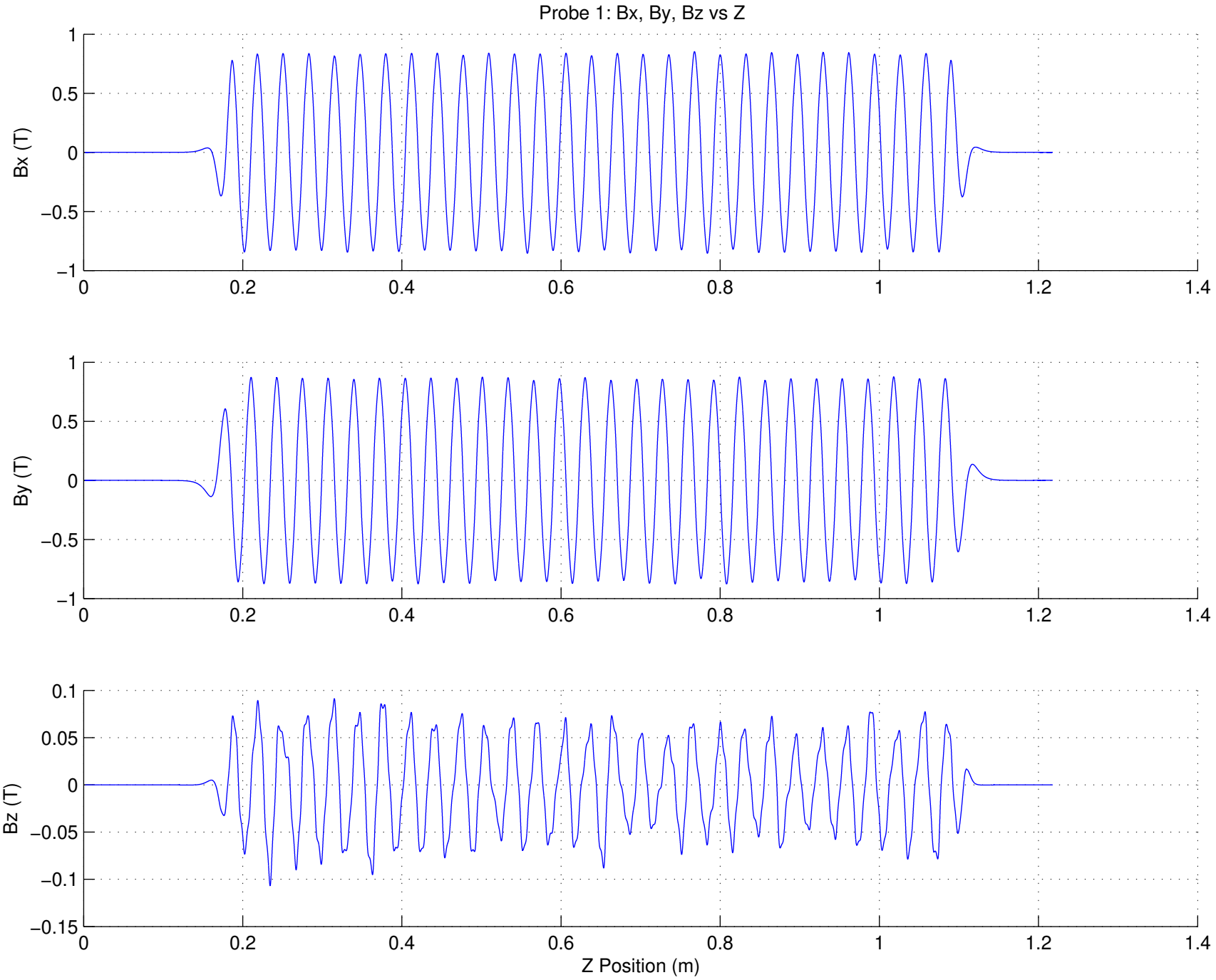
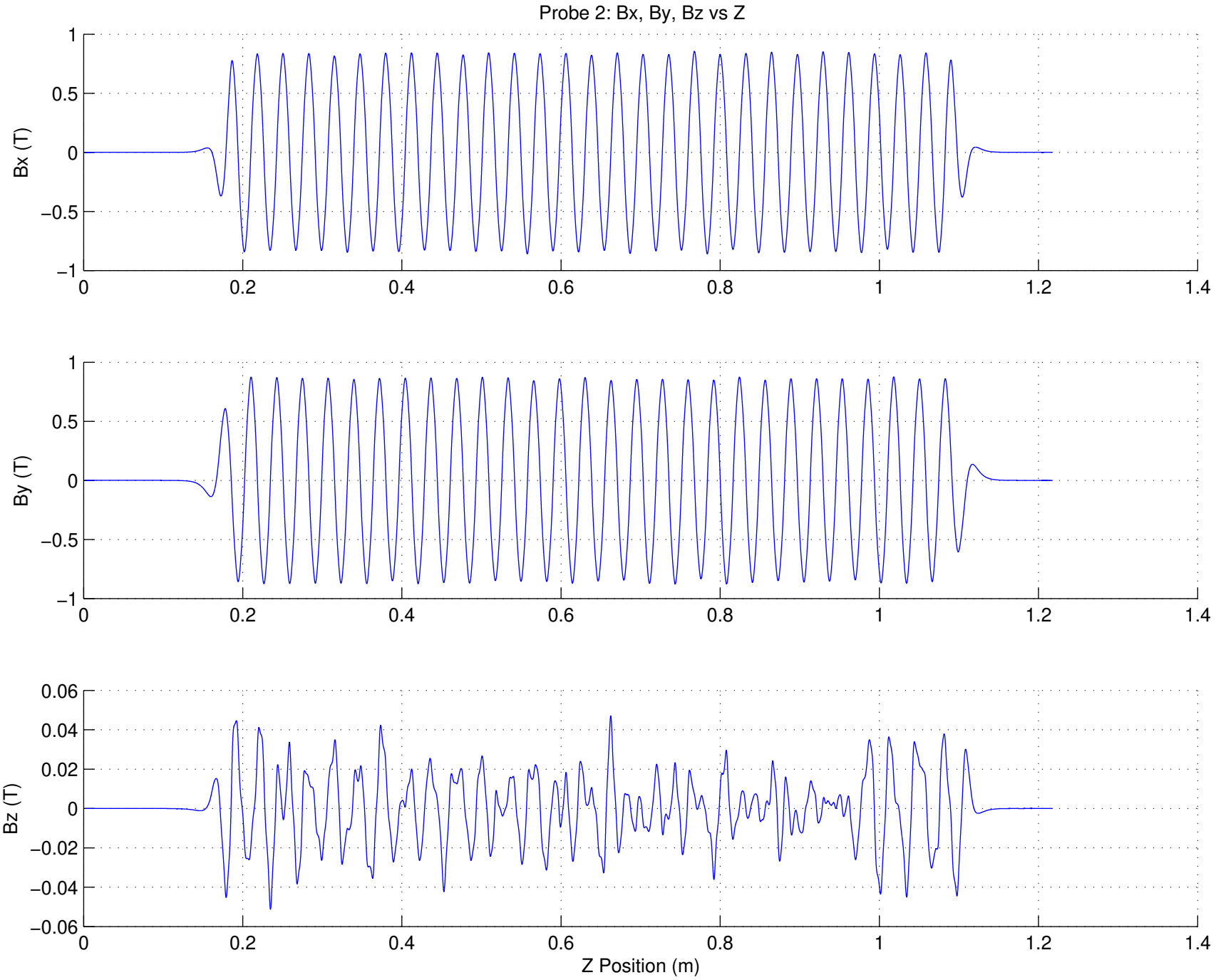
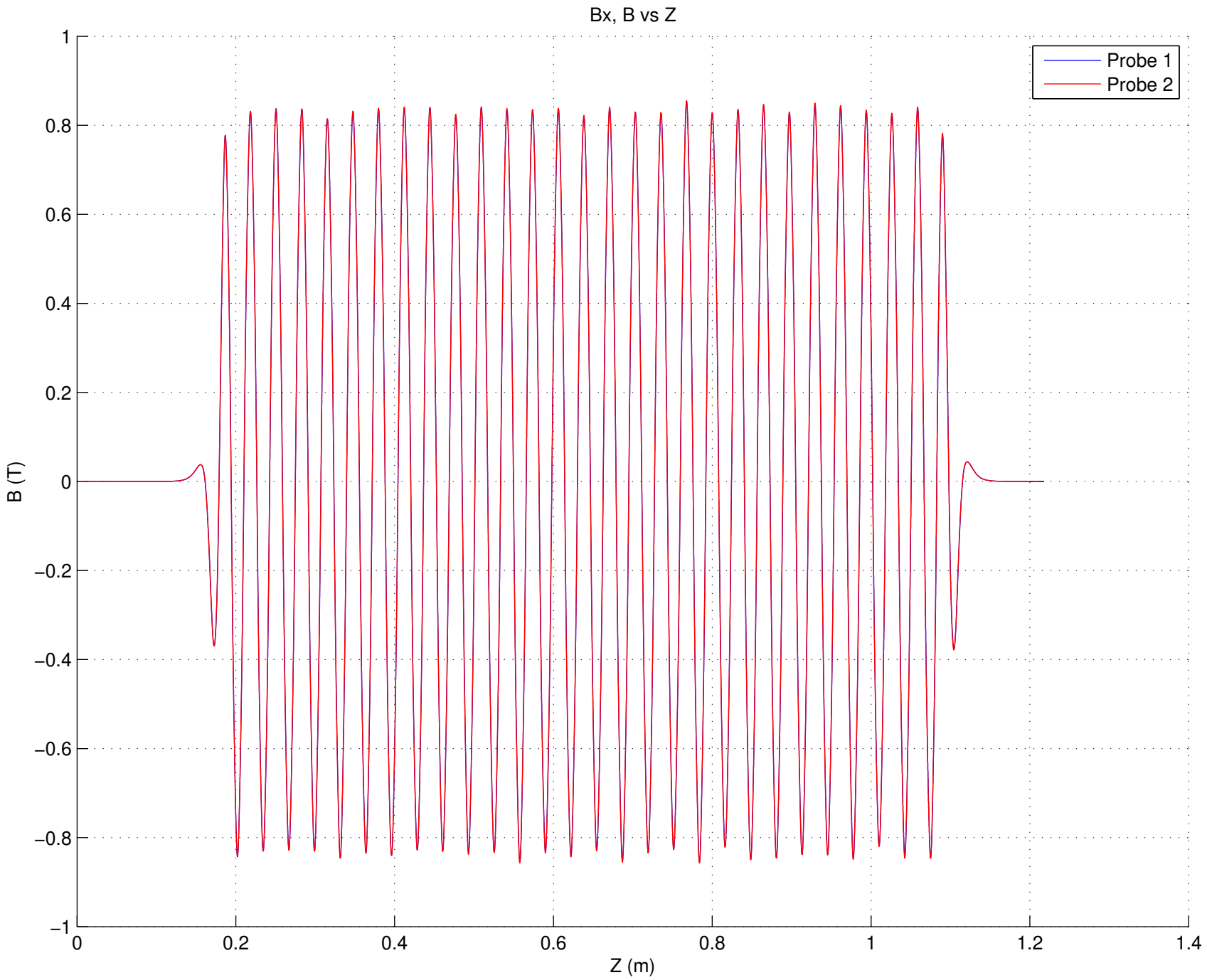
SLAC Magnetic Measurements

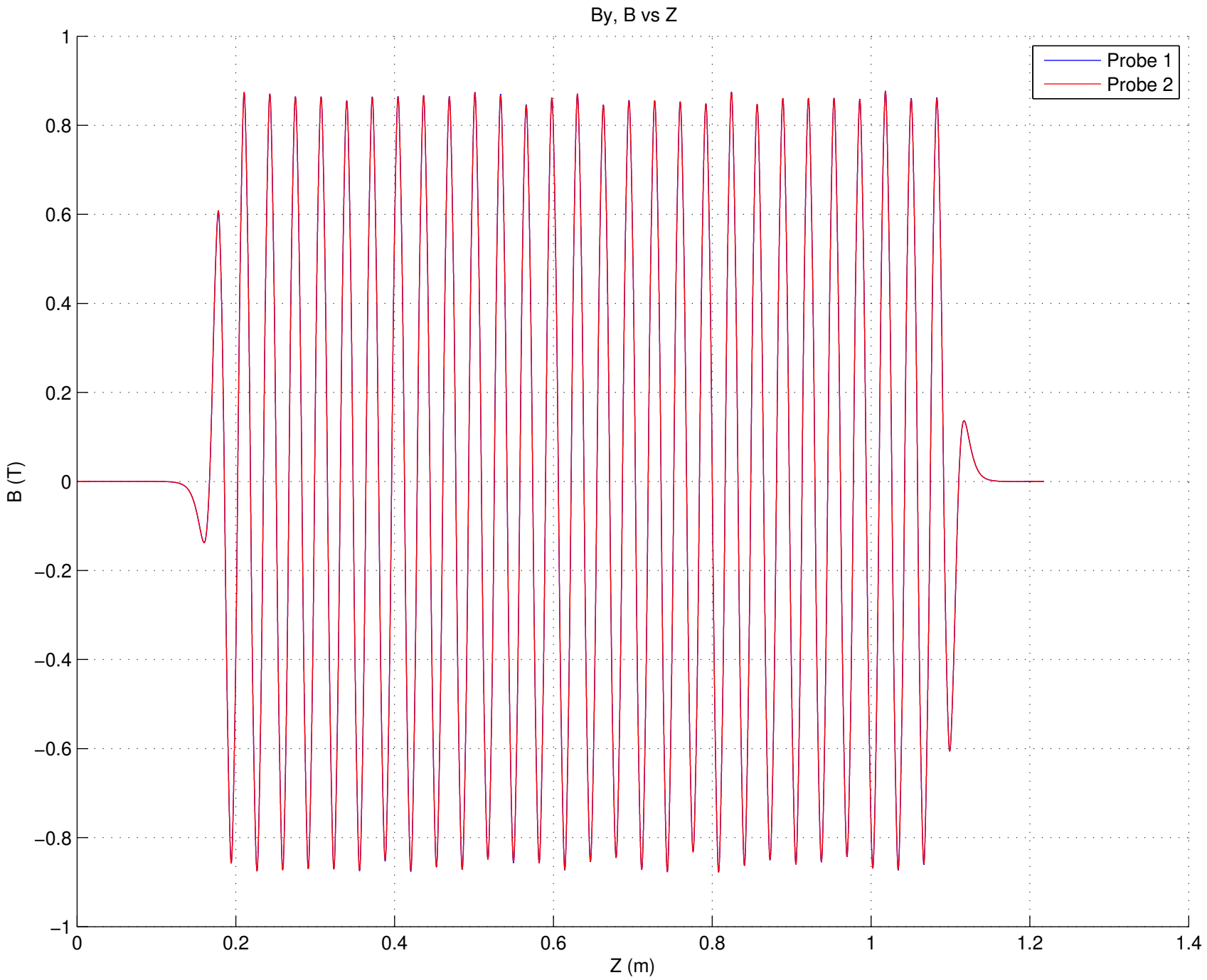
Hall Probe Array Analysis
****

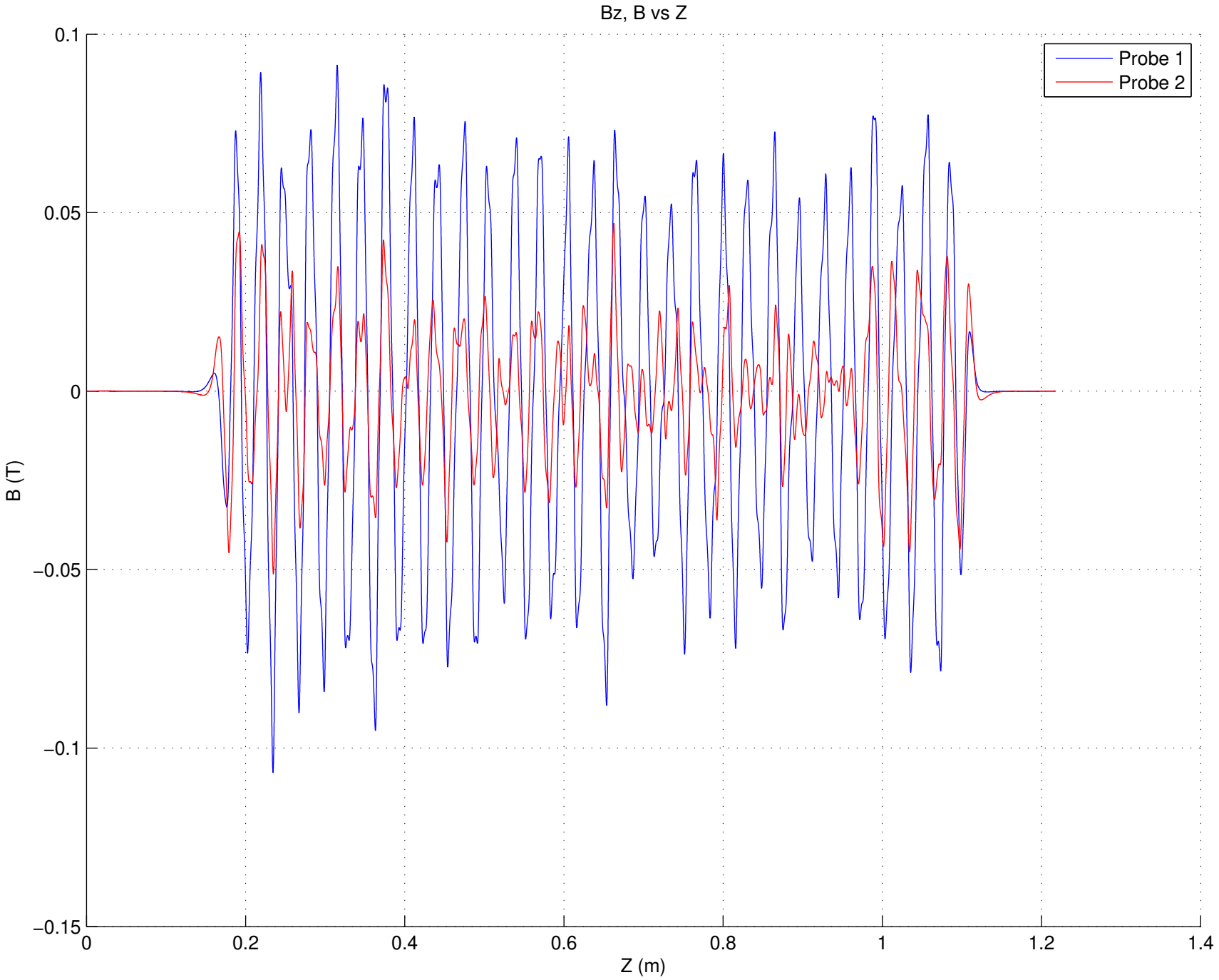
Parameters:
INPUT−FILE−DIR =s:\MagData\LCLS\Undulator\DELTA\Data\Run 577\
INPUT−FILE−NAME =DUTestStep+0.dat
INPUT−FILE−TYPE =ZVXYZVXYZH
UND−POL−MODE =LIN−POL−VERT−FIELD
PROBE1−BX−CALIB−FILE =v:\MET\MagServe\MagData\LCLS\Hall probe\SENIS−119−12\SENIS−119−12−X.ini
PROBE1−BY−CALIB−FILE =v:\MET\MagServe\MagData\LCLS\Hall 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

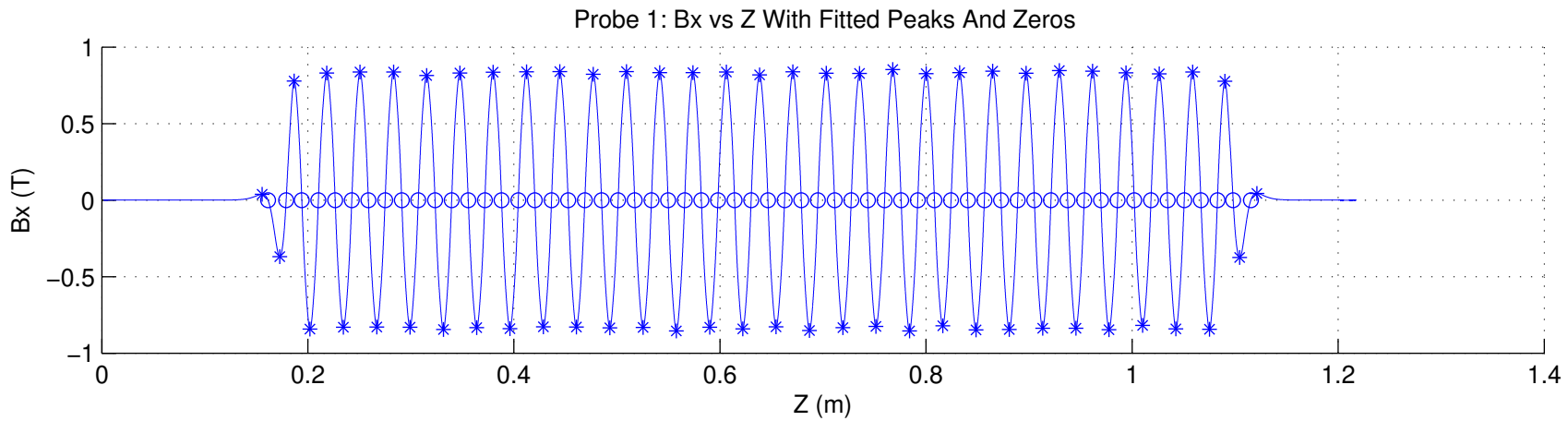

Probe 1: Bx, By, Bz vs Z
Bx (T)
By (T)
Bz (T)
Z Position (m)
1
0.5
0
−0.5
−1
0.1
0.05
−0.05
−0.1
−0.15
0
0.2
0.4
0.6
0.8
1
1.2
1.4

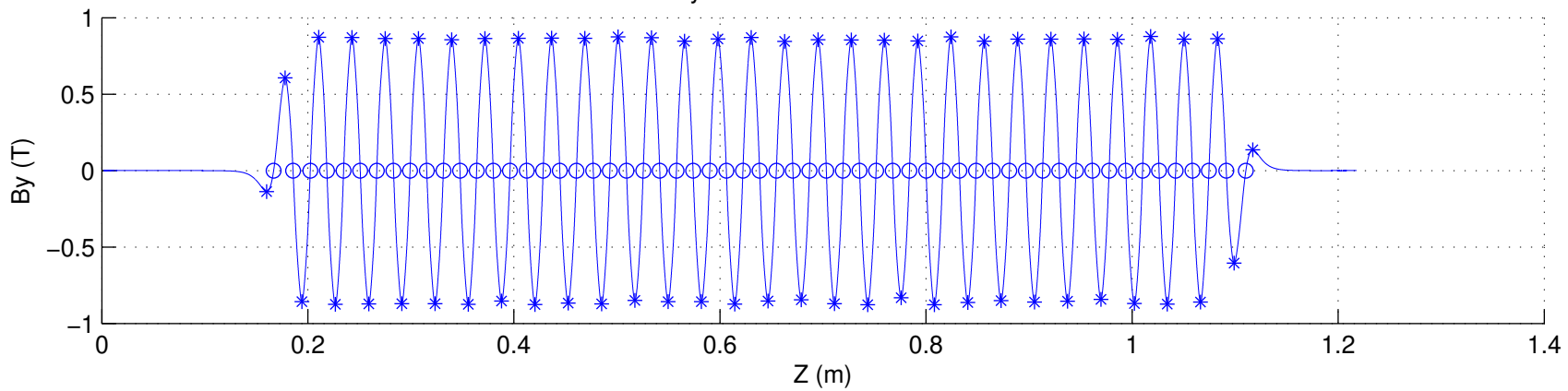

Probe 2: Bx, By, Bz vs Z
Bx (T)
By (T)
Bz (T)
Z Position (m)
1
0.5
0
−0.5
−1
0.06
0.04
0.02
−0.02
−0.04
−0.06
0
0.2
0.4
0.6
0.8
1
1.2
1.4

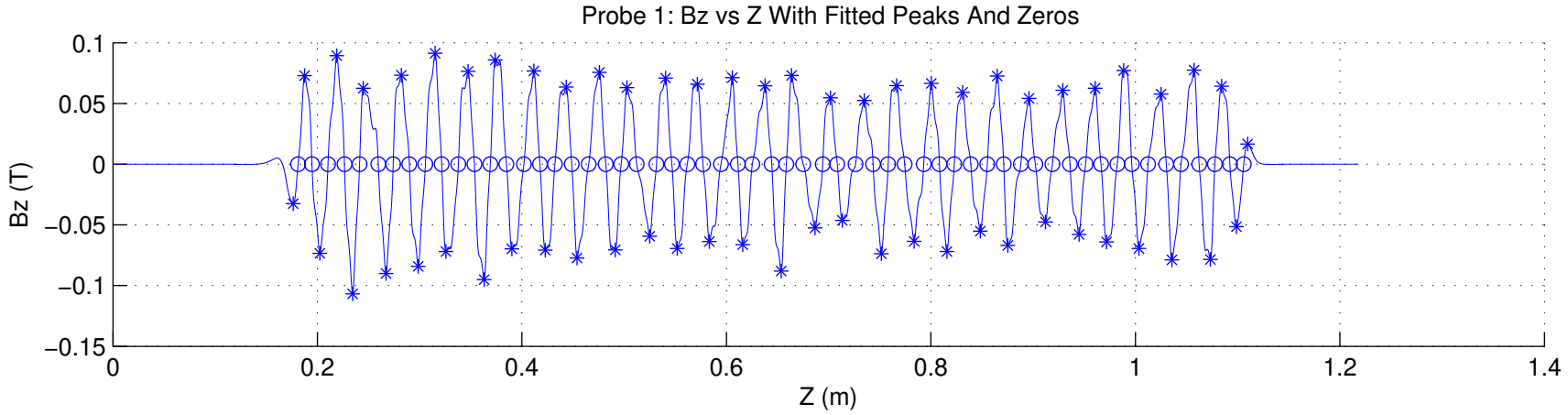

Bx, B vs Z
Probe 1
Probe 2
B (T)
Z (m)
1
0.8
0.6
0.4
0.2
0
−0.2
−0.4
−0.6
−0.8
−1
0
0.2
0.4
0.6
0.8
1
1.2
1.4

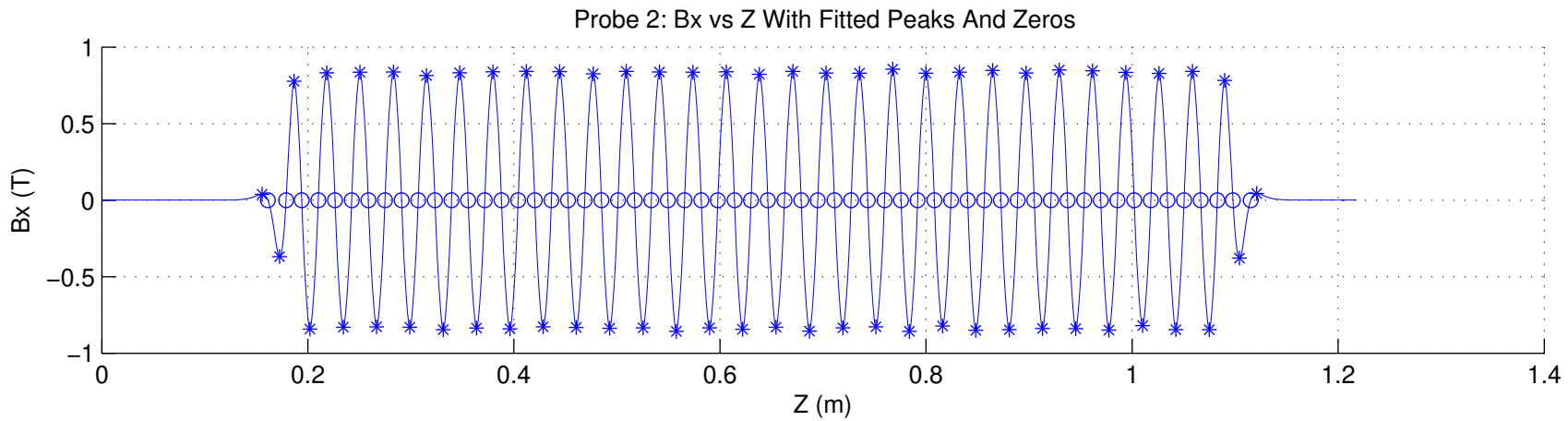

By, B vs Z
Probe 1
Probe 2
B (T)
Z (m)
1
0.8
0.6
0.4
0.2
0
−0.2
−0.4
−0.6
−0.8
−1
0
0.2
0.4
0.6
0.8
1
1.2
1.4

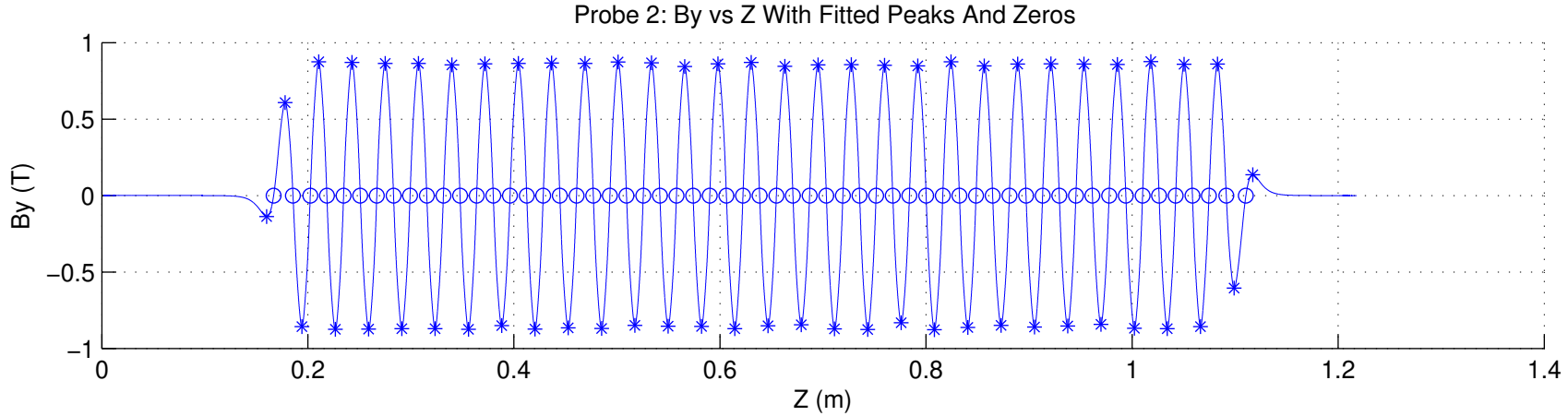

Bz, B vs Z
Probe 1
Probe 2
B (T)
Z (m)
0.1
0.05
0
−0.05
−0.1
−0.15
0
0.2
0.4
0.6
0.8
1
1.2
1.4

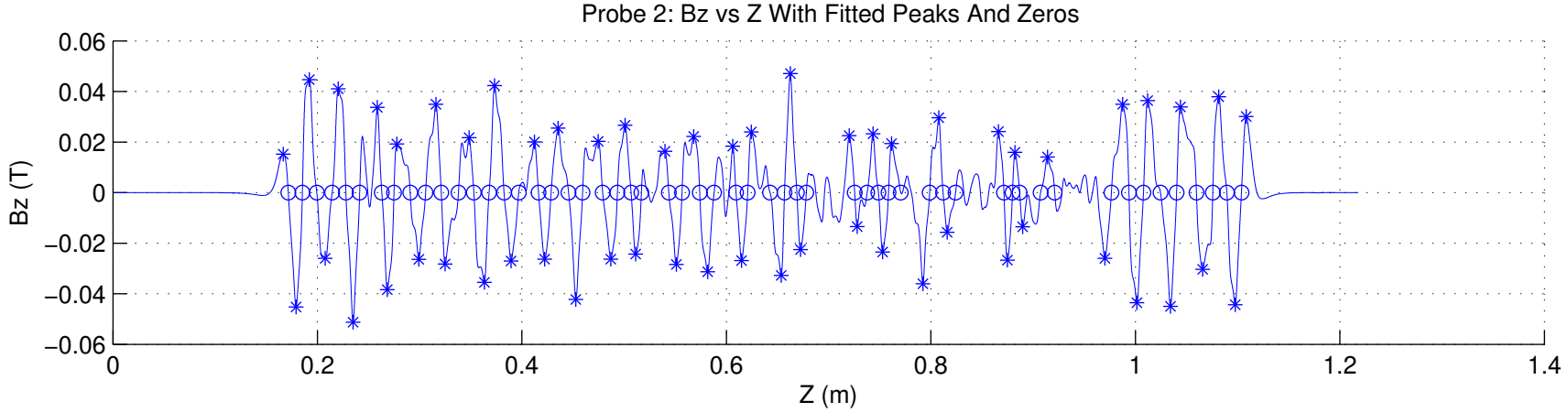

Probe 1: Bx vs Z With Fitted Peaks And Zeros
Bx (T)
Z (m)
1
0.5
0
−0.5
−1
0
0.2
0.4
0.6
0.8
1
1.2
1.4

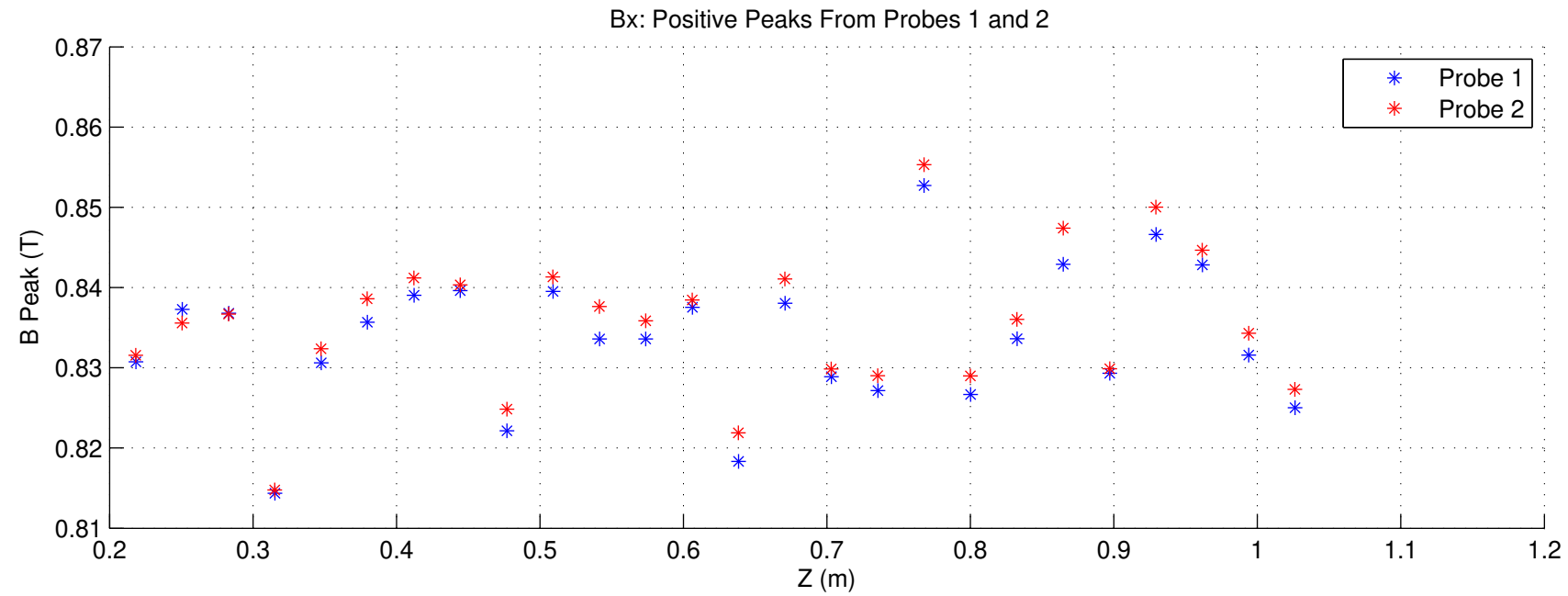

Probe 1: By vs Z With Fitted Peaks And Zeros
By (T)
Z (m)
1
0.5
0
−0.5
−1
0
0.2
0.4
0.6
0.8
1
1.2
1.4

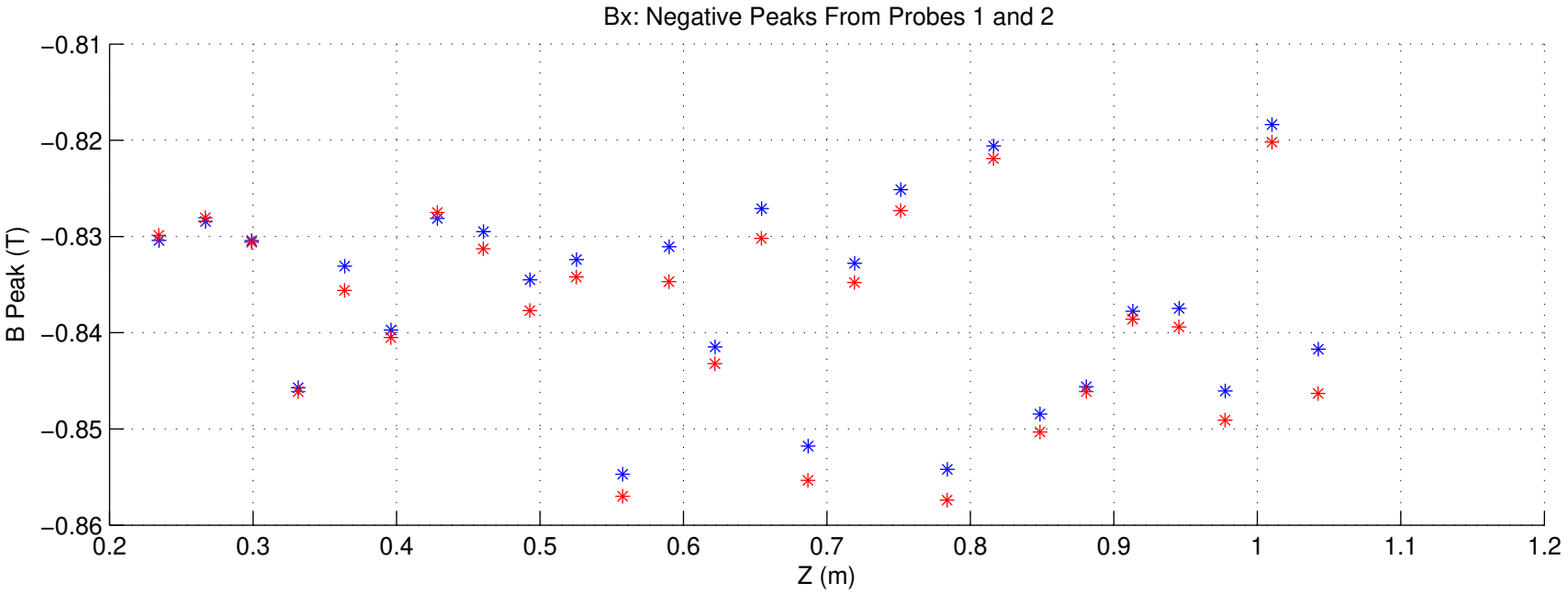

Probe 1: Bz vs Z With Fitted Peaks And Zeros
Bz (T)
Z (m)
0.1
0.05
0
−0.05
−0.1
−0.15
0
0.2
0.4
0.6
0.8
1
1.2
1.4

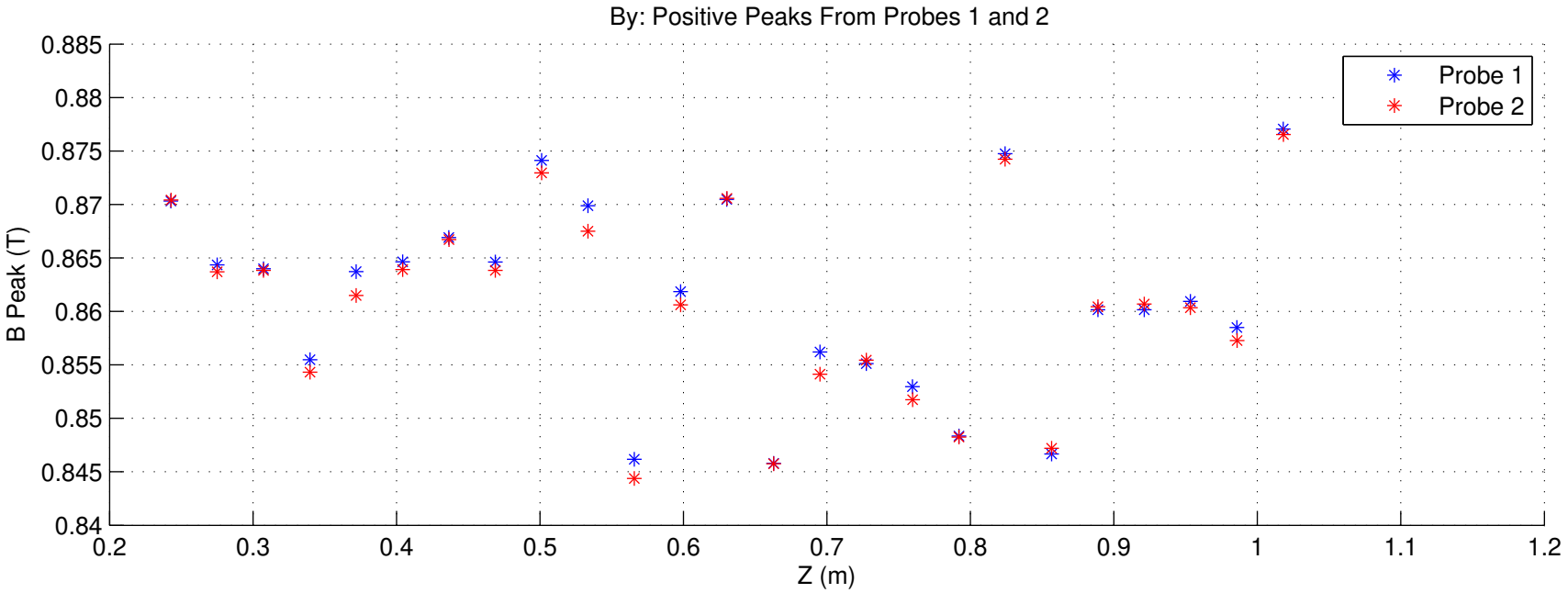

Probe 2: Bx vs Z With Fitted Peaks And Zeros
Bx (T)
Z (m)
1
0.5
0
−0.5
−1
0
0.2
0.4
0.6
0.8
1
1.2
1.4

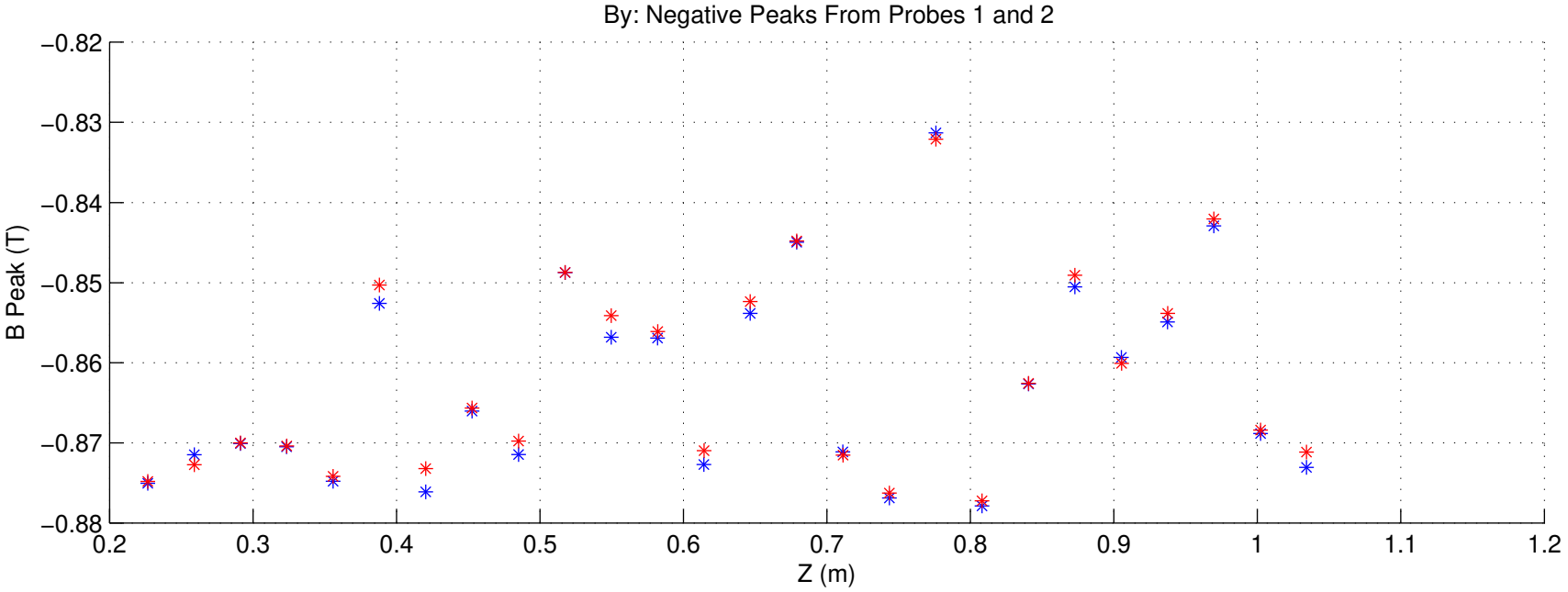

Probe 2: By vs Z With Fitted Peaks And Zeros
By (T)
Z (m)
1
0.5
0
−0.5
−1
0
0.2
0.4
0.6
0.8
1
1.2
1.4

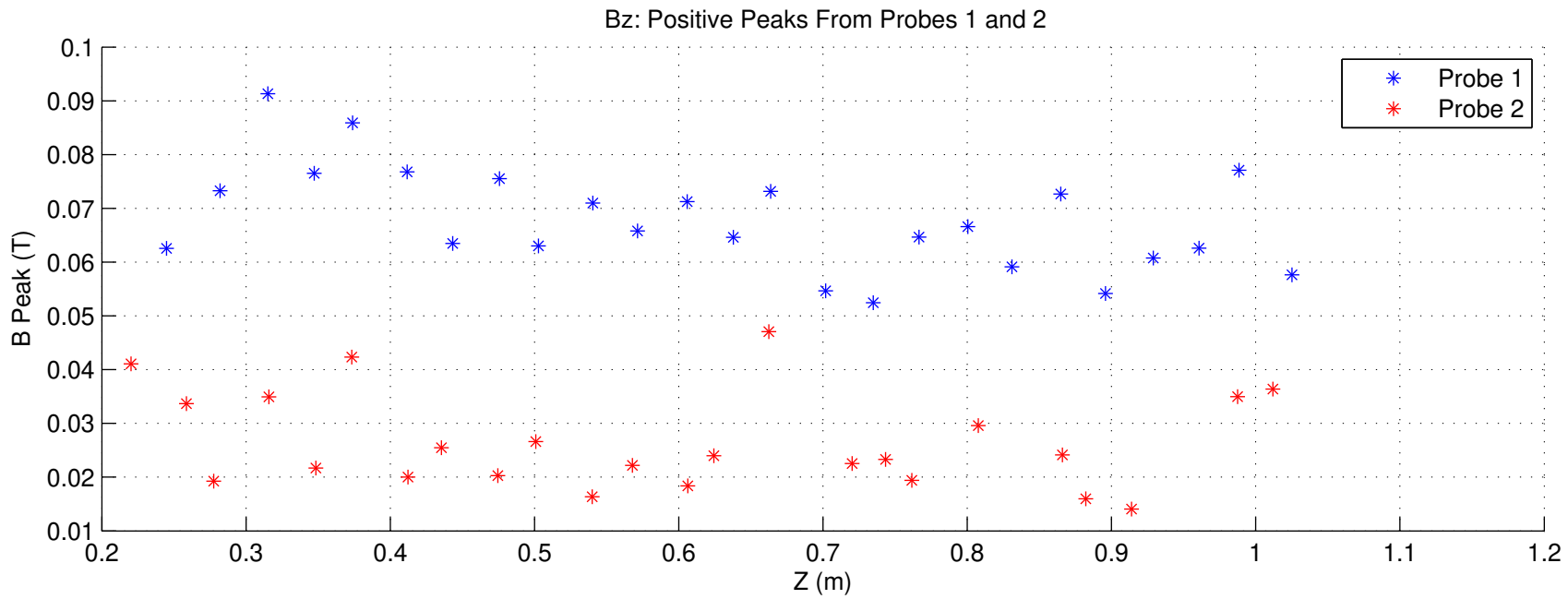

Probe 2: Bz vs Z With Fitted Peaks And Zeros
Bz (T)
Z (m)
0.06
0.04
0.02
0
−0.02
−0.04
−0.06
0
0.2
0.4
0.6
0.8
1
1.2
1.4

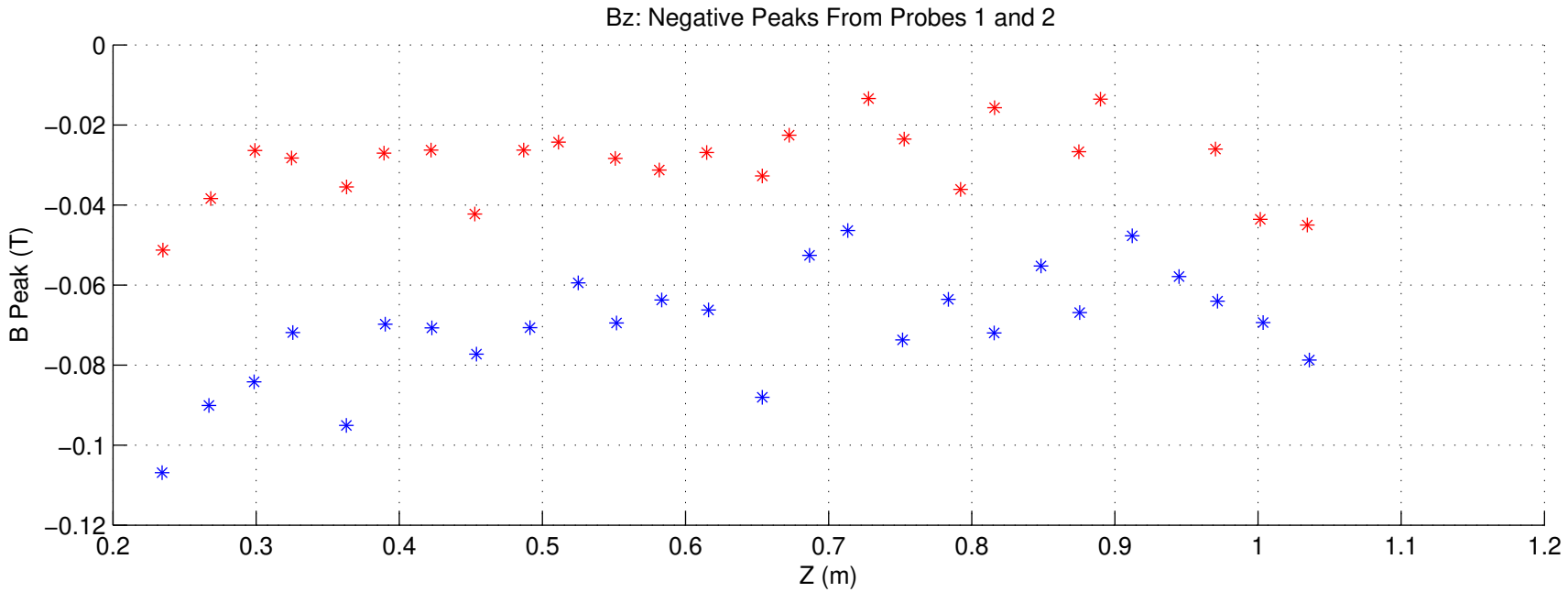

Bx: Positive Peaks From Probes 1 and 2
Probe 1
Probe 2
B Peak (T)
Z (m)
0.87
0.86
0.85
0.84
0.83
0.82
0.81
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
1.1
1.2

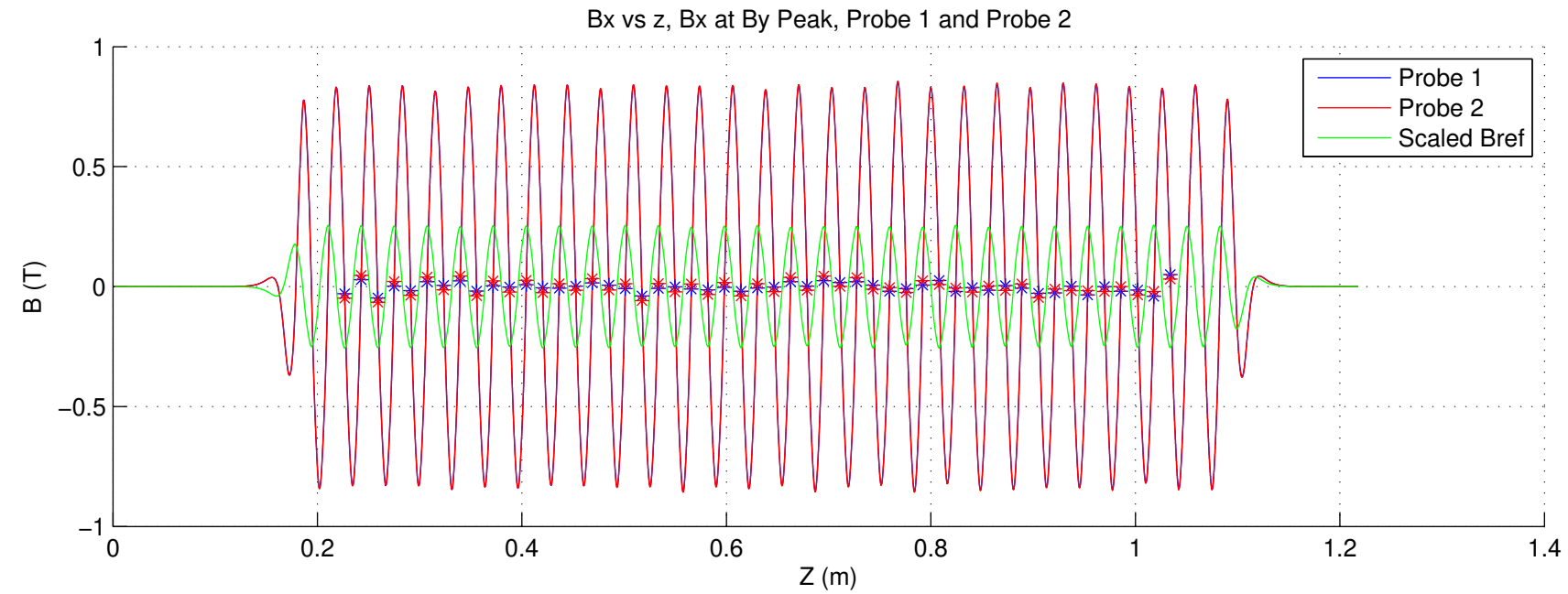

Bx: Negative Peaks From Probes 1 and 2
B Peak (T)
Z (m)
−0.81
−0.82
−0.83
−0.84
−0.85
−0.86
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
1.1
1.2

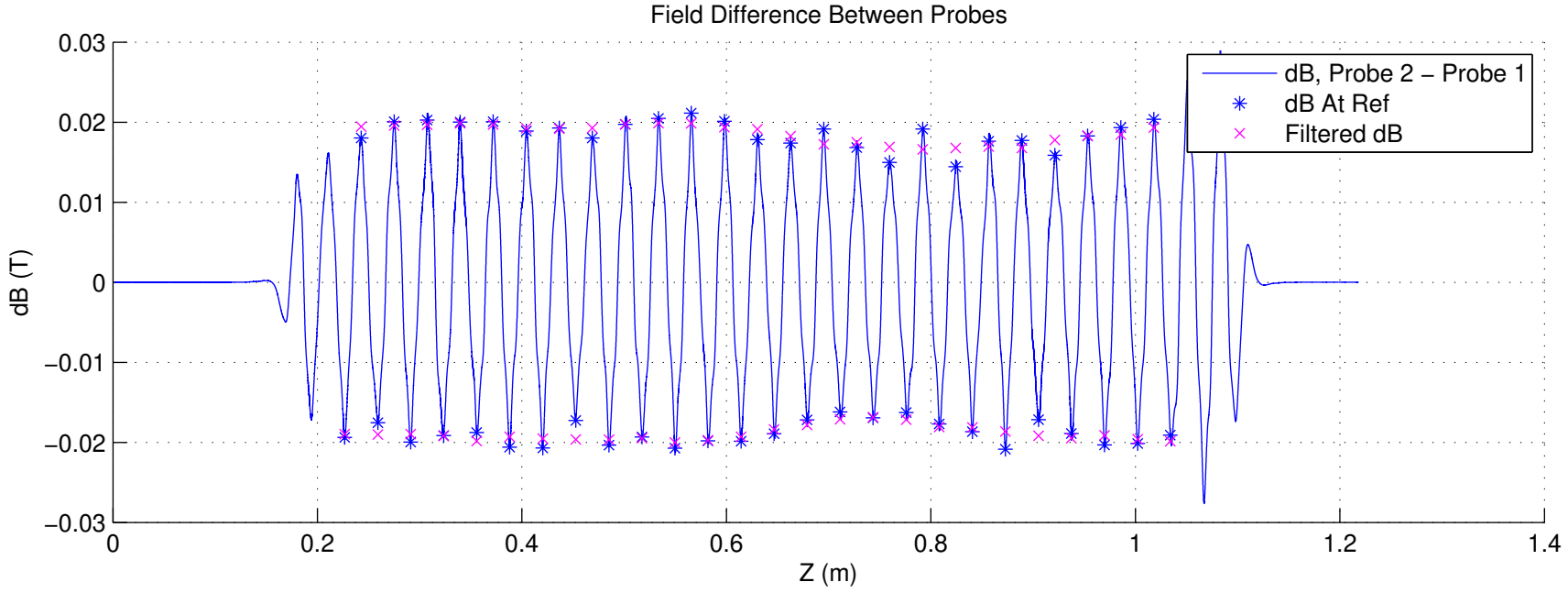

By: Positive Peaks From Probes 1 and 2
Probe 1
Probe 2
B Peak (T)
Z (m)
0.885
0.88
0.875
0.87
0.865
0.86
0.855
0.85
0.845
0.84
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
1.1
1.2

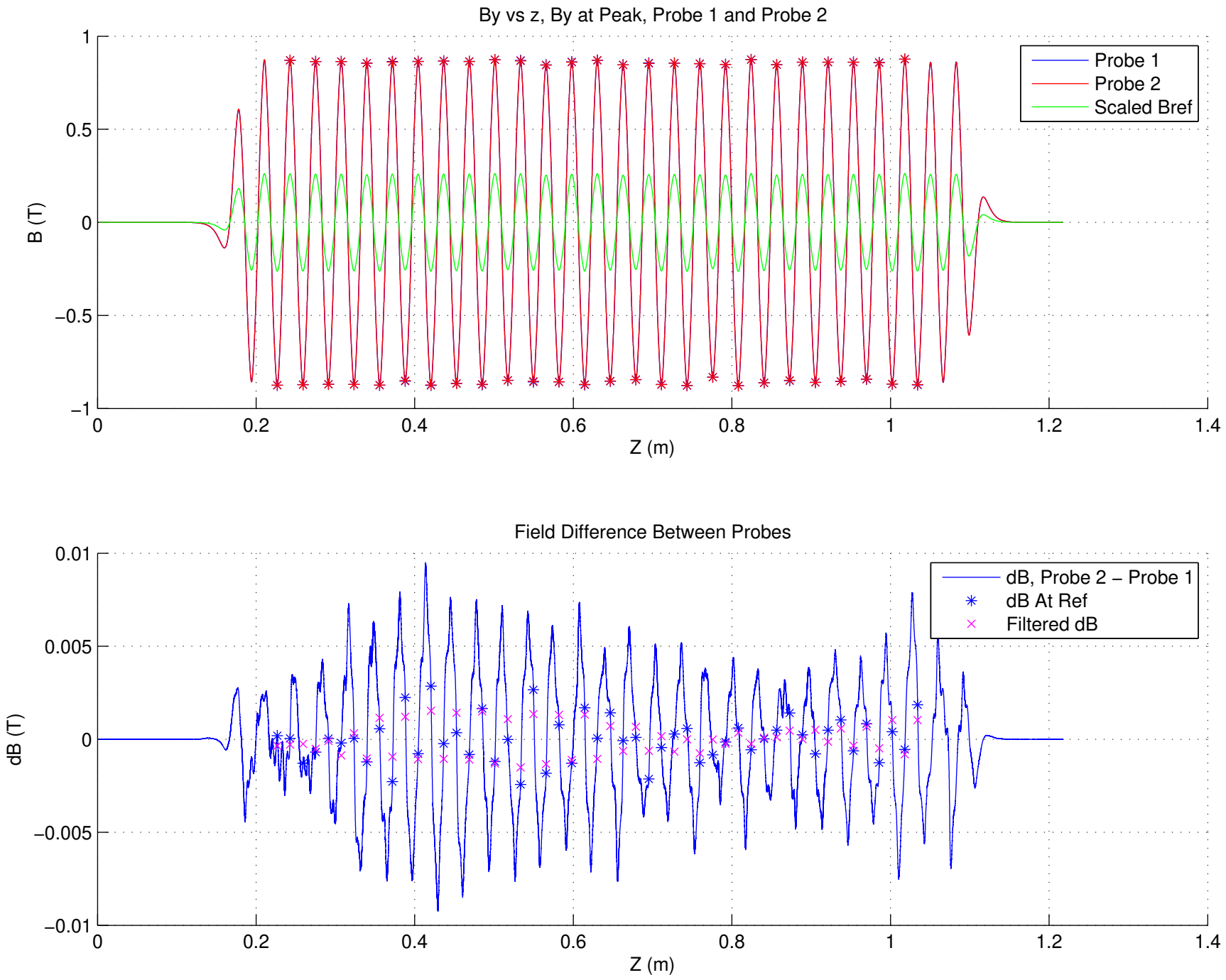

By: Negative Peaks From Probes 1 and 2
B Peak (T)
Z (m)
−0.82
−0.83
−0.84
−0.85
−0.86
−0.87
−0.88
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
1.1
1.2

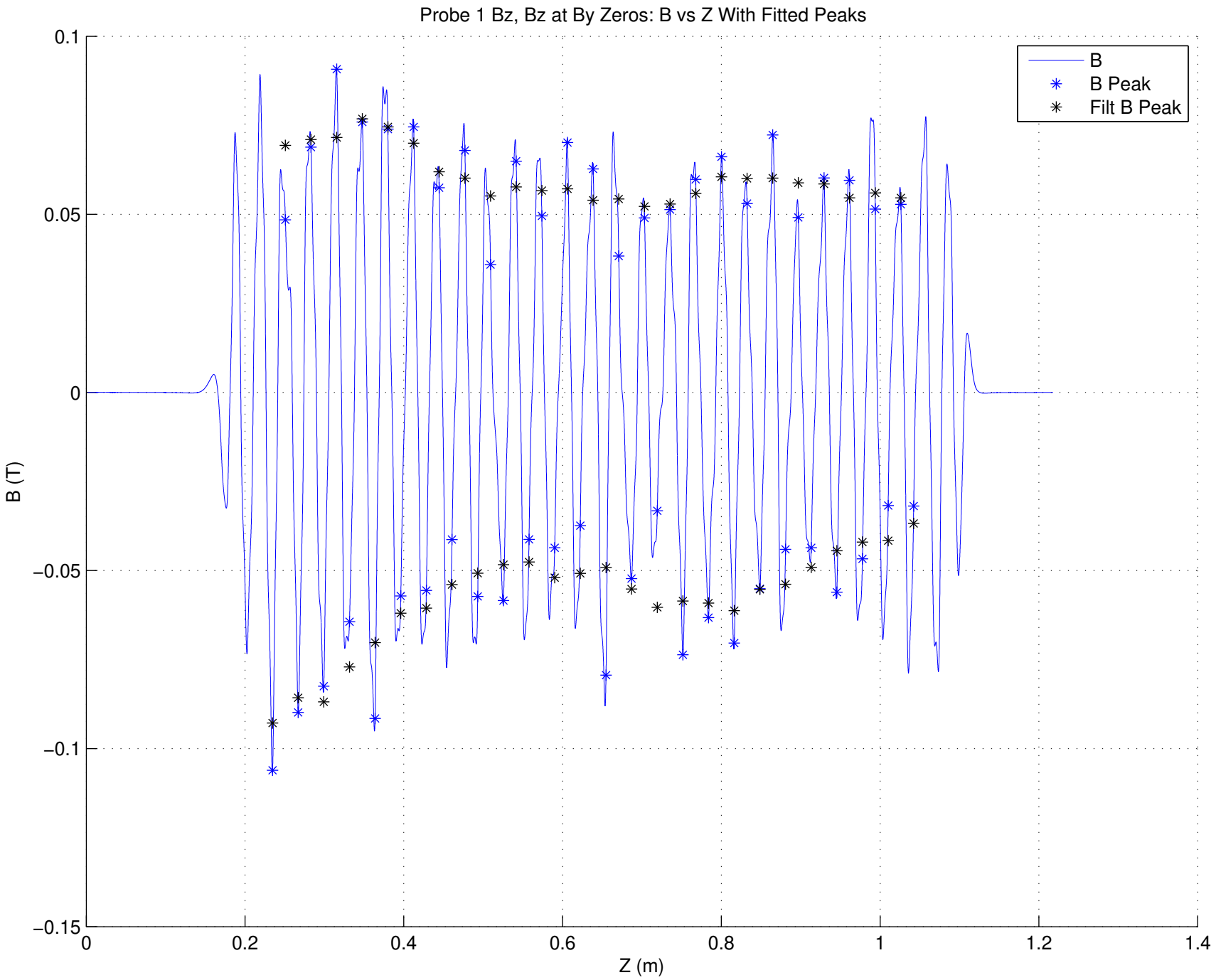

Bz: Positive Peaks From Probes 1 and 2
Probe 1
Probe 2
B Peak (T)
Z (m)
0.1
0.09
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
1.1
1.2

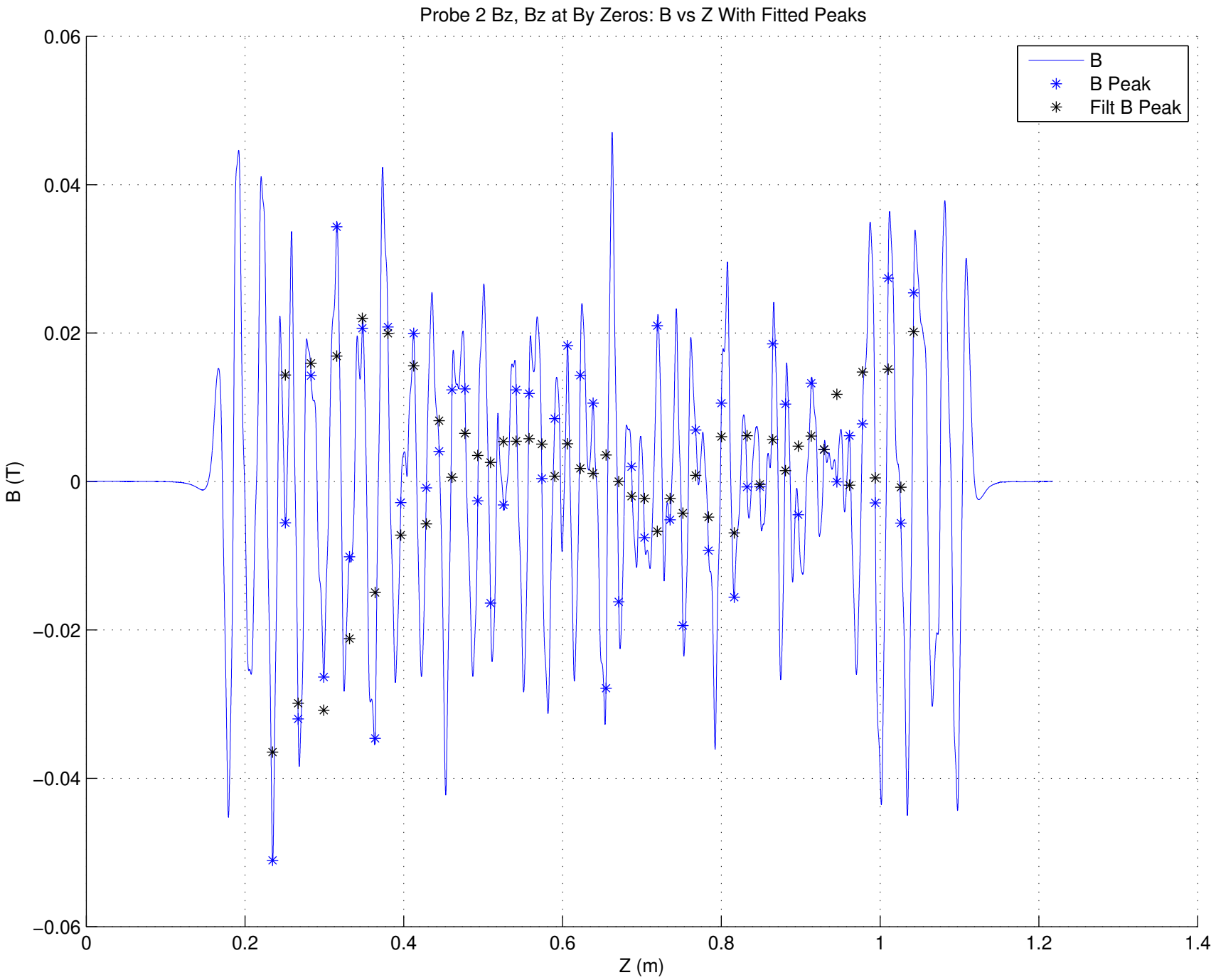

Bz: Negative Peaks From Probes 1 and 2
B Peak (T)
Z (m)
0
−0.02
−0.04
−0.06
−0.08
−0.1
−0.12
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
1.1
1.2

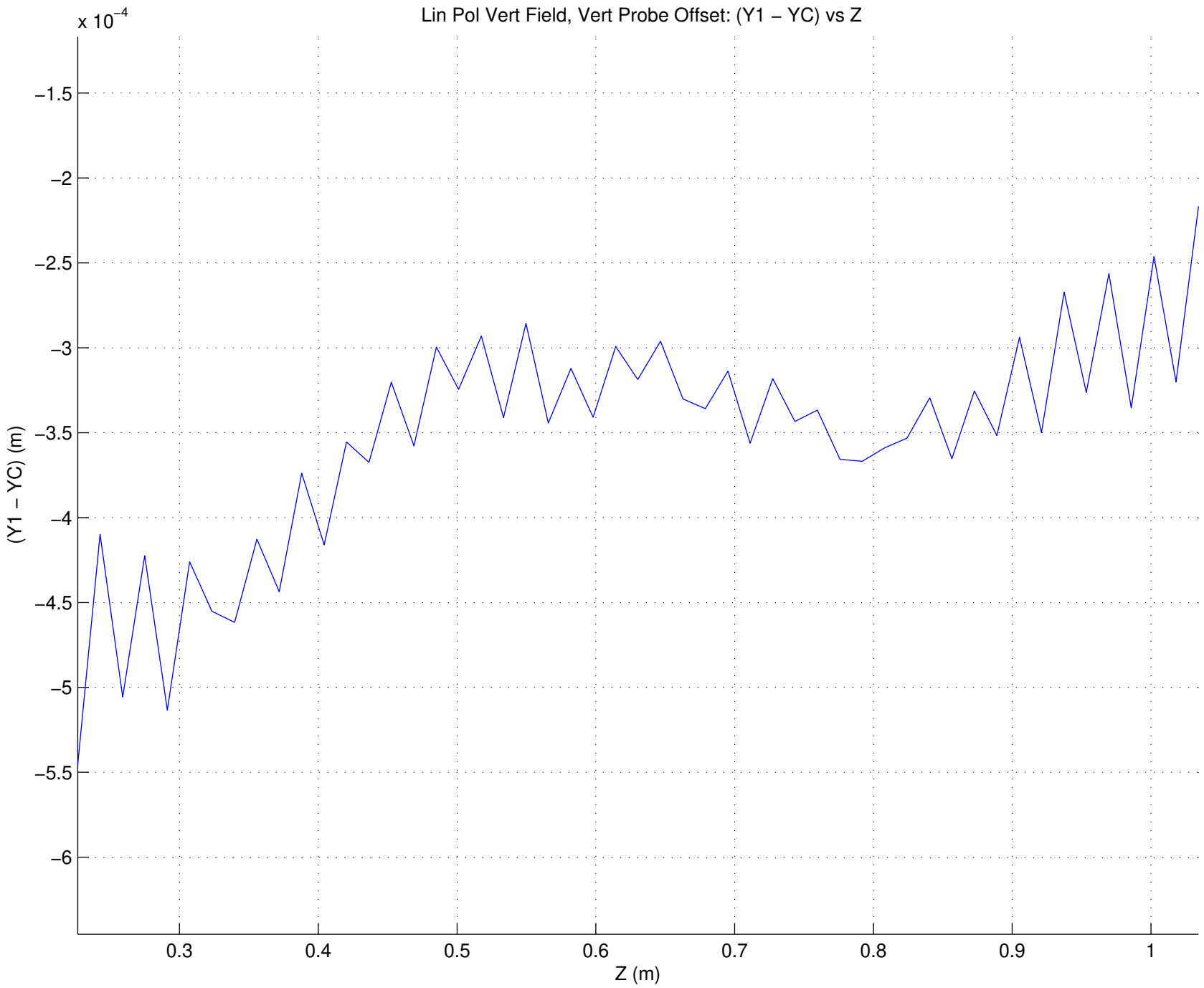

Bx vs z, Bx at By Peak, Probe 1 and Probe 2
Probe 1
Probe 2
Scaled Bref
B (T)
Z (m)
1
0.5
0
−0.5
−1
0
0.2
0.4
0.6
0.8
1
1.2
1.4

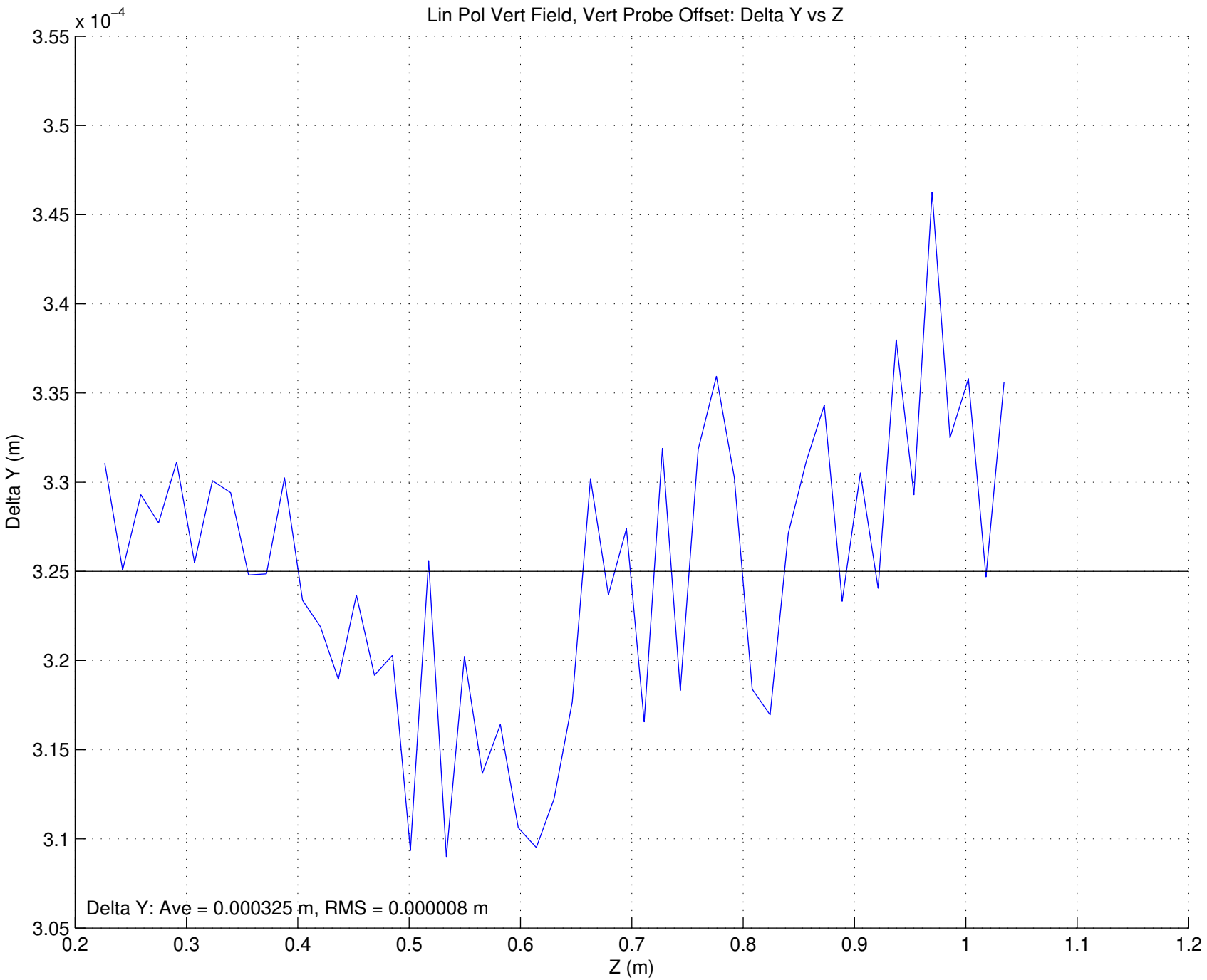

Field Difference Between Probes
dB, Probe 2 – Probe 1
dB At Ref
Filtered dB
dB (T)
Z (m)
0.03
0.02
0.01
0
−0.01
−0.02
−0.03
0
0.2
0.4
0.6
0.8
1
1.2
1.4

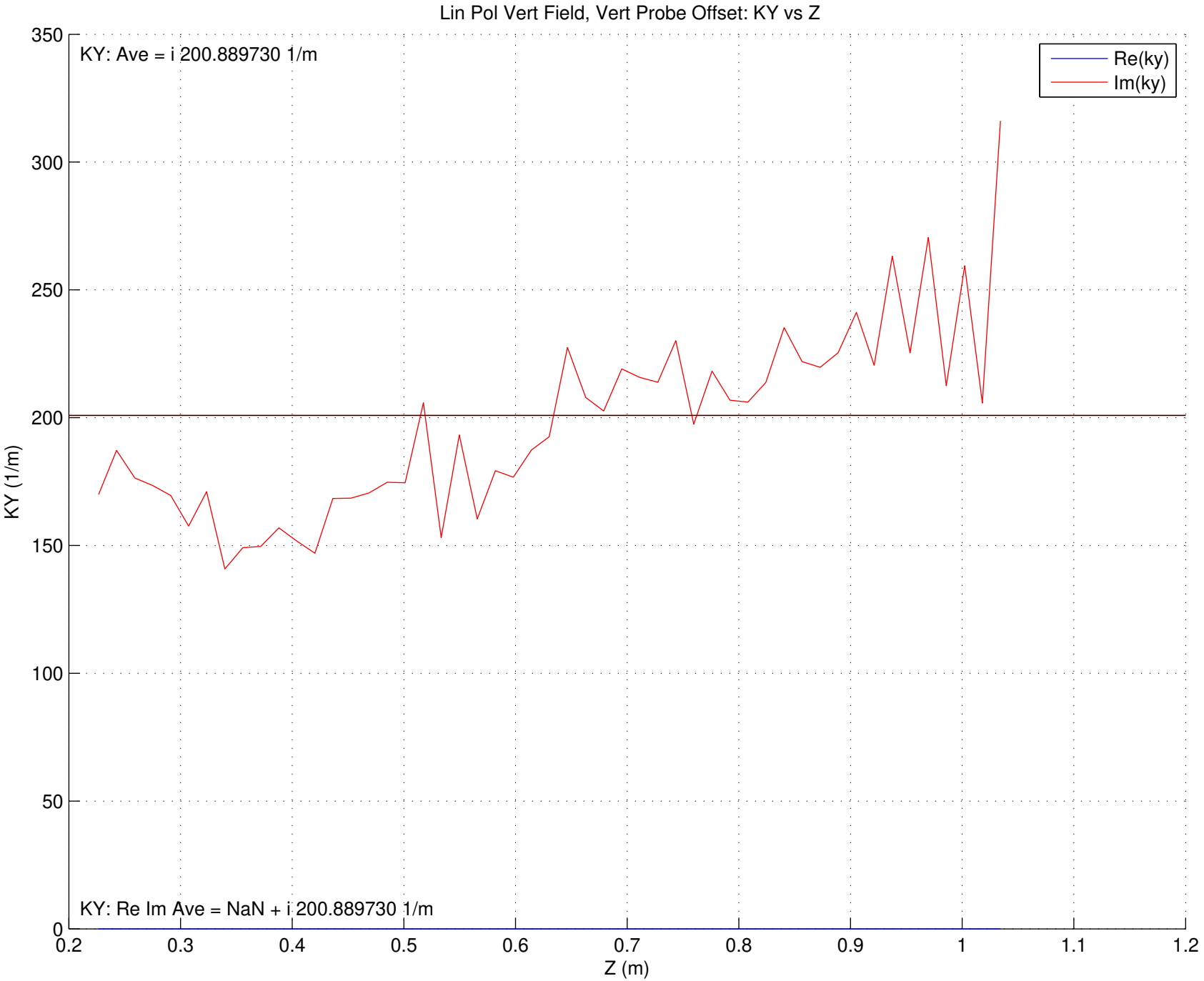

By vs z, By at Peak, Probe 1 and Probe 2
Probe 1
Probe 2
Scaled Bref
B (T)
Z (m)
1
0.5
0
−0.5
−1
0
0.2
0.4
0.6
0.8
1
1.2
1.4
Field Difference Between Probes
dB, Probe 2 – Probe 1
dB At Ref
Filtered dB
dB (T)
Z (m)
0.01
0.005
0
−0.005
−0.01

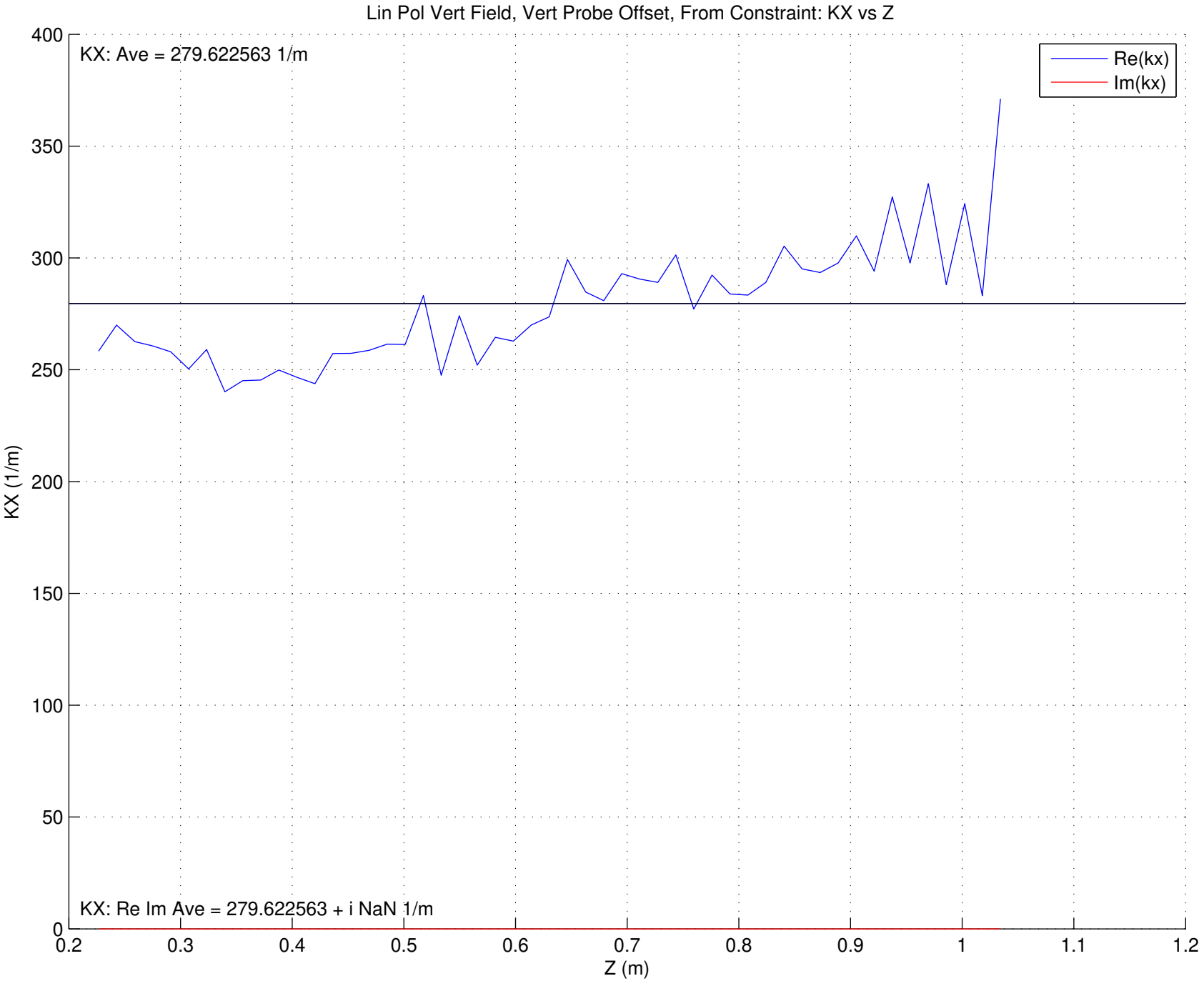

Probe 1 Bz, Bz at By Zeros: B vs Z With Fitted Peaks
B
B Peak
Filt B Peak
B (T)
Z (m)
0.1
0.05
0
−0.05
−0.1
−0.15
0
0.2
0.4
0.6
0.8
1
1.2
1.4

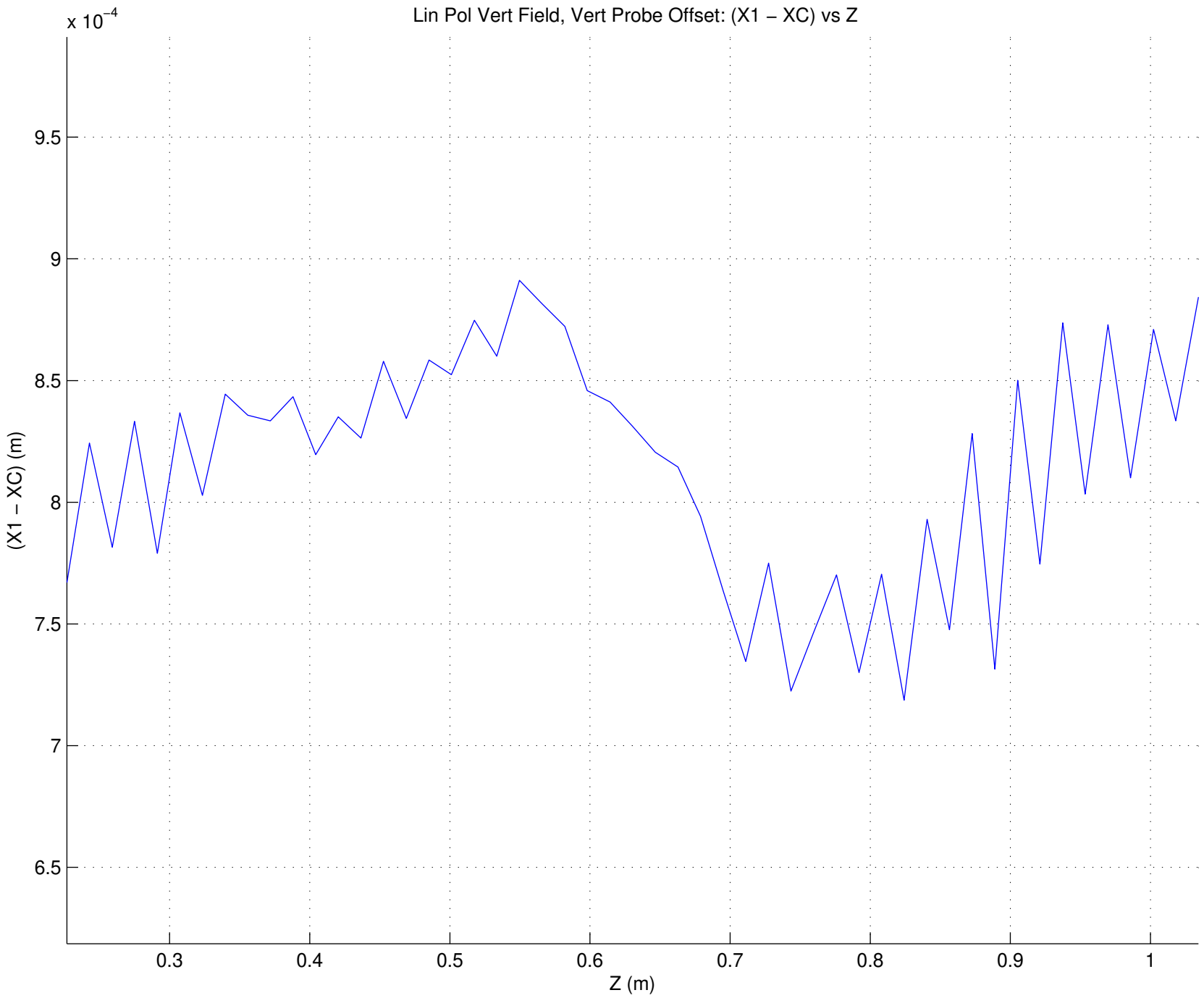

Probe 2 Bz, Bz at By Zeros: B vs Z With Fitted Peaks
B
B Peak
Filt B Peak
B (T)
Z (m)
0.06
0.04
0.02
0
−0.02
−0.04
−0.06
0
0.2
0.4
0.6
0.8
1
1.2
1.4

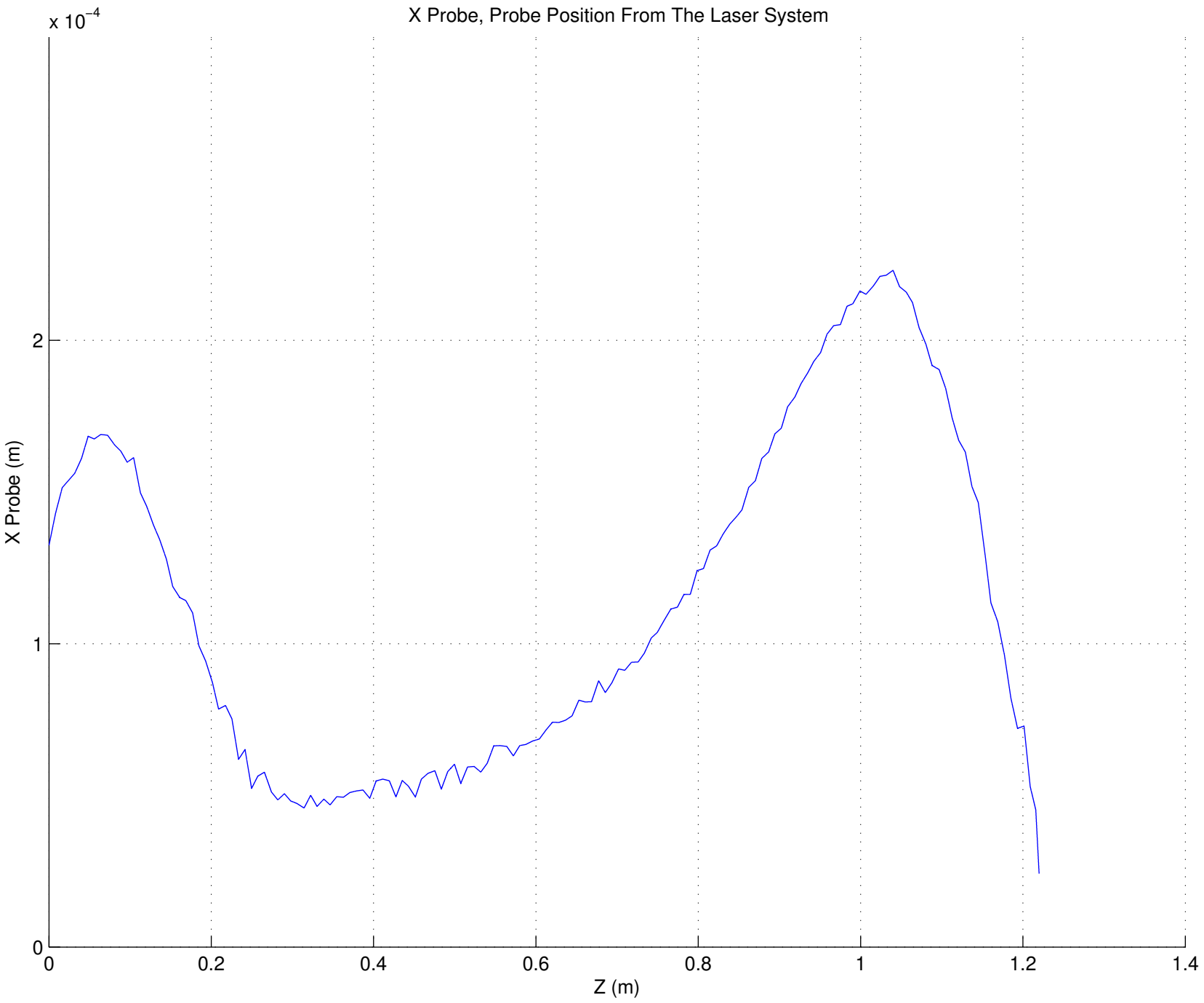

Lin Pol Vert Field, Vert Probe Offset: (Y1 – YC) vs Z
x 10^-4
(Y1 – YC) (m)
Z (m)
–1.5
–2
–2.5
–3
–3.5
–4
–4.5
–5
–5.5
–6
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1

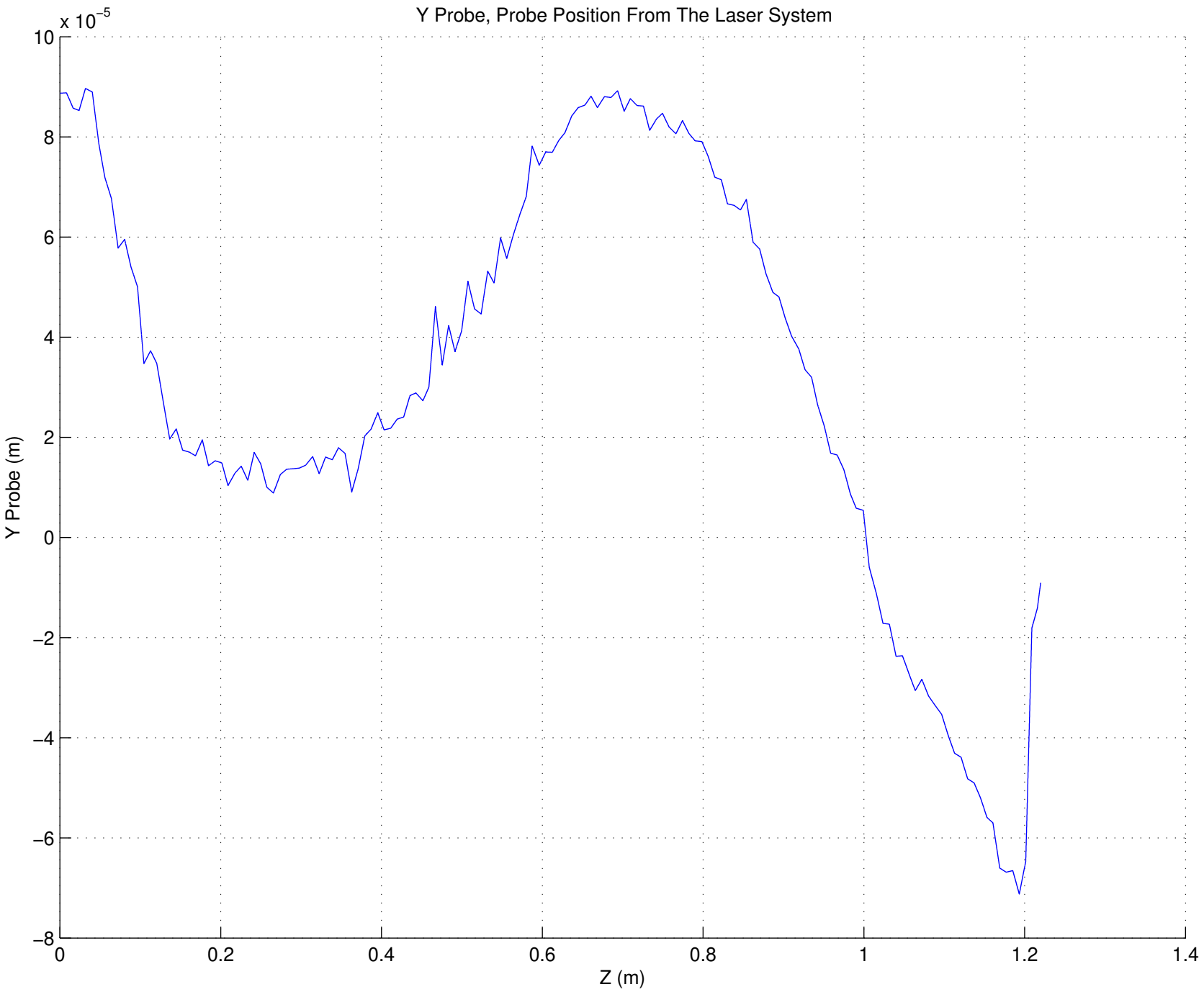

Lin Pol Vert Field, Vert Probe Offset: Delta Y vs Z
x 10^-4
3.55
3.5
3.45
3.4
3.35
3.3
3.25
3.2
3.15
3.1
3.05
Delta Y (m)
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
1.1
1.2
Z (m)
Delta Y: Ave = 0.000325 m, RMS = 0.000008 m

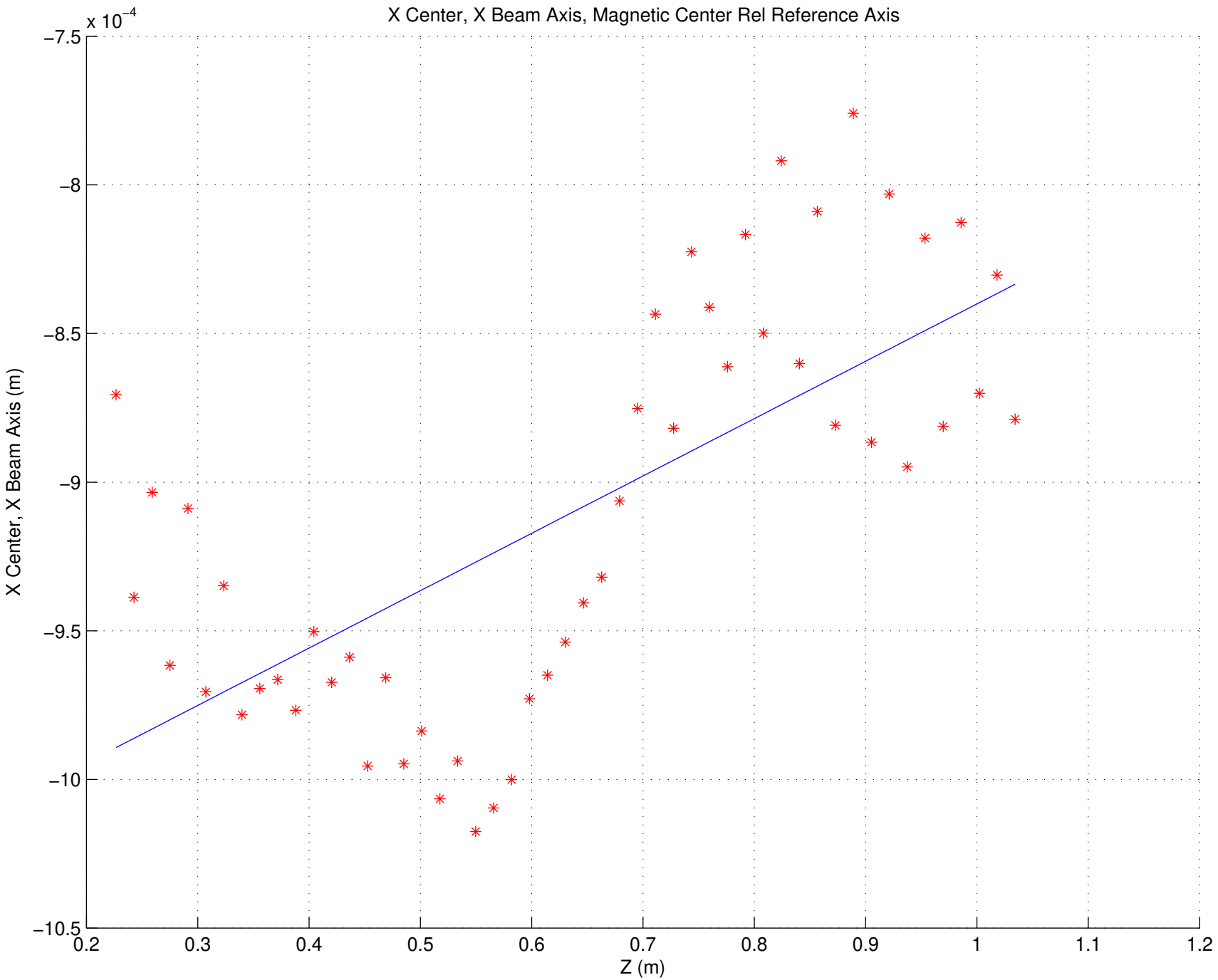

Lin Pol Vert Field, Vert Probe Offset: KY vs Z
KY: Ave = i 200.889730 1/m
KY: Re Im Ave = NaN + i 200.889730 1/m
Re(ky)
Im(ky)
KY (1/m)
Z (m)
350
300
250
200
150
100
50
0
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
1.1
1.2

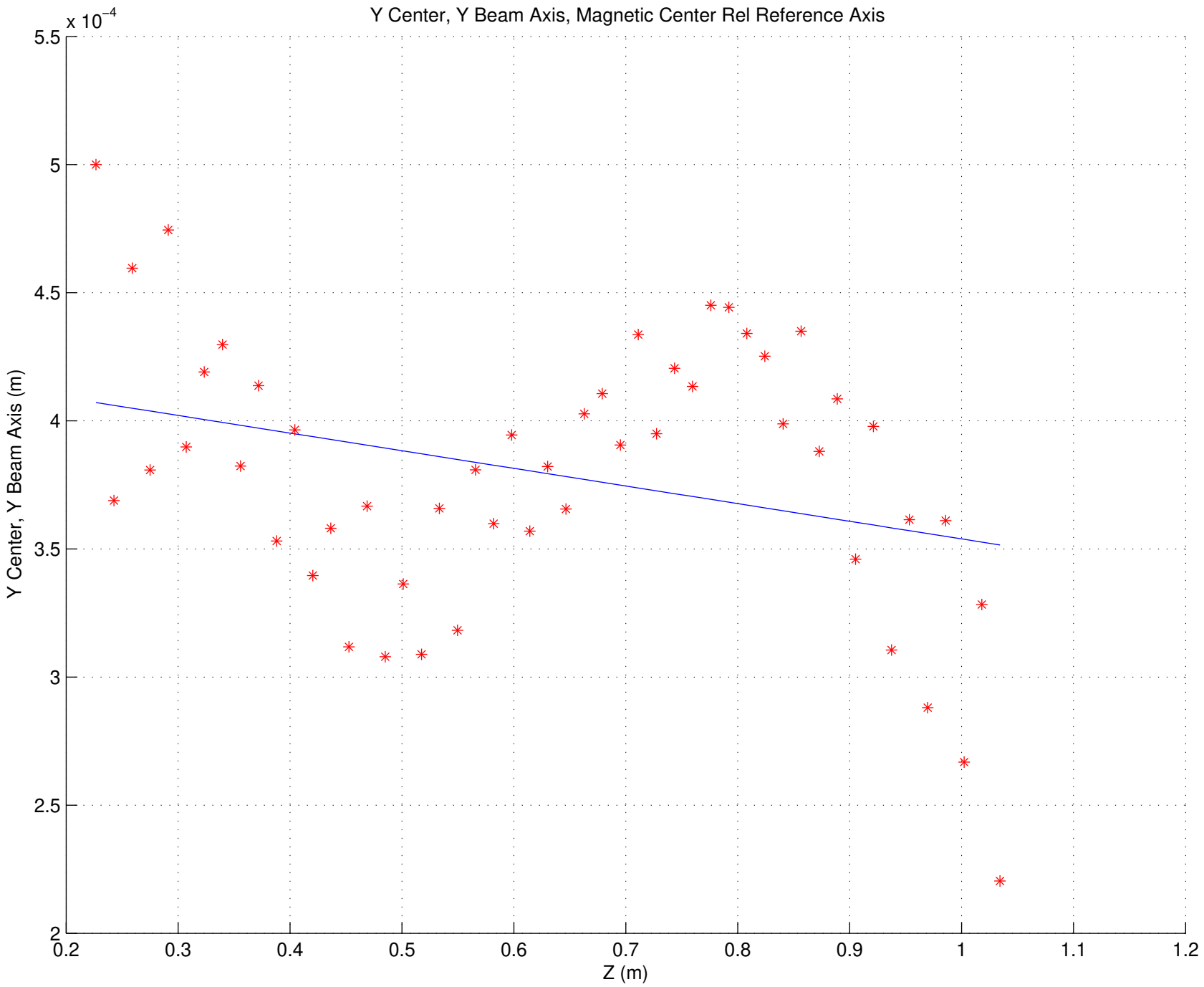

Lin Pol Vert Field, Vert Probe Offset, From Constraint: KX vs Z
KX: Ave = 279.622563 1/m
Re(kx)
Im(kx)
KX: Re Im Ave = 279.622563 + i NaN 1/m
KX (1/m)
Z (m)
400
350
300
250
200
150
100
50
0
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
1.1
1.2

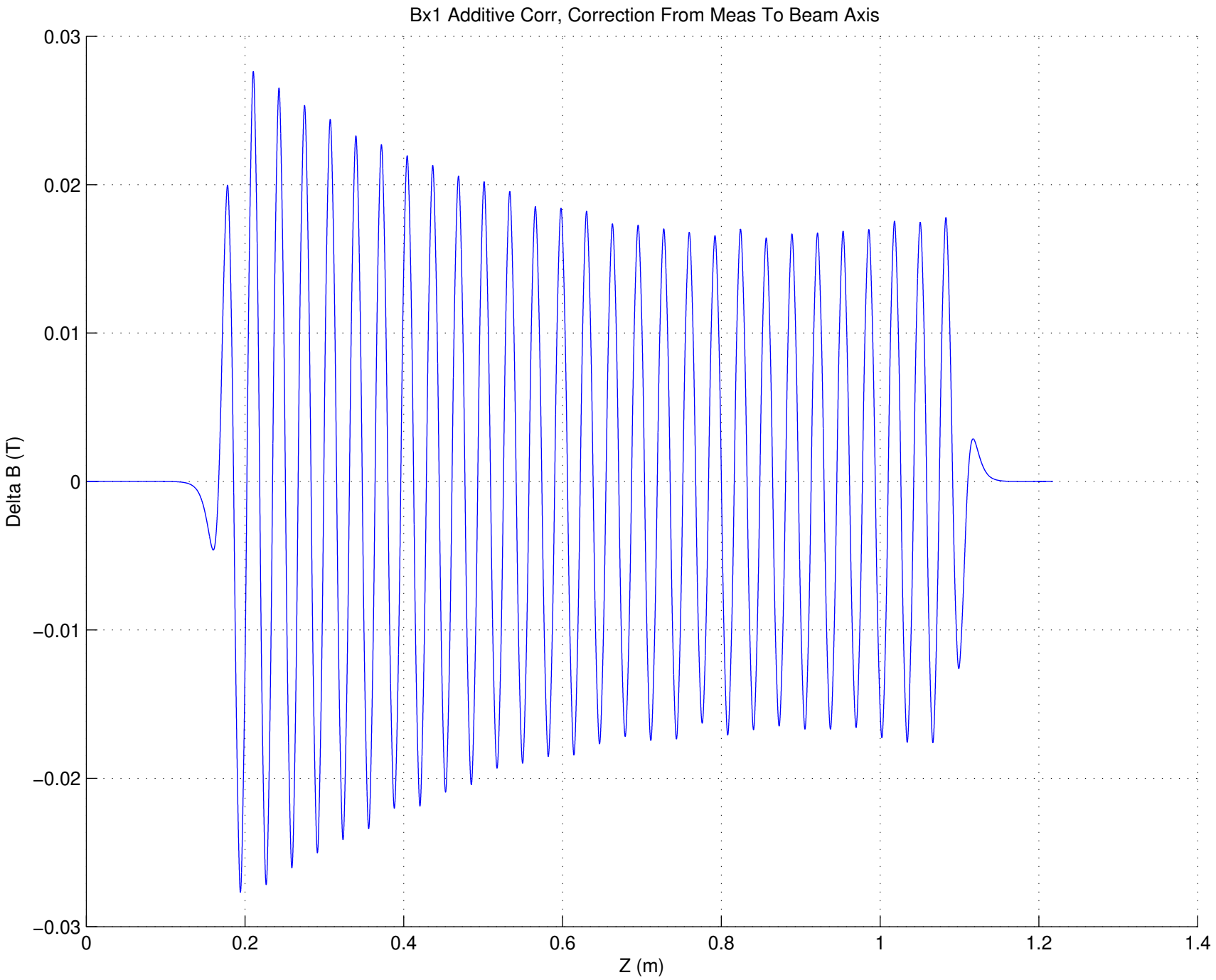

Lin Pol Vert Field, Vert Probe Offset: (X1 – XC) vs Z
x 10^-4
9.5
9
8.5
8
7.5
7
6.5
(X1 – XC) (m)
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
Z (m)

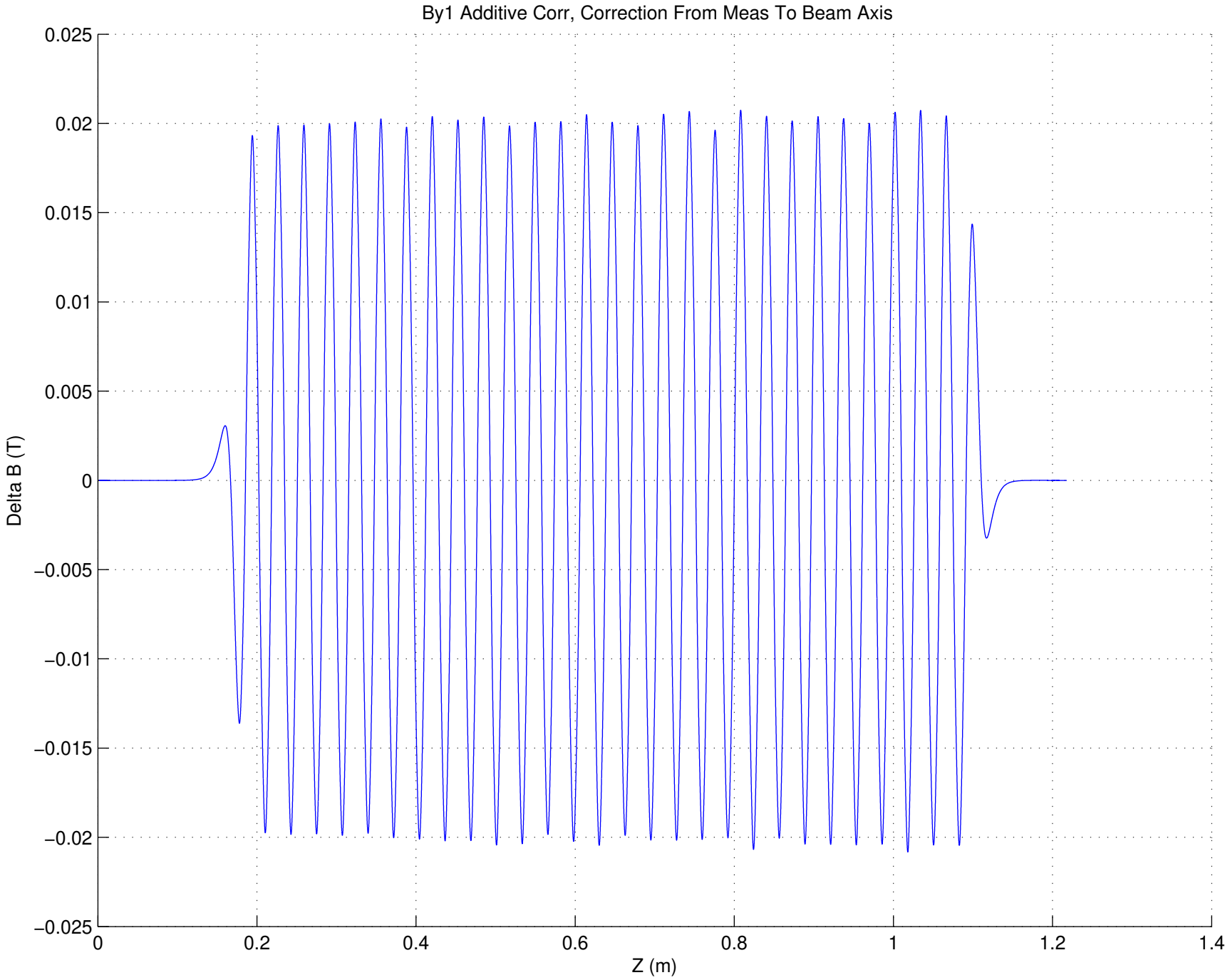

X Probe, Probe Position From The Laser System
x 10^-4
X Probe (m)
Z (m)
0
1
2
0
0.2
0.4
0.6
0.8
1
1.2
1.4

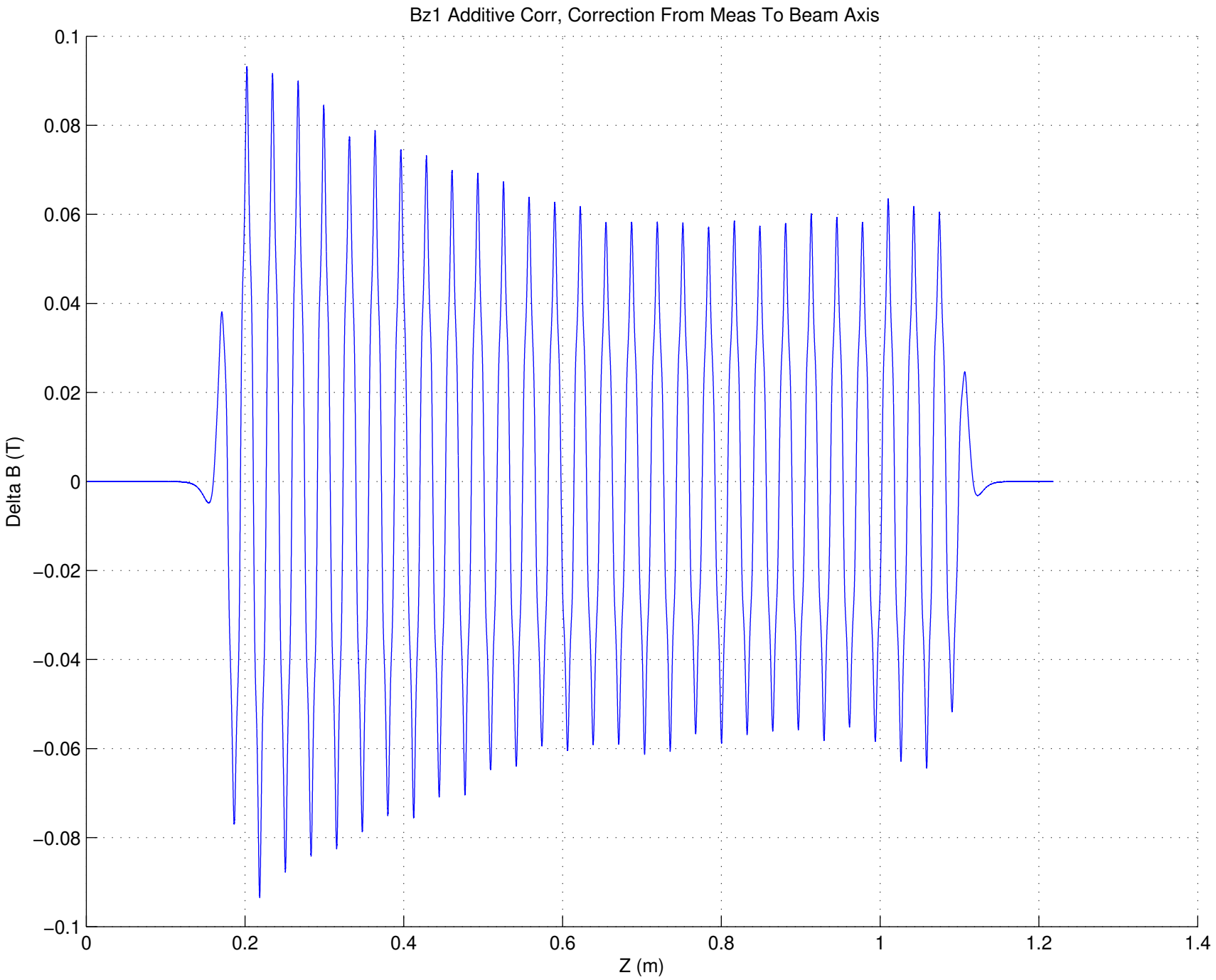

Y Probe, Probe Position From The Laser System
x 10^-5
10
8
6
4
2
0
−2
−4
−6
−8
Y Probe (m)
0
0.2
0.4
0.6
0.8
1
1.2
1.4
Z (m)

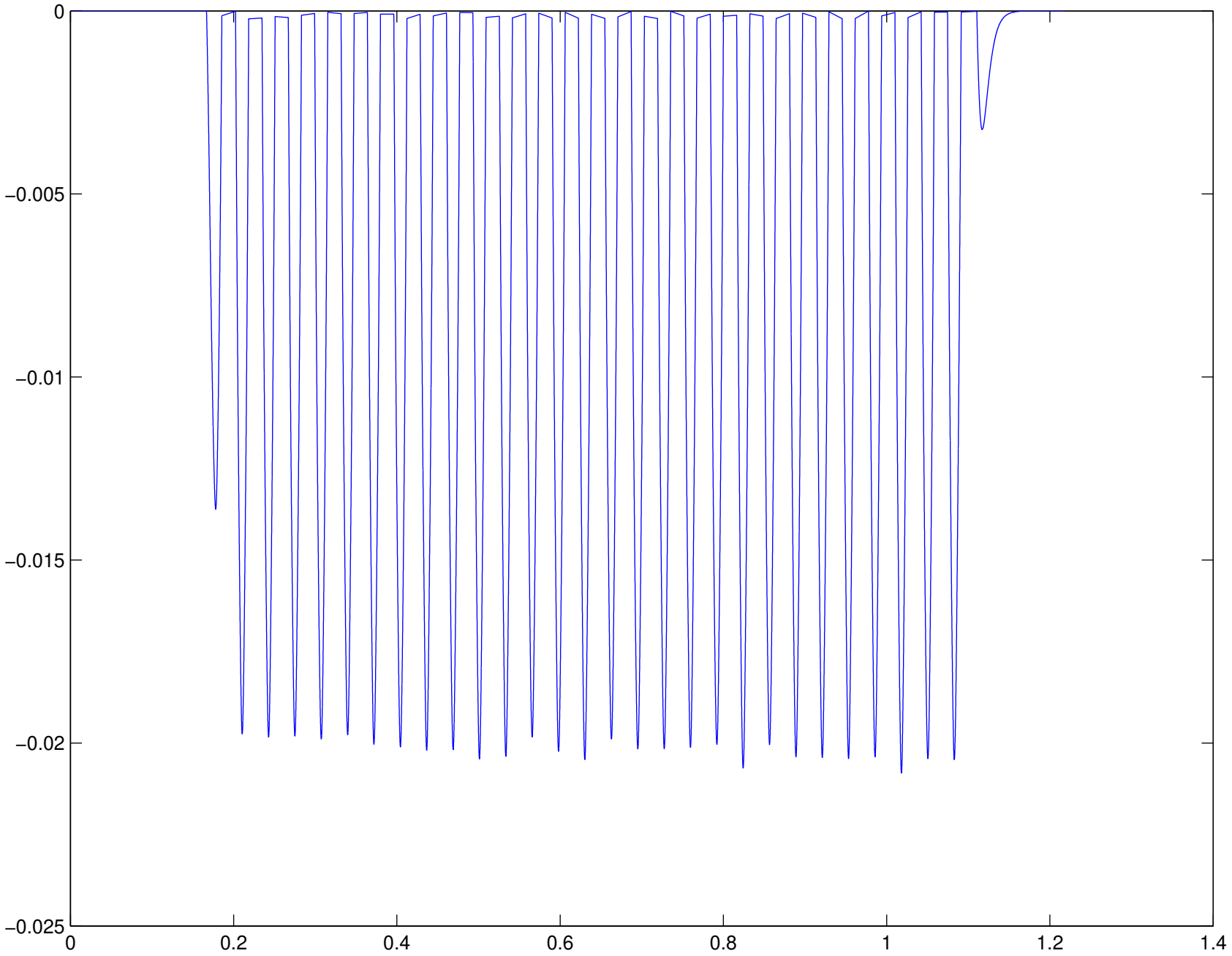

X Center, X Beam Axis, Magnetic Center Rel Reference Axis
x 10^-4
−7.5
−8
−8.5
−9
−9.5
−10
−10.5
X Center, X Beam Axis (m)
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
1.1
1.2
Z (m)

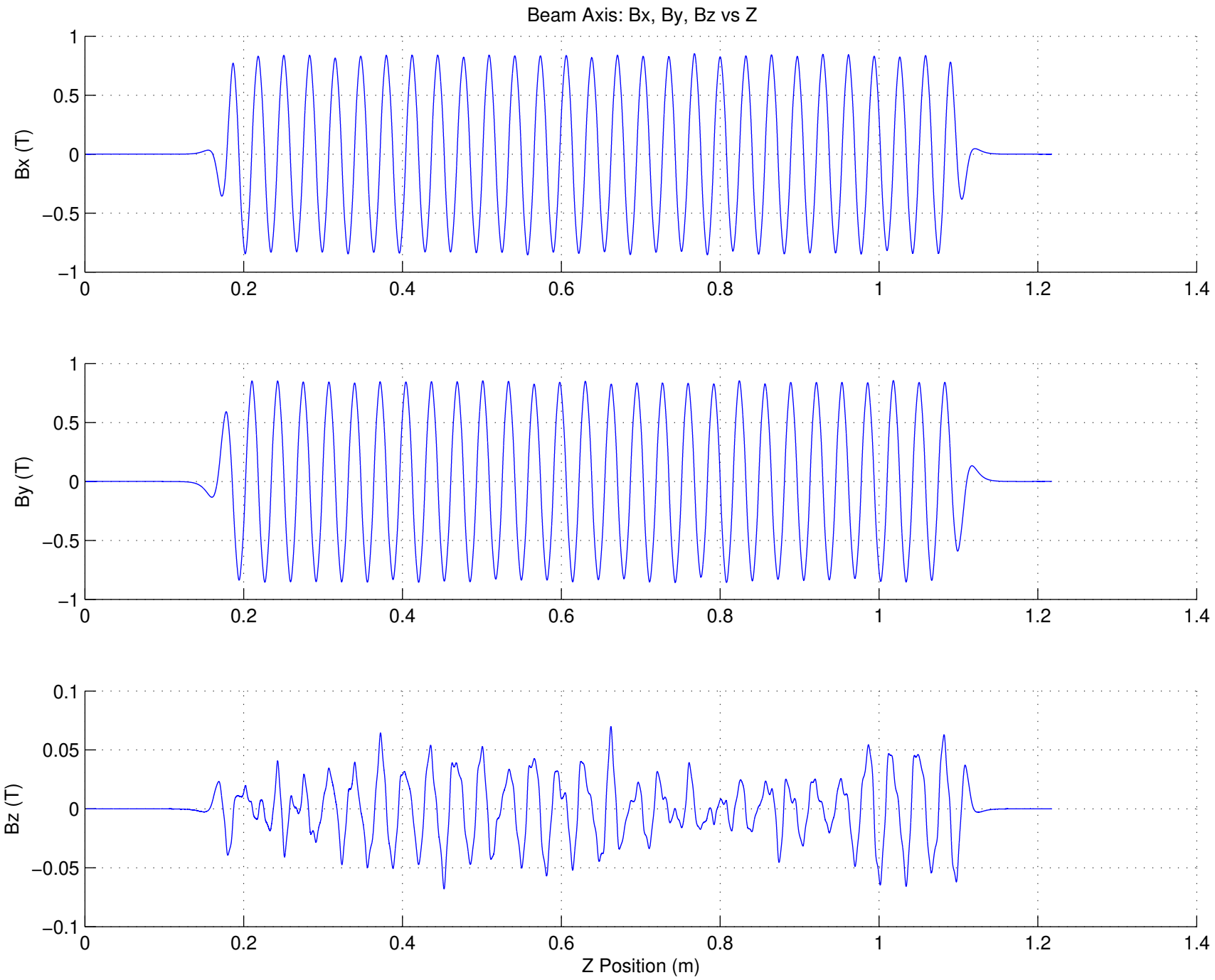

Y Center, Y Beam Axis, Magnetic Center Rel Reference Axis
x 10^-4
5.5
5
4.5
4
3.5
3
2.5
2
Y Center, Y Beam Axis (m)
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
1.1
1.2
Z (m)


Bx1 Additive Corr, Correction From Meas To Beam Axis
Delta B (T)
Z (m)
0.03
0.02
0.01
0
−0.01
−0.02
−0.03
0
0.2
0.4
0.6
0.8
1
1.2
1.4


By1 Additive Corr, Correction From Meas To Beam Axis
Delta B (T)
Z (m)
0.025
0.02
0.015
0.01
0.005
0
−0.005
−0.01
−0.015
−0.02
−0.025
0
0.2
0.4
0.6
0.8
1
1.2
1.4


Bz1 Additive Corr, Correction From Meas To Beam Axis
Delta B (T)
Z (m)
0.1
0.08
0.06
0.04
0.02
0
−0.02
−0.04
−0.06
−0.08
−0.1
0
0.2
0.4
0.6
0.8
1
1.2
1.4


0
−0.005
−0.01
−0.015
−0.02
−0.025
0
0.2
0.4
0.6
0.8
1
1.2
1.4


Beam Axis: Bx, By, Bz vs Z
Bx (T)
By (T)
Bz (T)
Z Position (m)
1
0.5
0
−0.5
−1
0.1
0.05
−0.05
−0.1
0
0.2
0.4
0.6
0.8
1
1.2
1.4