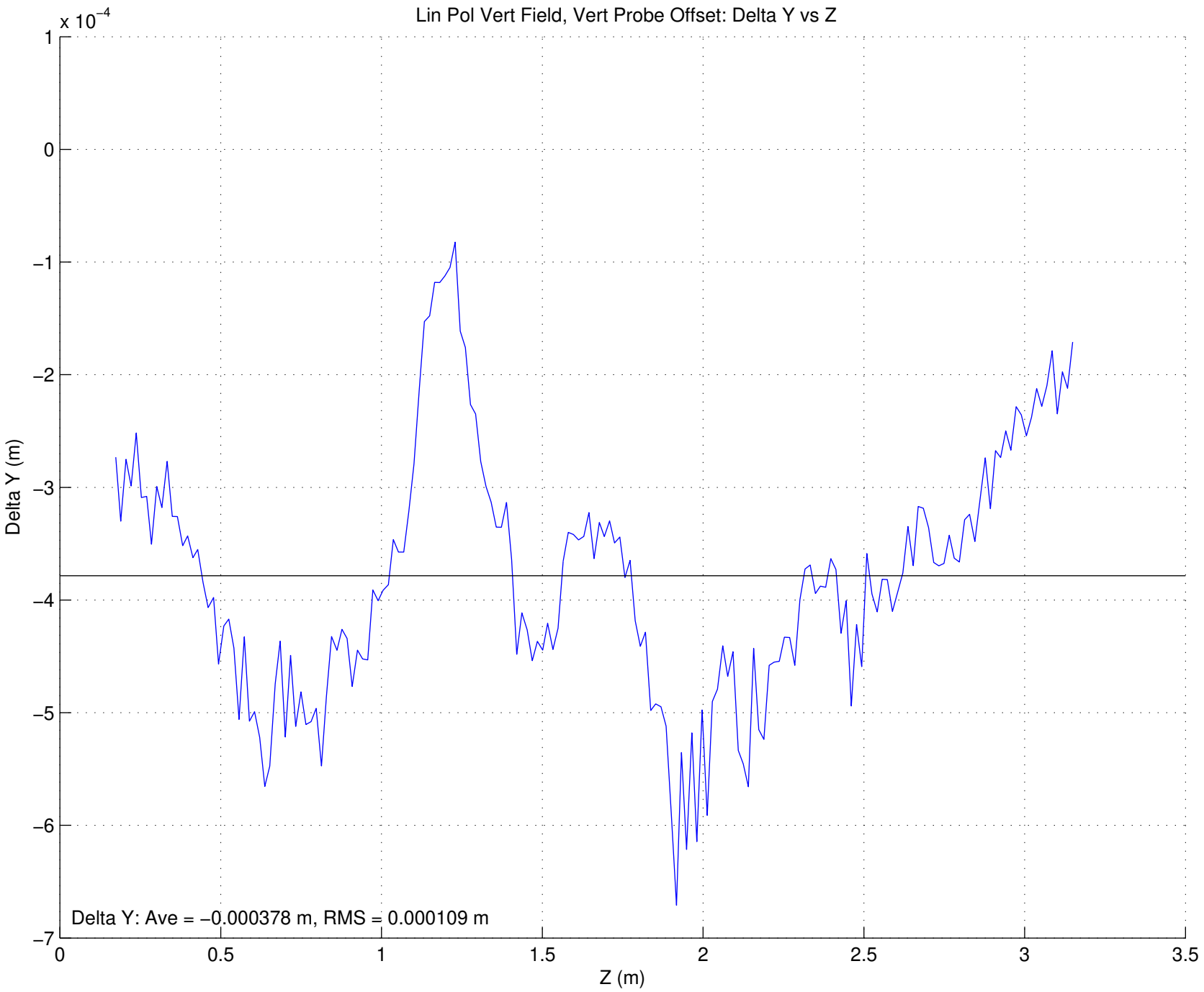

By vs z, By at Peak, Probe 1 and Probe 2
Probe 1
Probe 2
Scaled Bref
B (T)
Z (m)
0.3
0.2
0.1
0
−0.1
−0.2
−0.3
−0.4
0
0.5
1
1.5
2
2.5
3
3.5

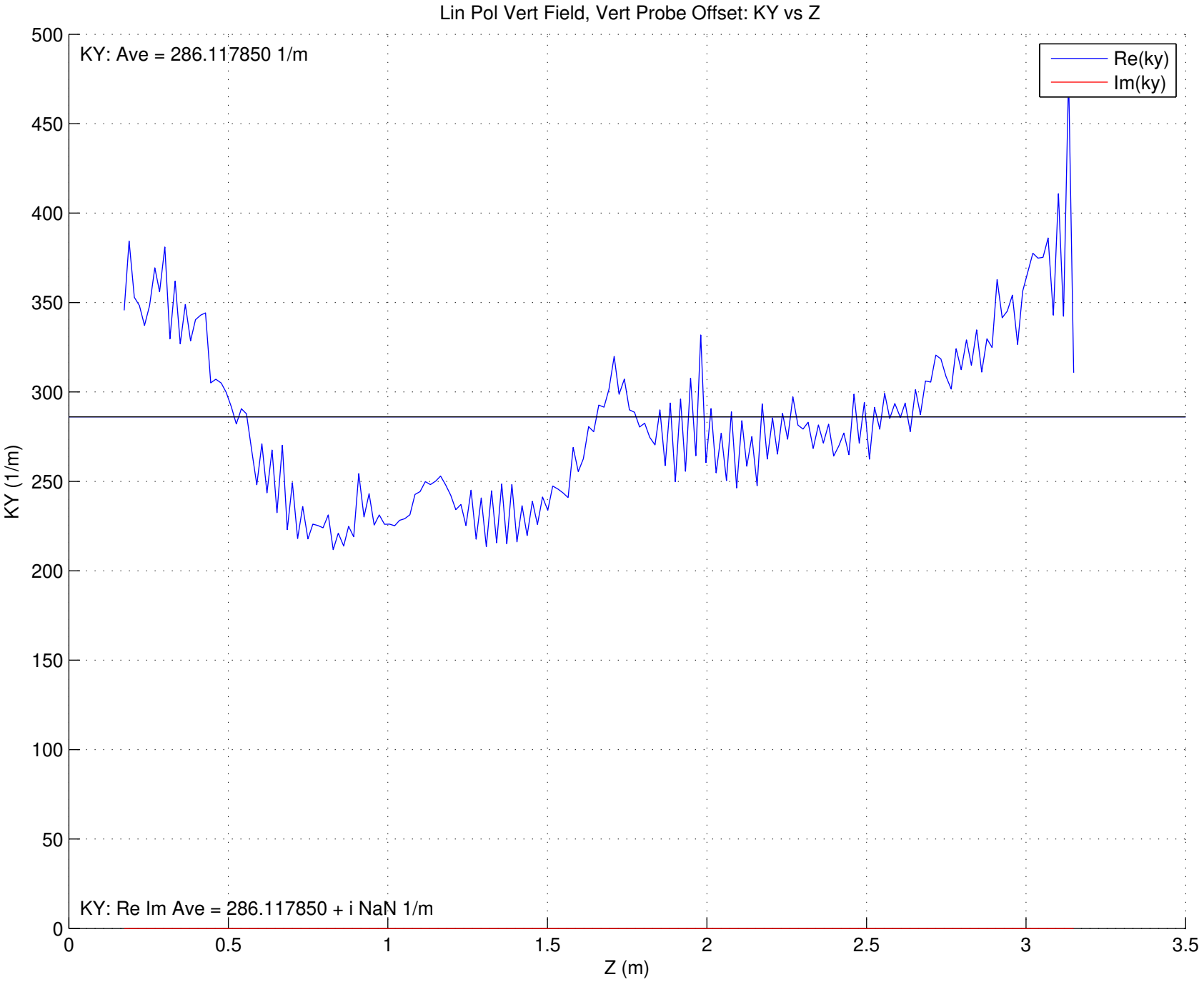

Field Difference Between Probes
dB, Probe 2 – Probe 1
dB At Ref
Filtered dB
dB (T)
Z (m)
0.04
0.03
0.02
0.01
0
−0.01
−0.02
−0.03
−0.04
0
0.5
1
1.5
2
2.5
3
3.5

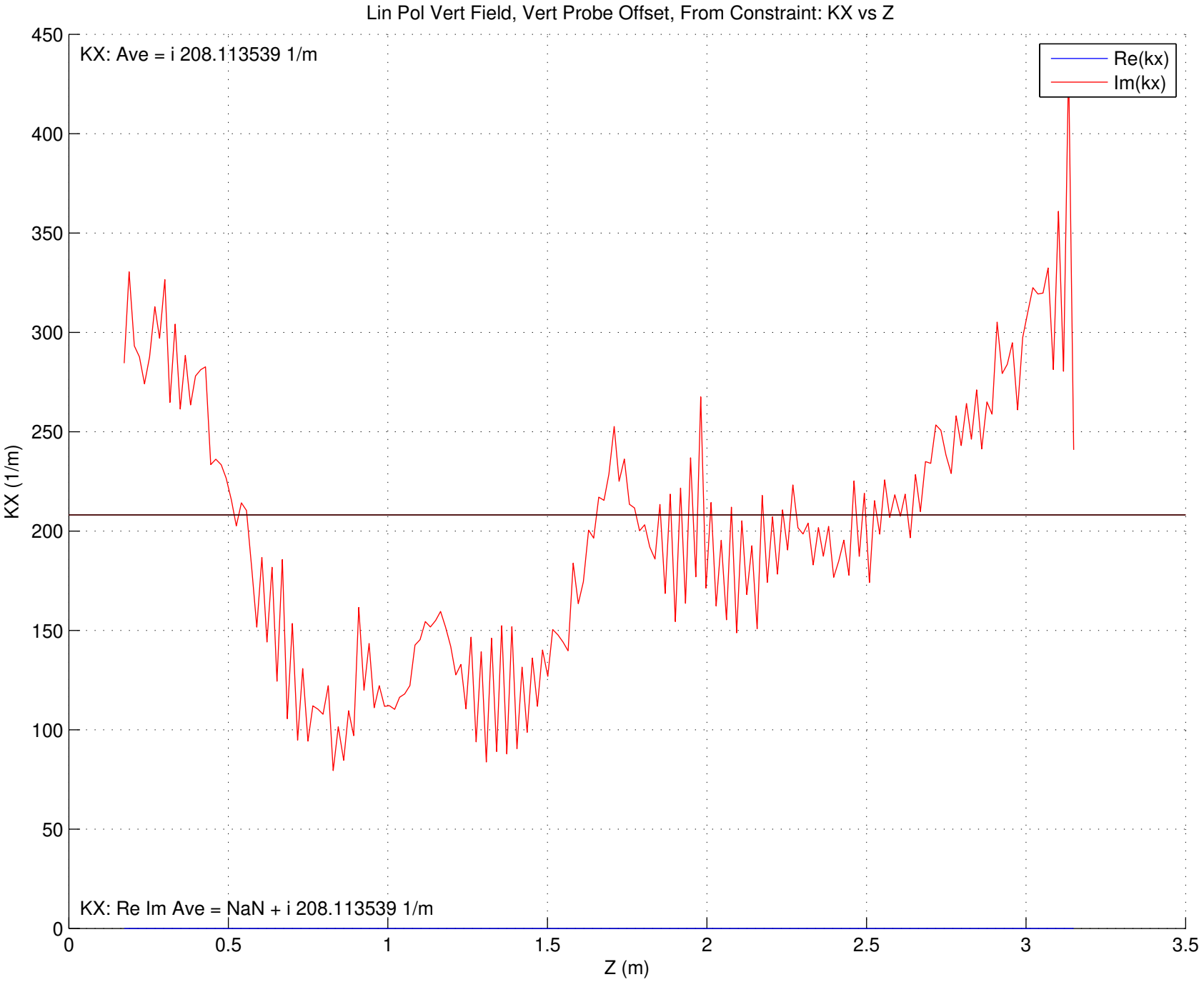

Probe 1 Bz, Bz at By Zeros: B vs Z With Fitted Peaks
B
B Peak
Filt B Peak
B (T)
Z (m)
1
0.8
0.6
0.4
0.2
0
−0.2
−0.4
−0.6
−0.8
−1
0
0.5
1
1.5
2
2.5
3
3.5

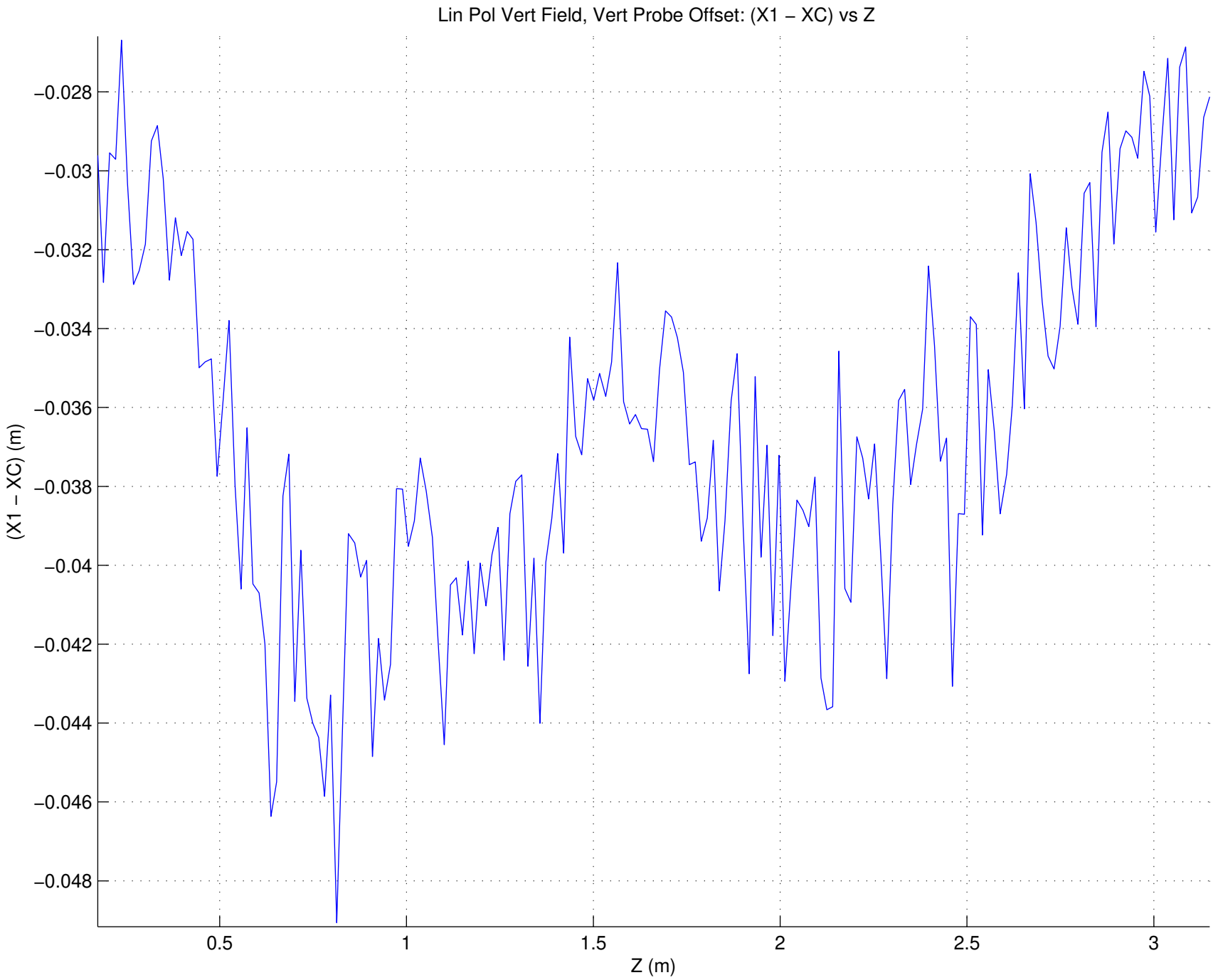

Probe 2 Bz, Bz at By Zeros: B vs Z With Fitted Peaks
B
B Peak
Filt B Peak
B (T)
Z (m)
1
0.8
0.6
0.4
0.2
0
−0.2
−0.4
−0.6
−0.8
−1
0
0.5
1
1.5
2
2.5
3
3.5

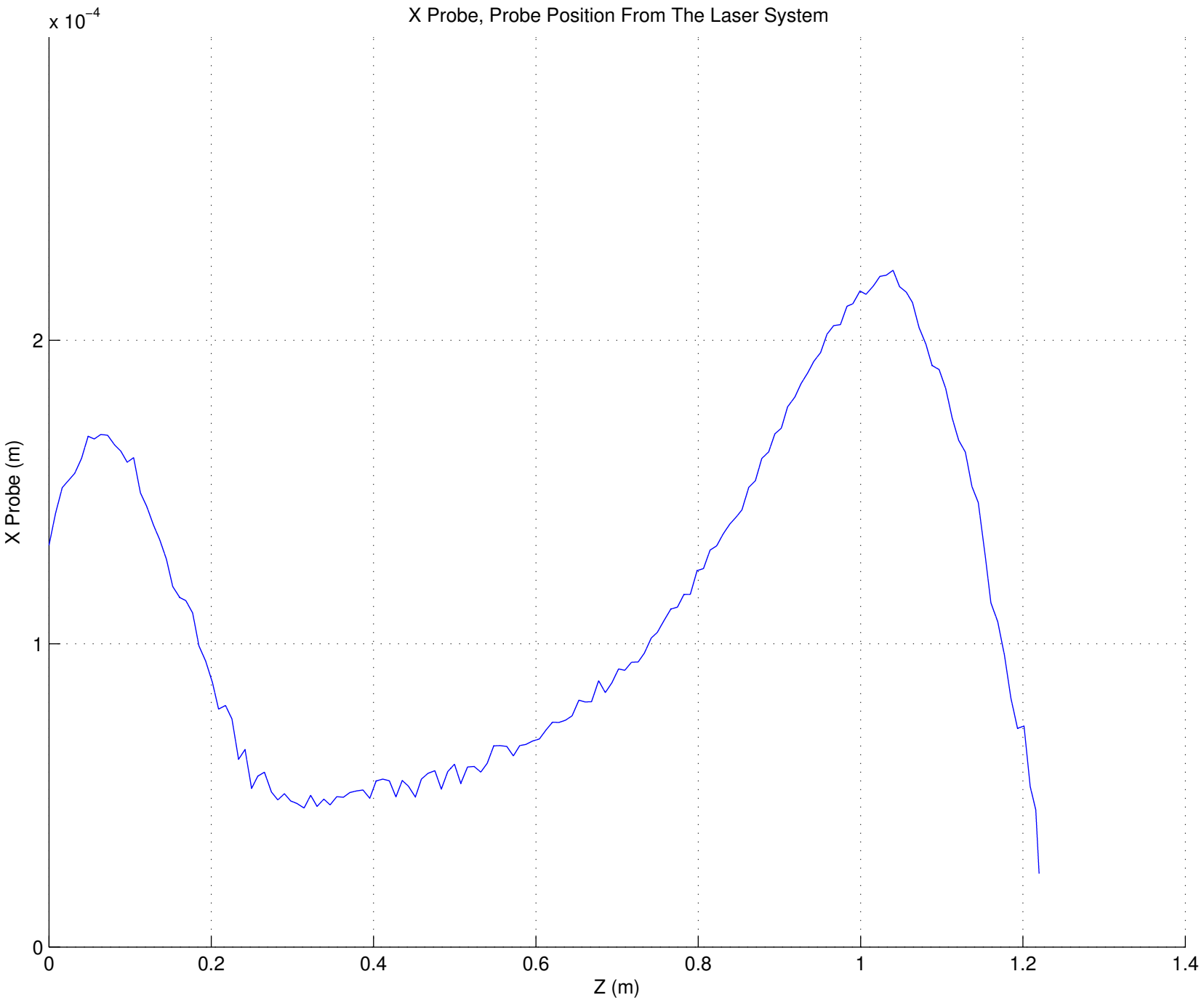

Lin Pol Vert Field, Vert Probe Offset: (Y1 – YC) vs Z
x 10^-3
(Y1 – YC) (m)
–4
–6
–8
–10
–12
–14
0.5
1
1.5
2
2.5
3
Z (m)

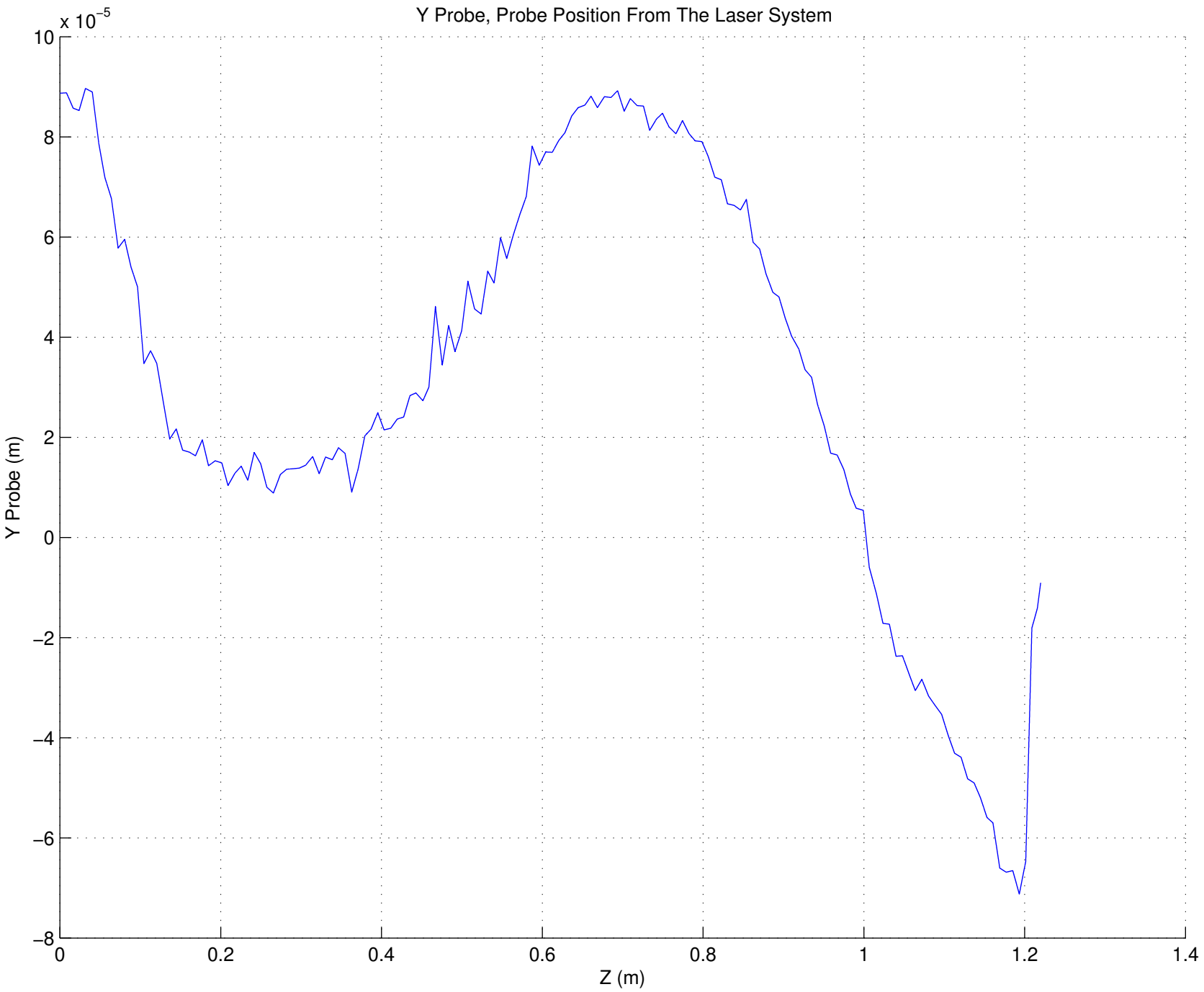

Lin Pol Vert Field, Vert Probe Offset: Delta Y vs Z
x 10^-4
1
0
−1
−2
−3
−4
−5
−6
−7
Delta Y (m)
0
0.5
1
1.5
2
2.5
3
3.5
Z (m)
Delta Y: Ave = −0.000378 m, RMS = 0.000109 m

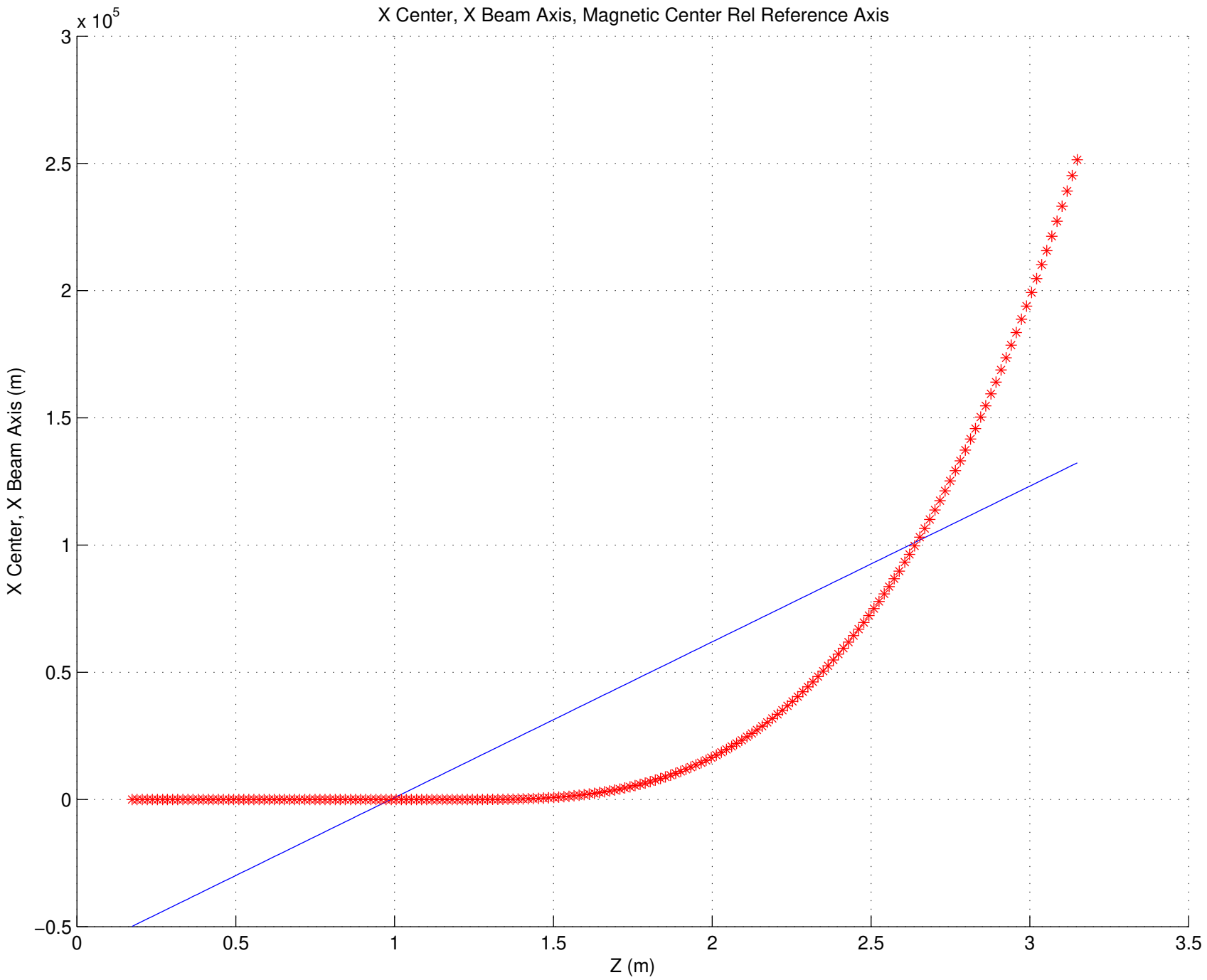

Lin Pol Vert Field, Vert Probe Offset: KY vs Z
KY: Ave = 286.117850 1/m
Re(ky)
Im(ky)
KY: Re Im Ave = 286.117850 + i NaN 1/m
KY (1/m)
Z (m)
500
450
400
350
300
250
200
150
100
50
0
0
0.5
1
1.5
2
2.5
3
3.5

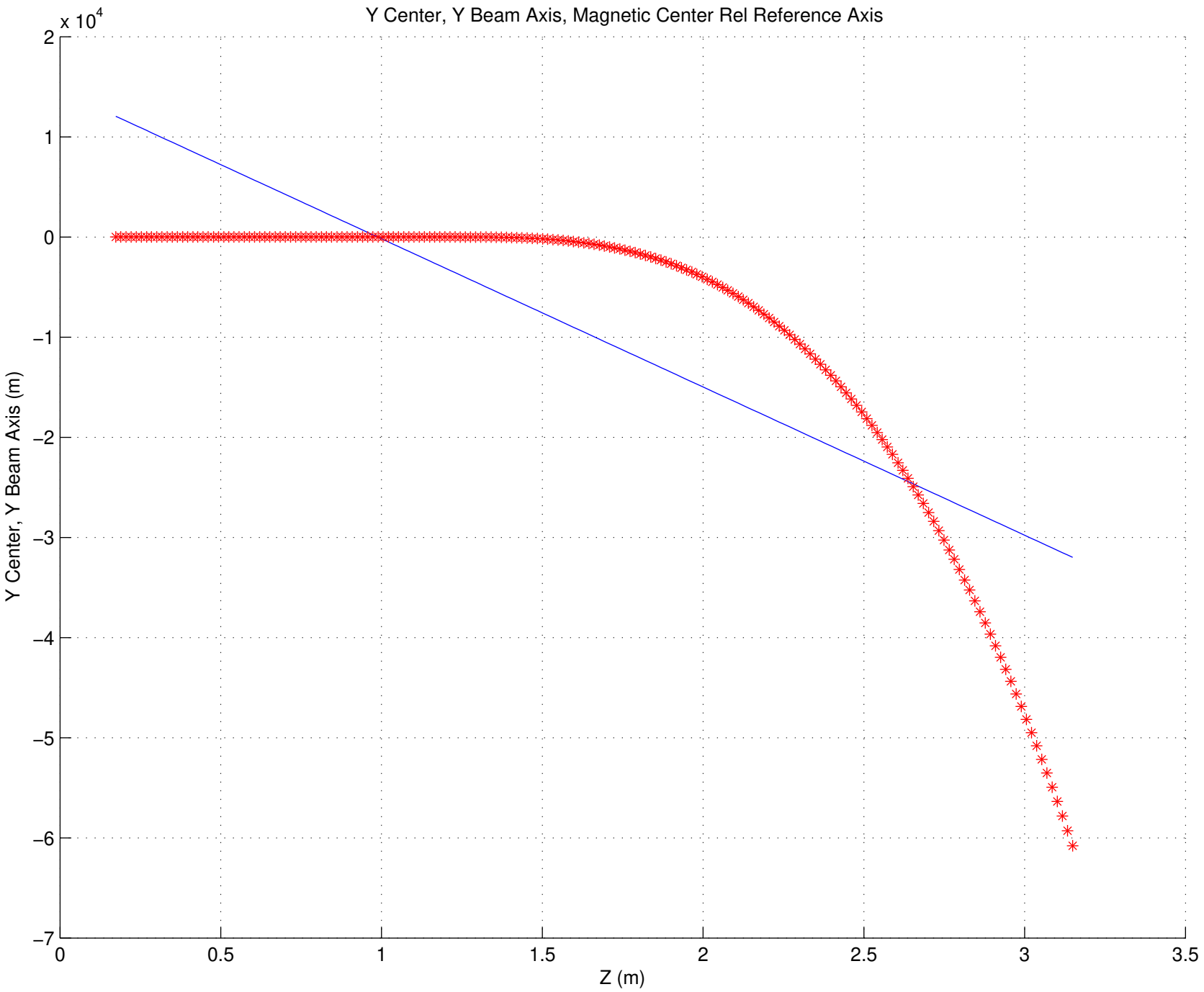

Lin Pol Vert Field, Vert Probe Offset, From Constraint: KX vs Z
KX: Ave = i 208.113539 1/m
KX: Re Im Ave = NaN + i 208.113539 1/m
Re(kx)
Im(kx)
KX (1/m)
Z (m)
0
50
100
150
200
250
300
350
400
450
0
0.5
1
1.5
2
2.5
3
3.5

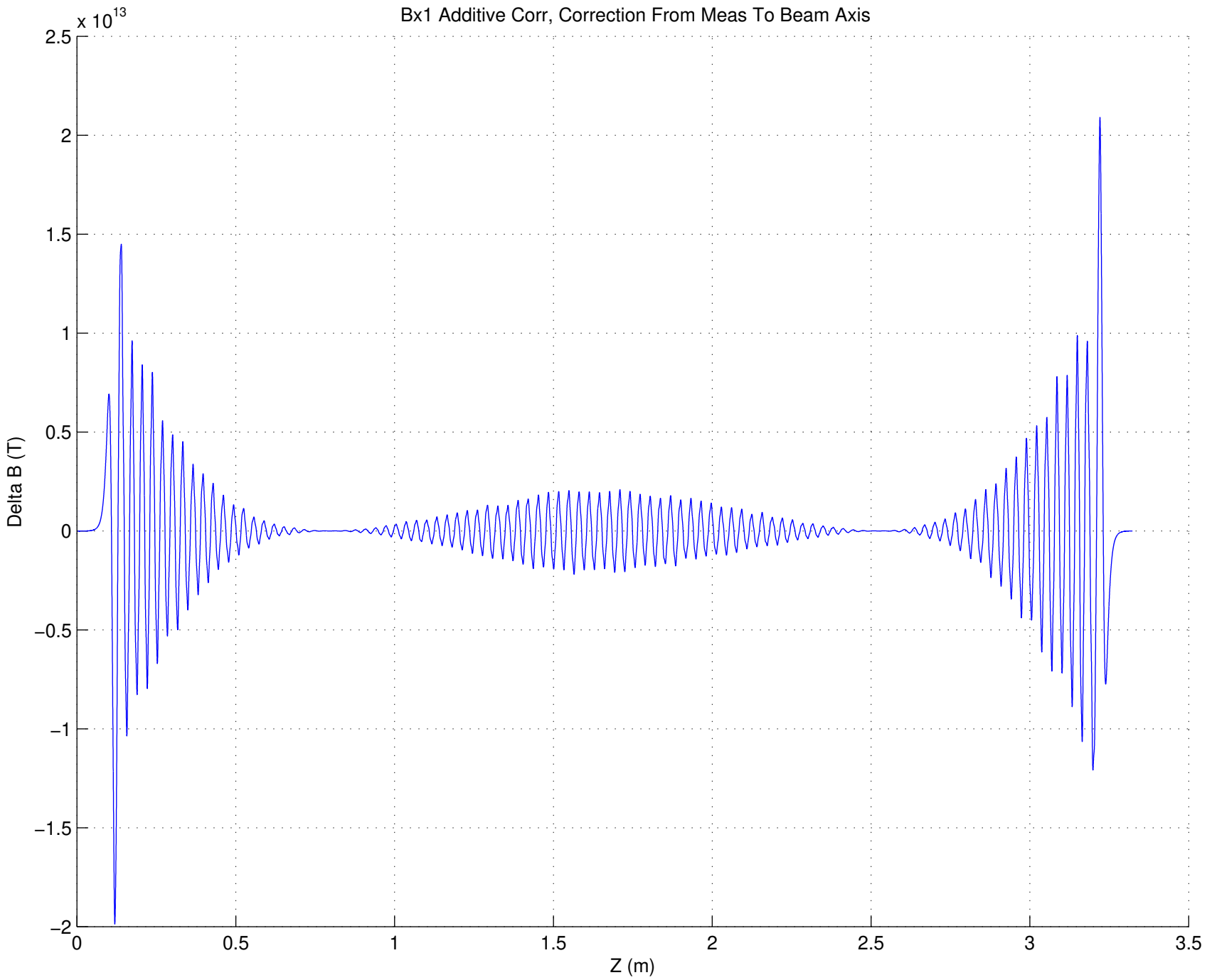

Lin Pol Vert Field, Vert Probe Offset: (X1 – XC) vs Z
(X1 – XC) (m)
–0.028
–0.03
–0.032
–0.034
–0.036
–0.038
–0.04
–0.042
–0.044
–0.046
–0.048
0.5
1
1.5
2
2.5
3
Z (m)

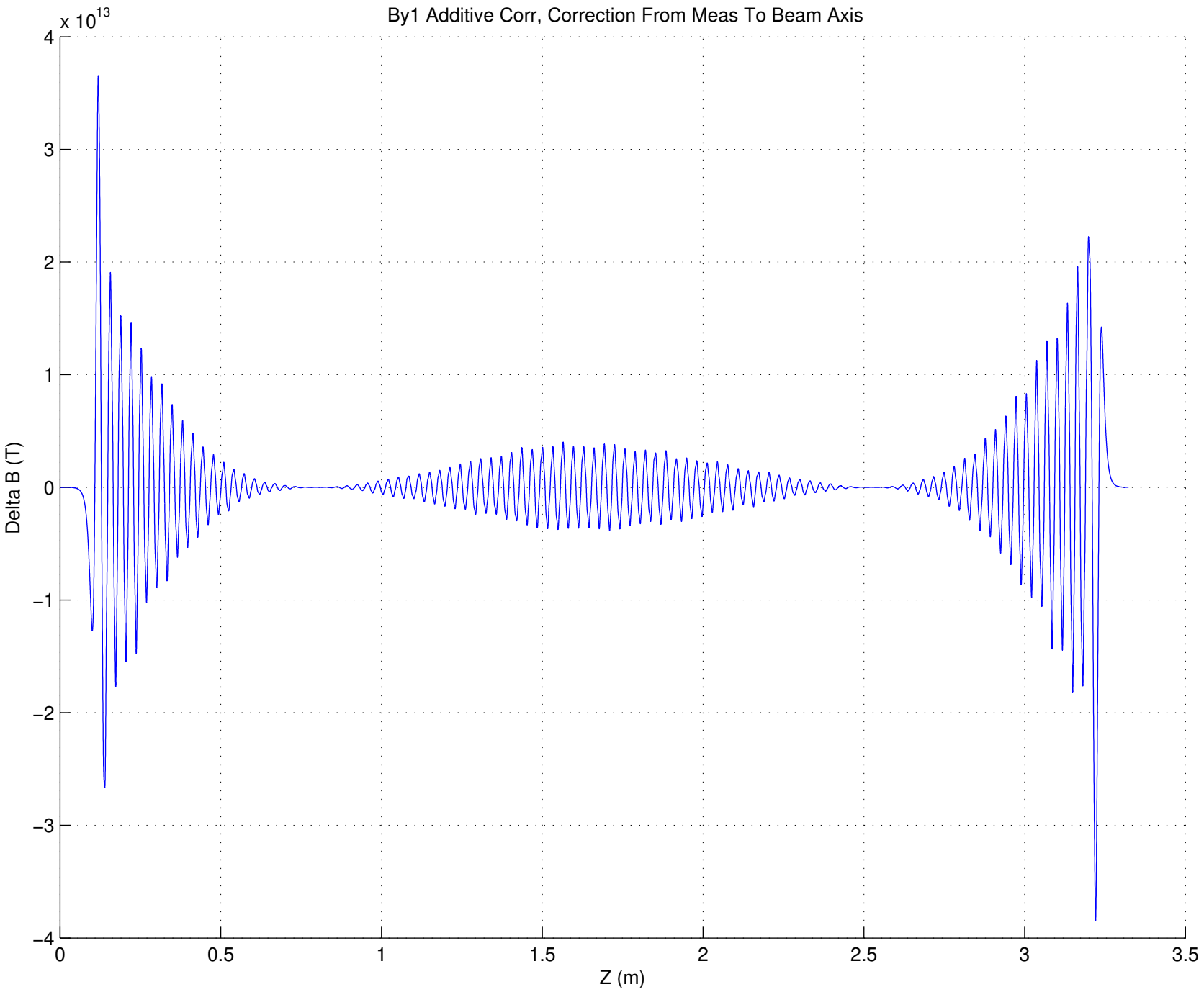

X Probe, Probe Position From The Laser System
x 10^-4
X Probe (m)
Z (m)
0
1
2
0
0.2
0.4
0.6
0.8
1
1.2
1.4

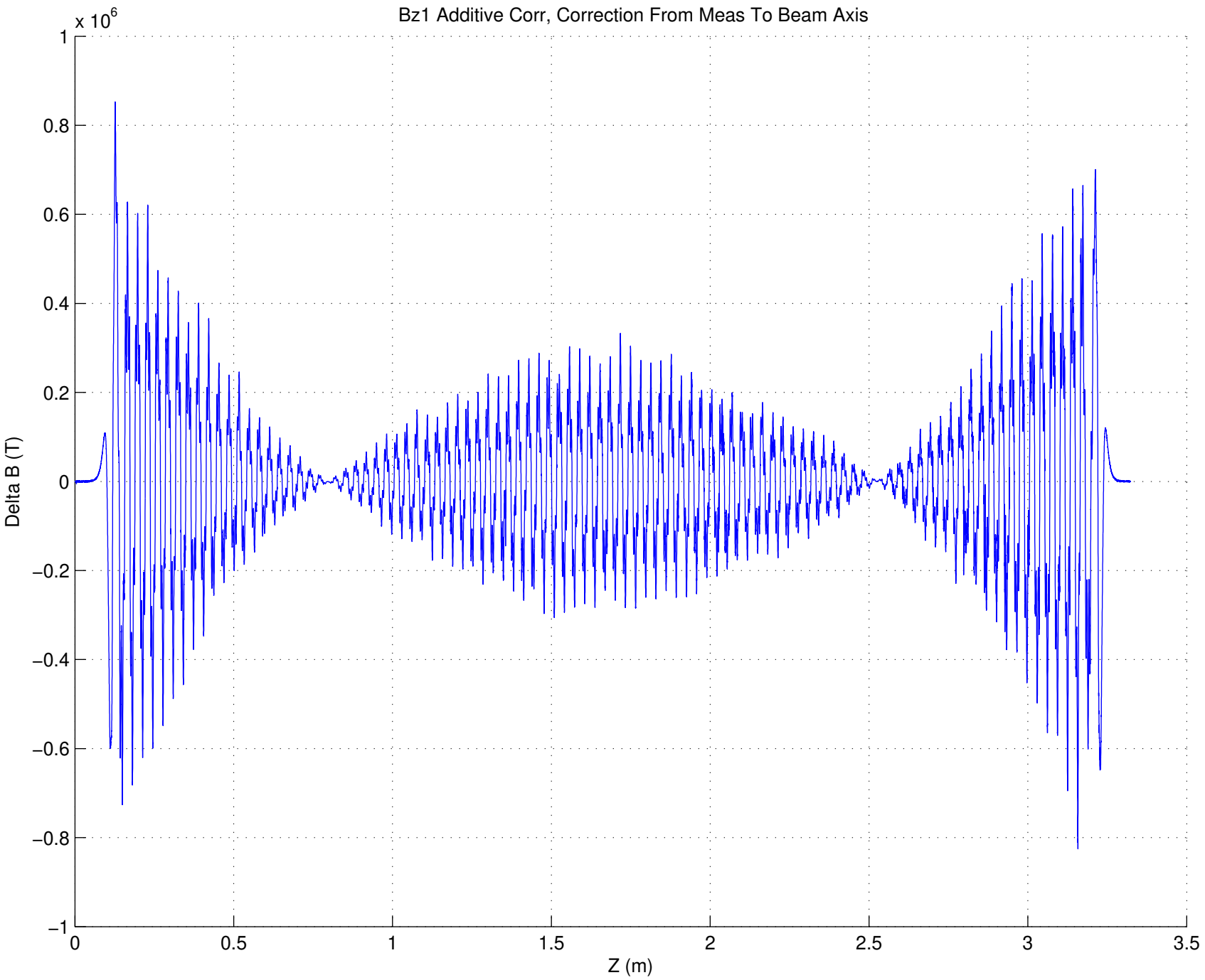

Y Probe, Probe Position From The Laser System
x 10^-5
10
8
6
4
2
0
−2
−4
−6
−8
Y Probe (m)
0
0.2
0.4
0.6
0.8
1
1.2
1.4
Z (m)

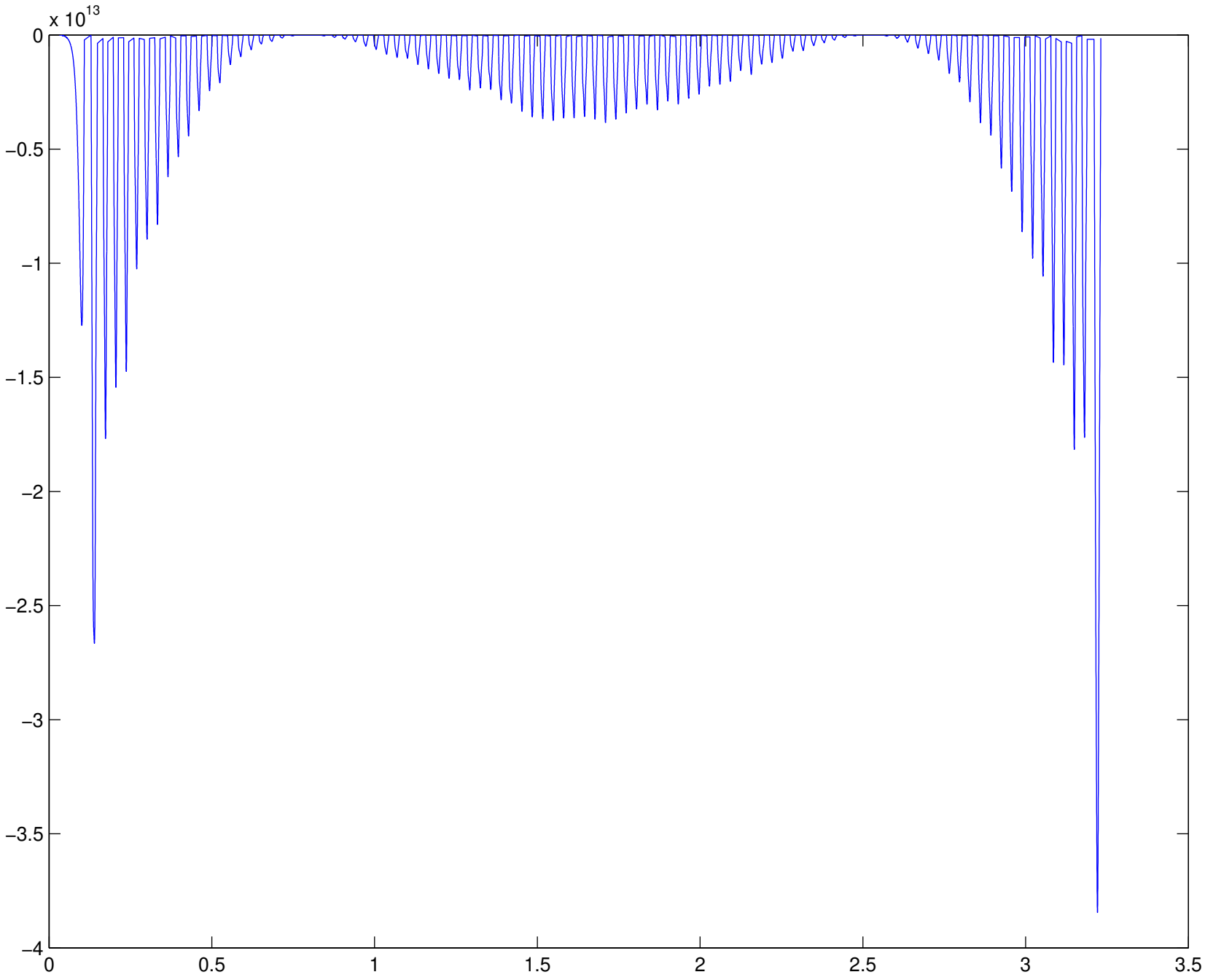

X Center, X Beam Axis, Magnetic Center Rel Reference Axis
x 10^5
3
2.5
2
1.5
1
0.5
0
−0.5
X Center, X Beam Axis (m)
0
0.5
1
1.5
2
2.5
3
3.5
Z (m)

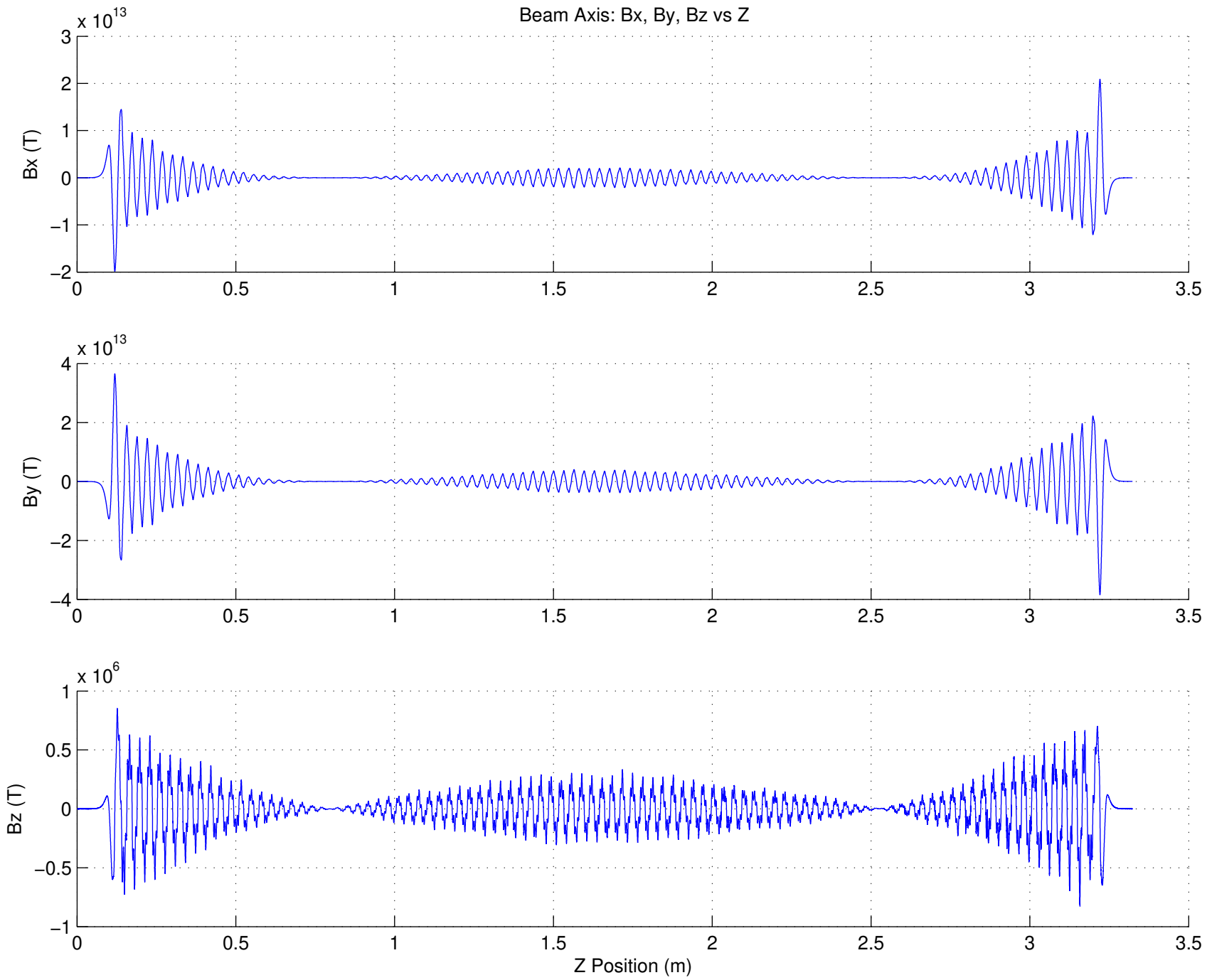

Y Center, Y Beam Axis, Magnetic Center Rel Reference Axis
x 10^4
2
1
0
−1
−2
−3
−4
−5
−6
−7
Y Center, Y Beam Axis (m)
0
0.5
1
1.5
2
2.5
3
3.5
Z (m)


Bx1 Additive Corr, Correction From Meas To Beam Axis
x 10^13
2.5
2
1.5
1
0.5
0
−0.5
−1
−1.5
−2
Delta B (T)
0
0.5
1
1.5
2
2.5
3
3.5
Z (m)


By1 Additive Corr, Correction From Meas To Beam Axis
x 10^13
4
3
2
1
0
−1
−2
−3
−4
Delta B (T)
0
0.5
1
1.5
2
2.5
3
3.5
Z (m)


Bz1 Additive Corr, Correction From Meas To Beam Axis
x 10^6
1
0.8
0.6
0.4
0.2
0
−0.2
−0.4
−0.6
−0.8
−1
Delta B (T)
0
0.5
1
1.5
2
2.5
3
3.5
Z (m)


x 10^13
0
−0.5
−1
−1.5
−2
−2.5
−3
−3.5
−4
0
0.5
1
1.5
2
2.5
3
3.5


Beam Axis: Bx, By, Bz vs Z
x 10^13
Bx (T)
3
2
1
0
−1
−2
0
0.5
1
1.5
2
2.5
3
3.5
x 10^13
By (T)
4
2
0
−2
−4
0
0.5
1
1.5
2
2.5
3
3.5
x 10^6
Bz (T)
1
0.5
0
−0.5
−1
0
0.5
1
1.5
2
2.5
3
3.5
Z Position (m)