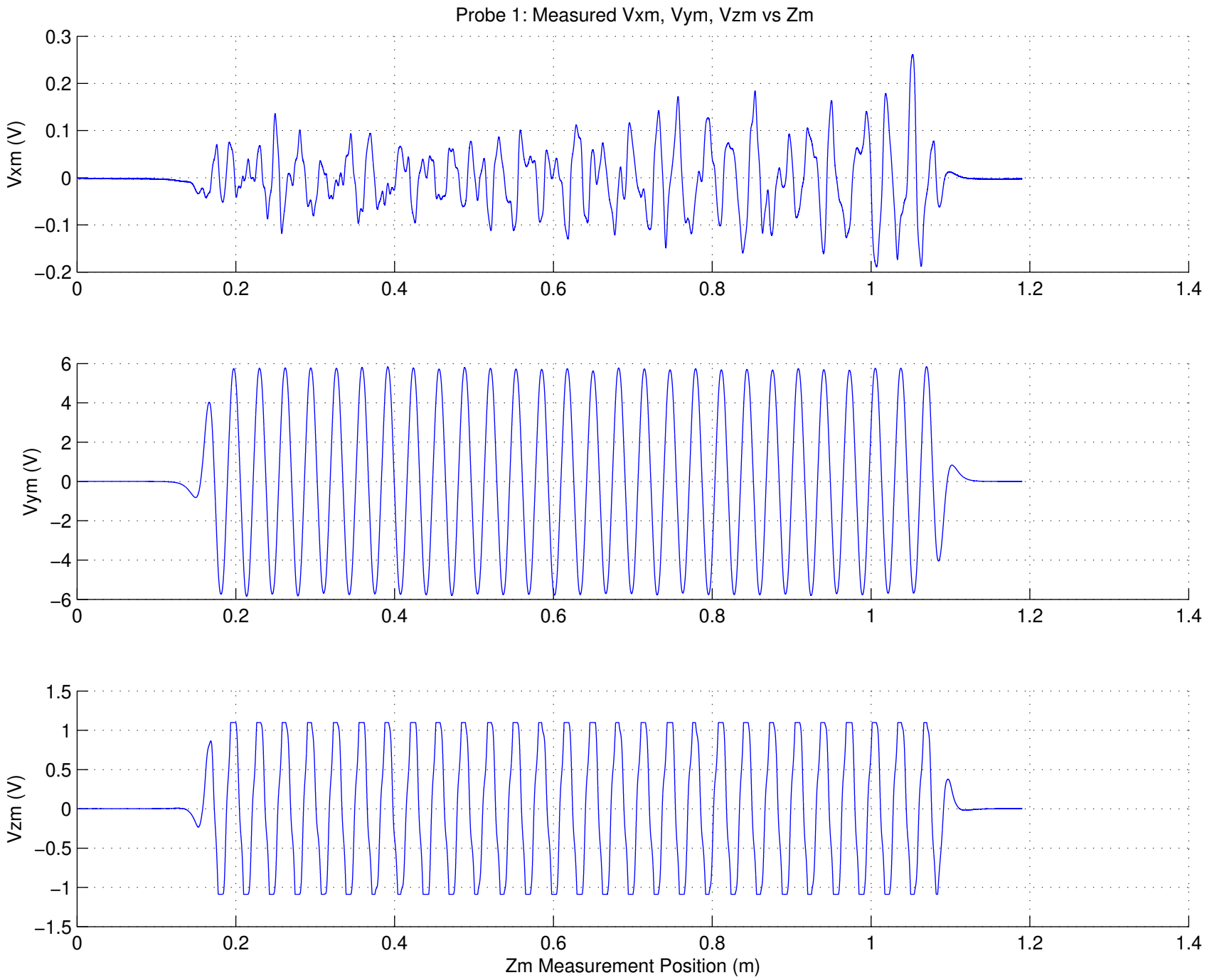
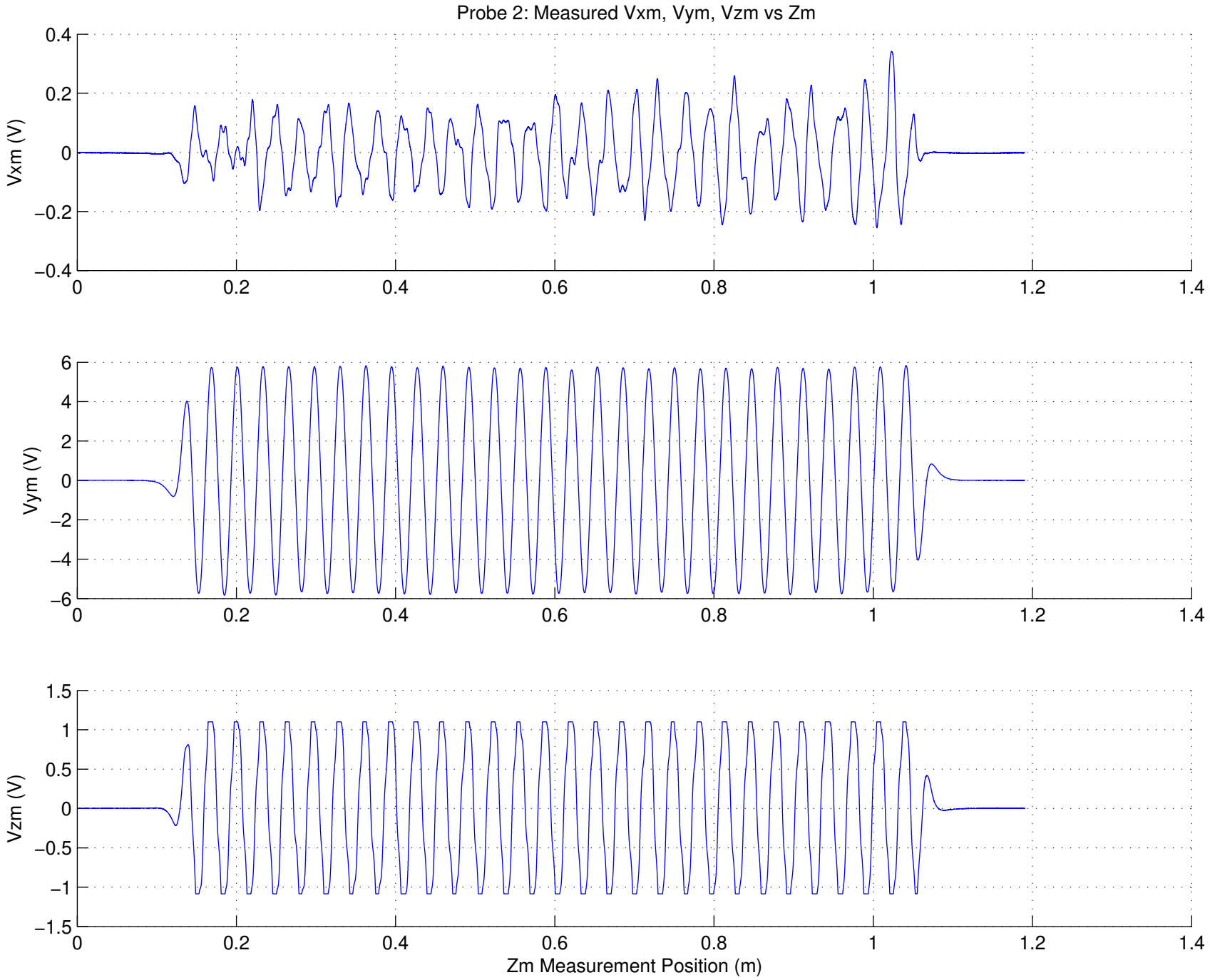
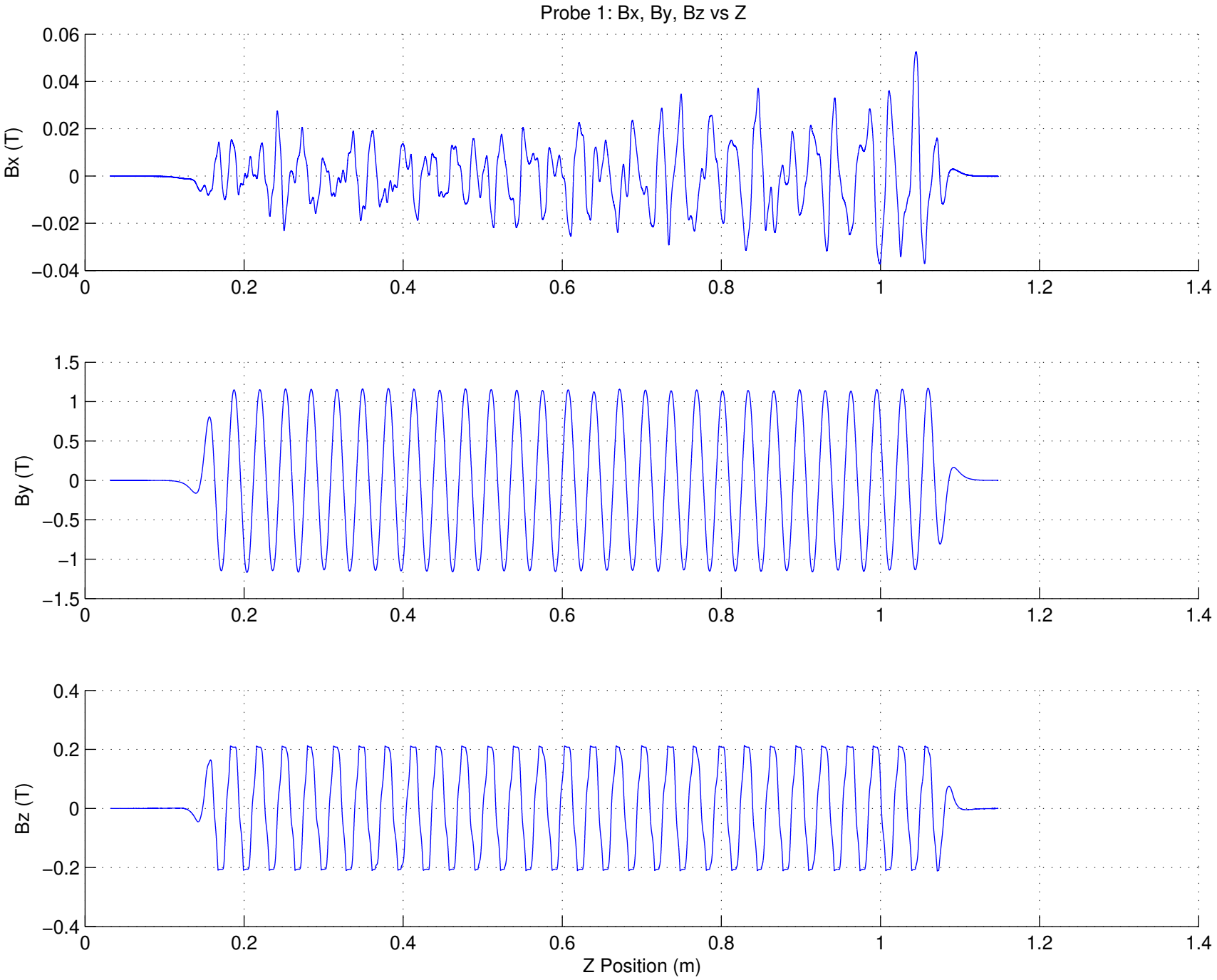
SLAC Magnetic Measurements

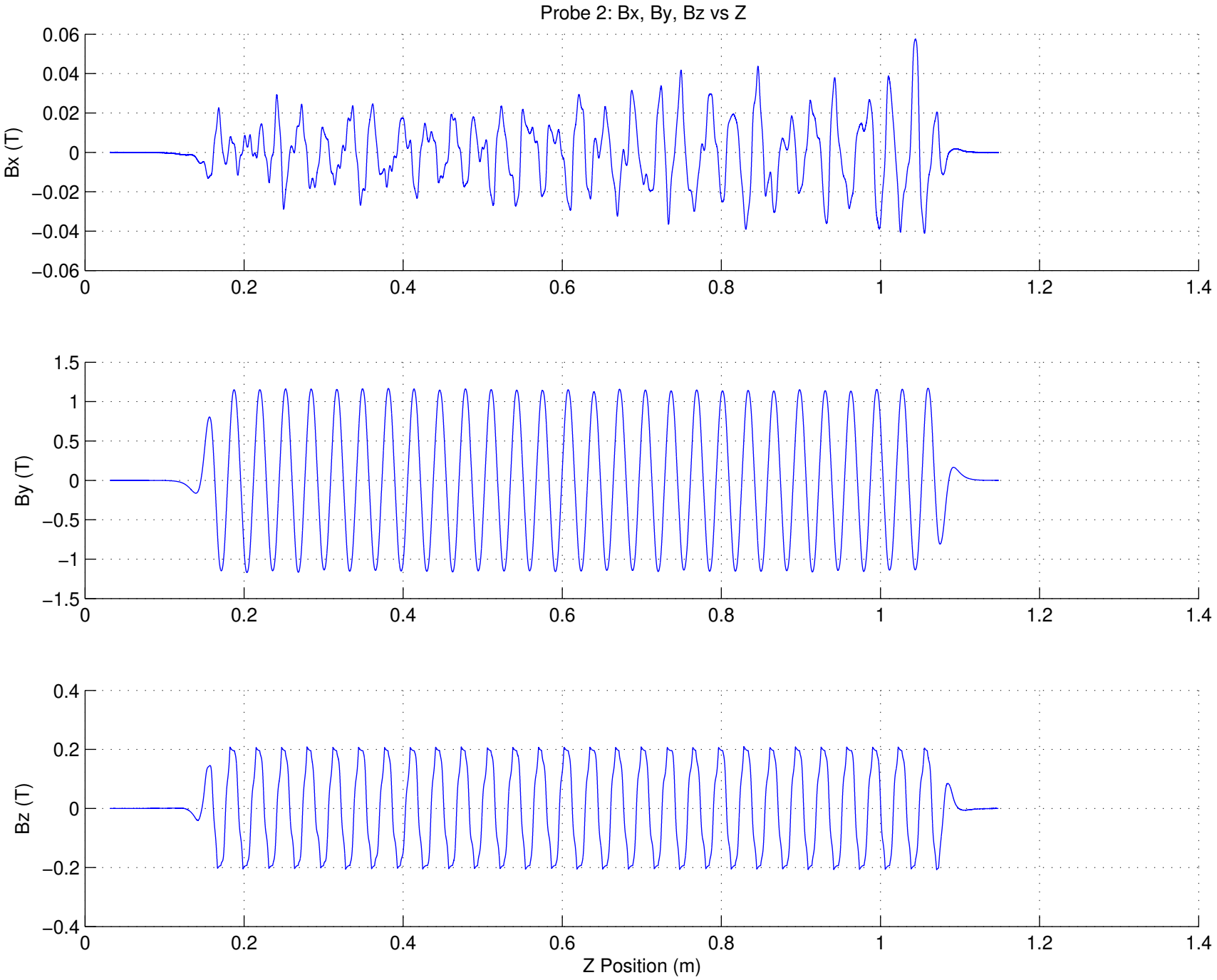
Hall Probe Array Analysis
****

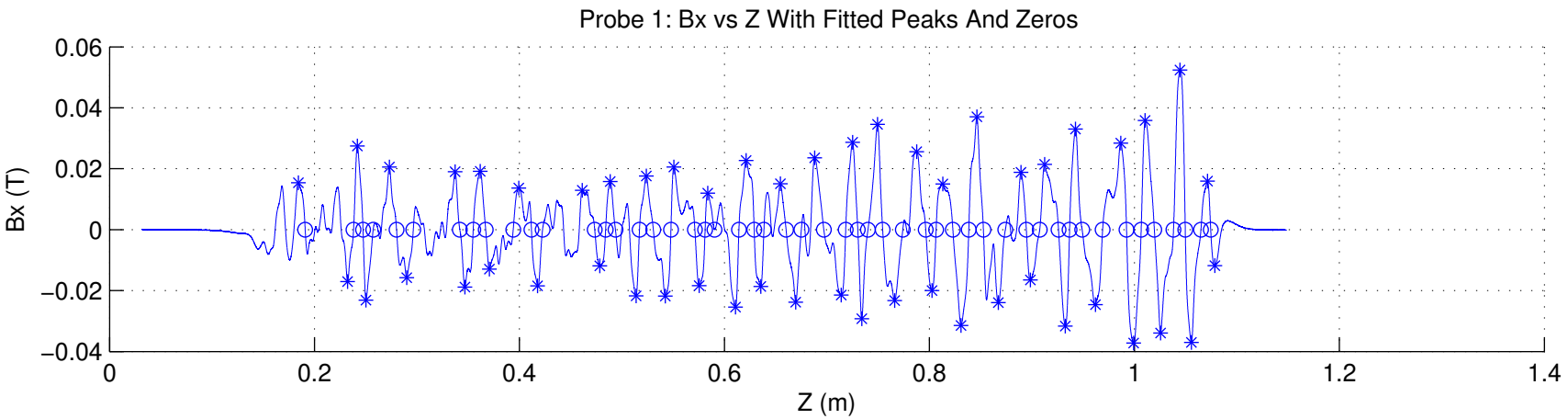
Parameters:
INPUT−FILE−DIR =V:\MET\MagServe\MagData\DELTA\Delta data\Run 190\
INPUT−FILE−NAME =DUTestOutput−190.dat
INPUT−FILE−TYPE =ZVXYZVXYZH
UND−POL−MODE =LIN−POL−VERT−FIELD
PROBE1−BX−CALIB−FILE =V:\MET\MagServe\MagData\LCLS\Hall probe\SENIS−120−12\HPCS−080\calib.mat
PROBE1−BY−CALIB−FILE =V:\MET\MagServe\MagData\LCLS\Hall probe\SENIS−120−12\HPCS−079\calib.mat
PROBE2−BX−CALIB−FILE =V:\MET\MagServe\MagData\LCLS\Hall probe\SENIS−119−12\HPCS−001\calib.mat
PROBE2−BY−CALIB−FILE =V:\MET\MagServe\MagData\LCLS\Hall probe\SENIS−119−12\HPCS−002\calib.mat
NUM−ZERO−GAUSS−MEAS =200
PROBE2−OFFSET−DIR =Y
PROBE2−OFFSET−X−DIST (m) =1.5e−05
PROBE2−OFFSET−Y−DIST (m) =0.0001
PROBE2−BX−ROLL (rad) =−0.0095993
PROBE2−BY−ROLL (rad) =−0.039444
PROBE1−BY−ROLL (rad) =−0.031416

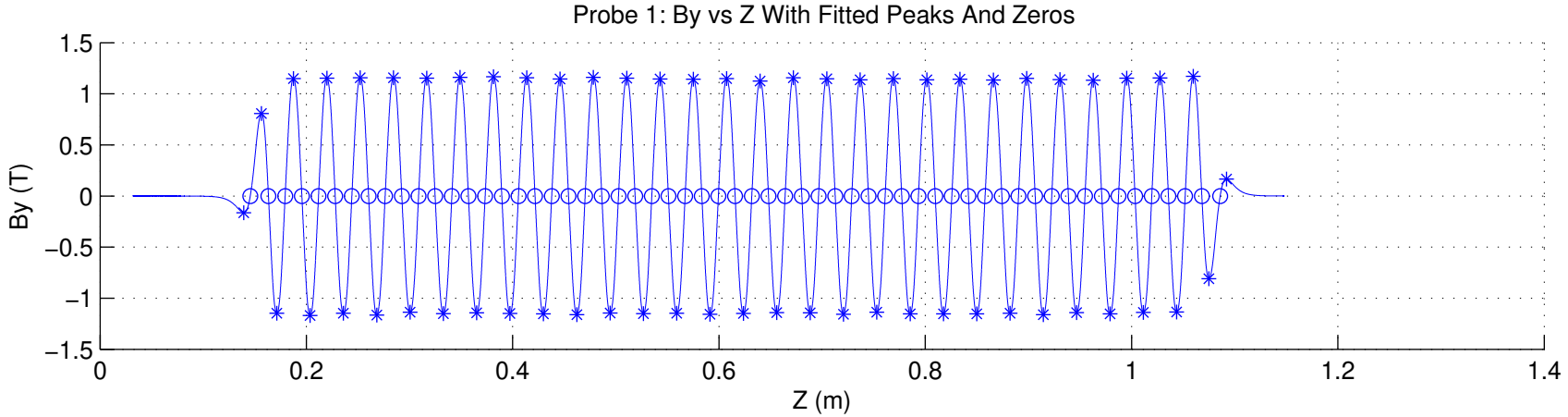

Probe 1: Measured Vxm, Vym, Vzm vs Zm
Vxm (V)
Vym (V)
Vzm (V)
Zm Measurement Position (m)
0.3
0.2
0.1
0
−0.1
−0.2
6
4
2
0
−2
−4
−6
1.5
1
0.5
0
−0.5
−1
−1.5
0
0.2
0.4
0.6
0.8
1
1.2
1.4

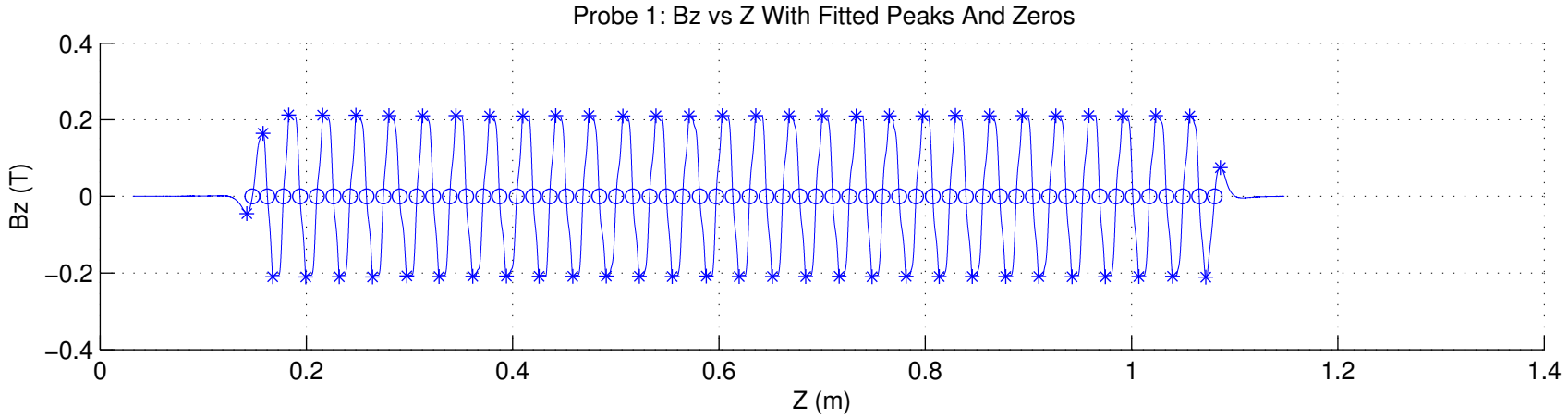

Probe 2: Measured Vxm, Vym, Vzm vs Zm
Vxm (V)
Vym (V)
Vzm (V)
Zm Measurement Position (m)
0.4
0.2
0
−0.2
−0.4
6
4
2
0
−2
−4
−6
1.5
1
0.5
0
−0.5
−1
−1.5
0
0.2
0.4
0.6
0.8
1
1.2
1.4

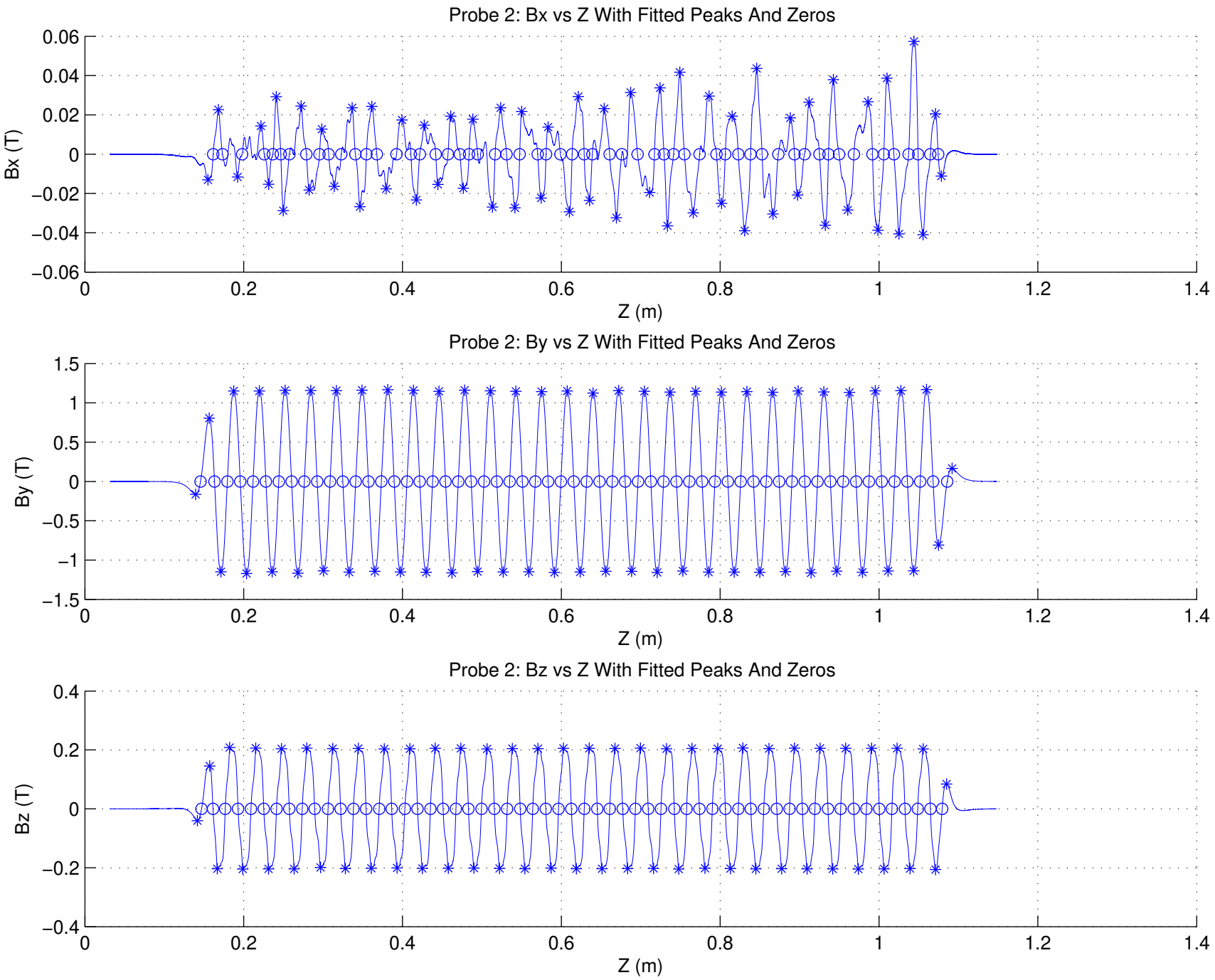

Probe 1: Bx, By, Bz vs Z
Bx (T)
0.06
0.04
0.02
0
−0.02
−0.04
By (T)
1.5
1
0.5
0
−0.5
−1
−1.5
Bz (T)
0.4
0.2
0
−0.2
−0.4
0
0.2
0.4
0.6
0.8
1
1.2
1.4
Z Position (m)

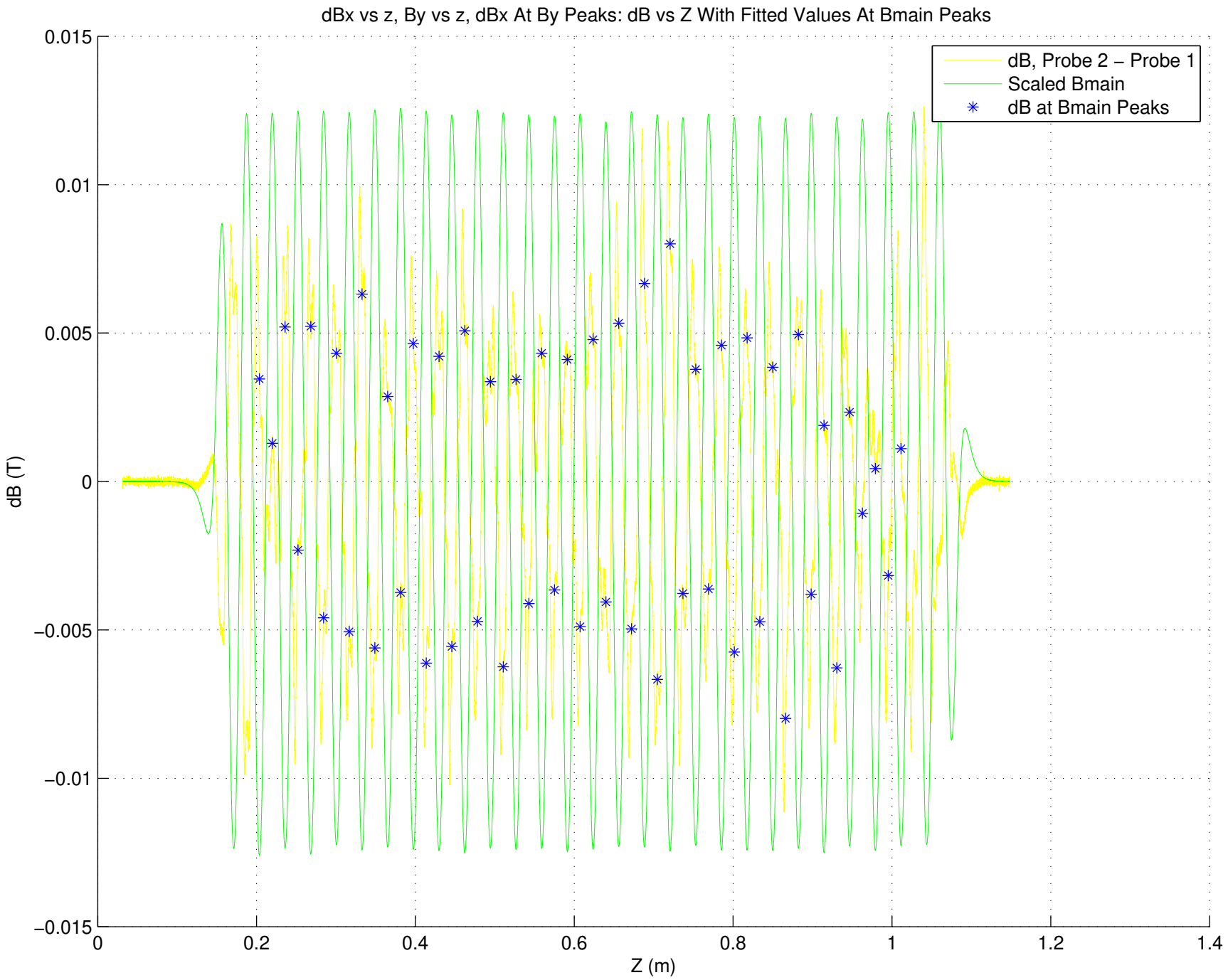

Probe 2: Bx, By, Bz vs Z
Bx (T)
0.06
0.04
0.02
0
−0.02
−0.04
−0.06
By (T)
1.5
1
0.5
0
−0.5
−1
−1.5
Bz (T)
0.4
0.2
0
−0.2
−0.4
0
0.2
0.4
0.6
0.8
1
1.2
1.4
Z Position (m)

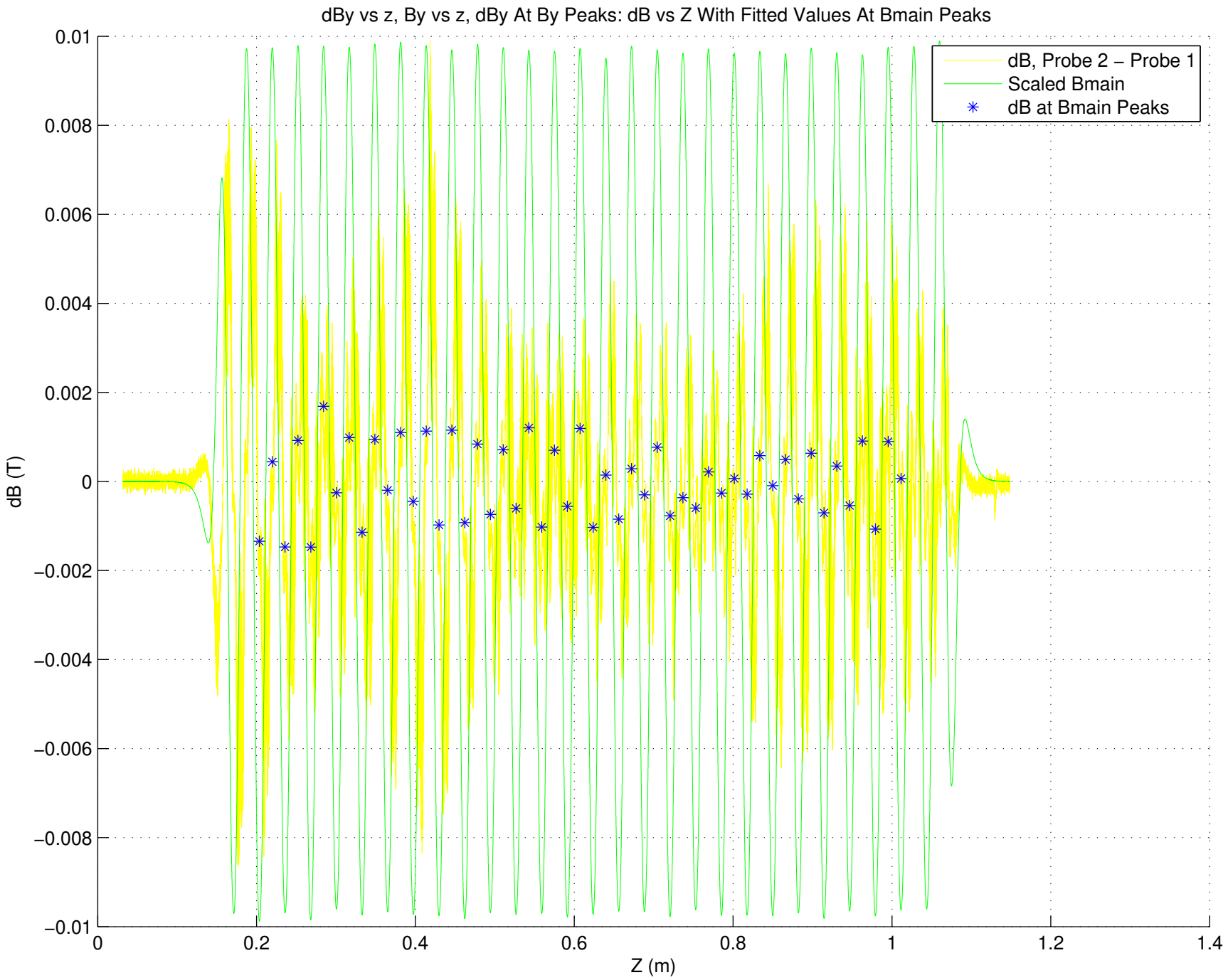

Probe 1: Bx vs Z With Fitted Peaks And Zeros
Bx (T)
0.06
0.04
0.02
0
−0.02
−0.04
0
0.2
0.4
0.6
0.8
1
1.2
1.4
Z (m)

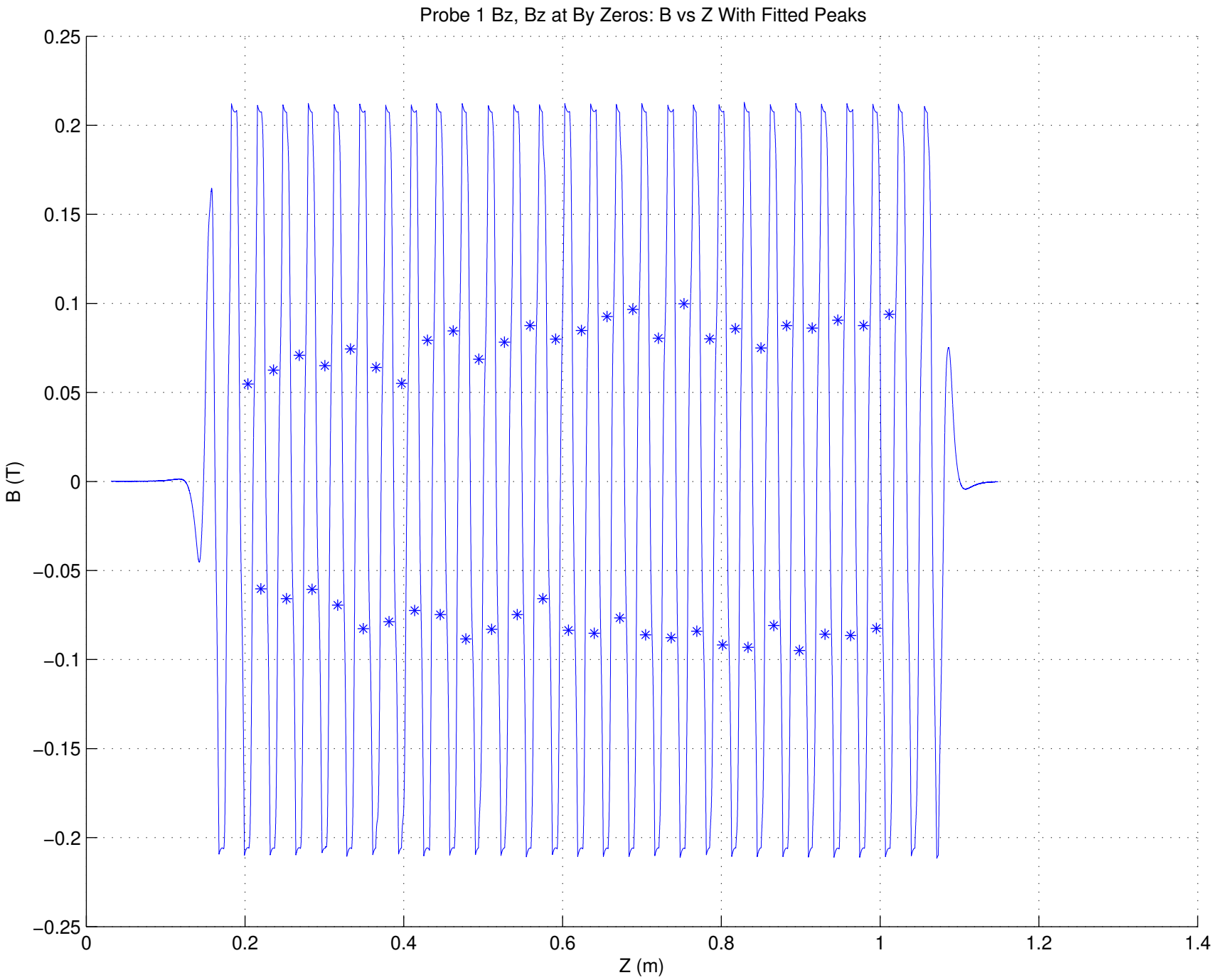

Probe 1: By vs Z With Fitted Peaks And Zeros
By (T)
1.5
1
0.5
0
−0.5
−1
−1.5
0
0.2
0.4
0.6
0.8
1
1.2
1.4
Z (m)

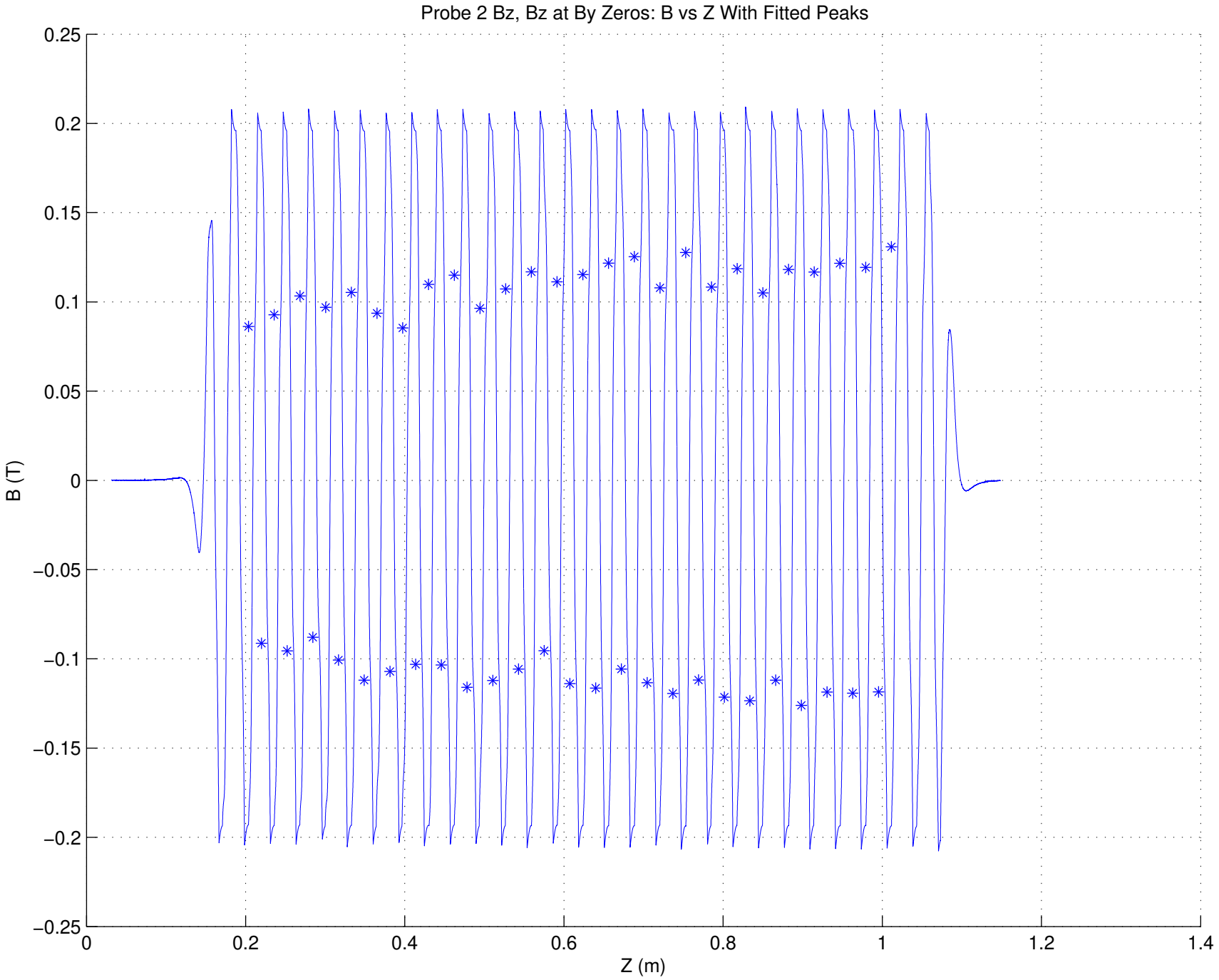

Probe 1: Bz vs Z With Fitted Peaks And Zeros
Bz (T)
0.4
0.2
0
−0.2
−0.4
0
0.2
0.4
0.6
0.8
1
1.2
1.4
Z (m)

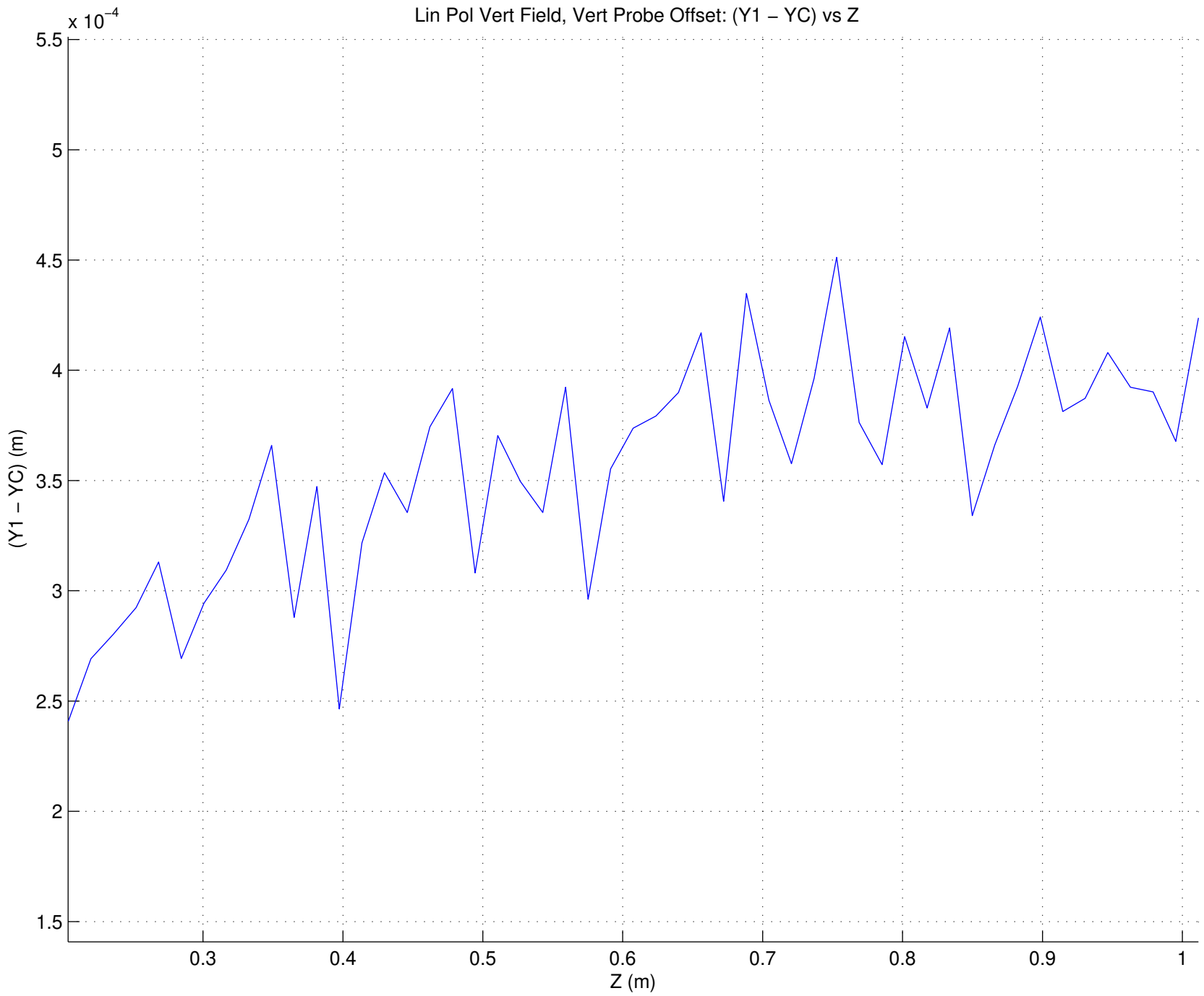

Probe 2: Bx vs Z With Fitted Peaks And Zeros
Bx (T)
0.06
0.04
0.02
0
−0.02
−0.04
−0.06
0
0.2
0.4
0.6
0.8
1
1.2
1.4
Z (m)
Probe 2: By vs Z With Fitted Peaks And Zeros
By (T)
1.5
1
0.5
0
−0.5
−1
−1.5
0
0.2
0.4
0.6
0.8
1
1.2
1.4
Z (m)
Probe 2: Bz vs Z With Fitted Peaks And Zeros
Bz (T)
0.4
0.2
0
−0.2
−0.4
0
0.2
0.4
0.6
0.8
1
1.2
1.4
Z (m)

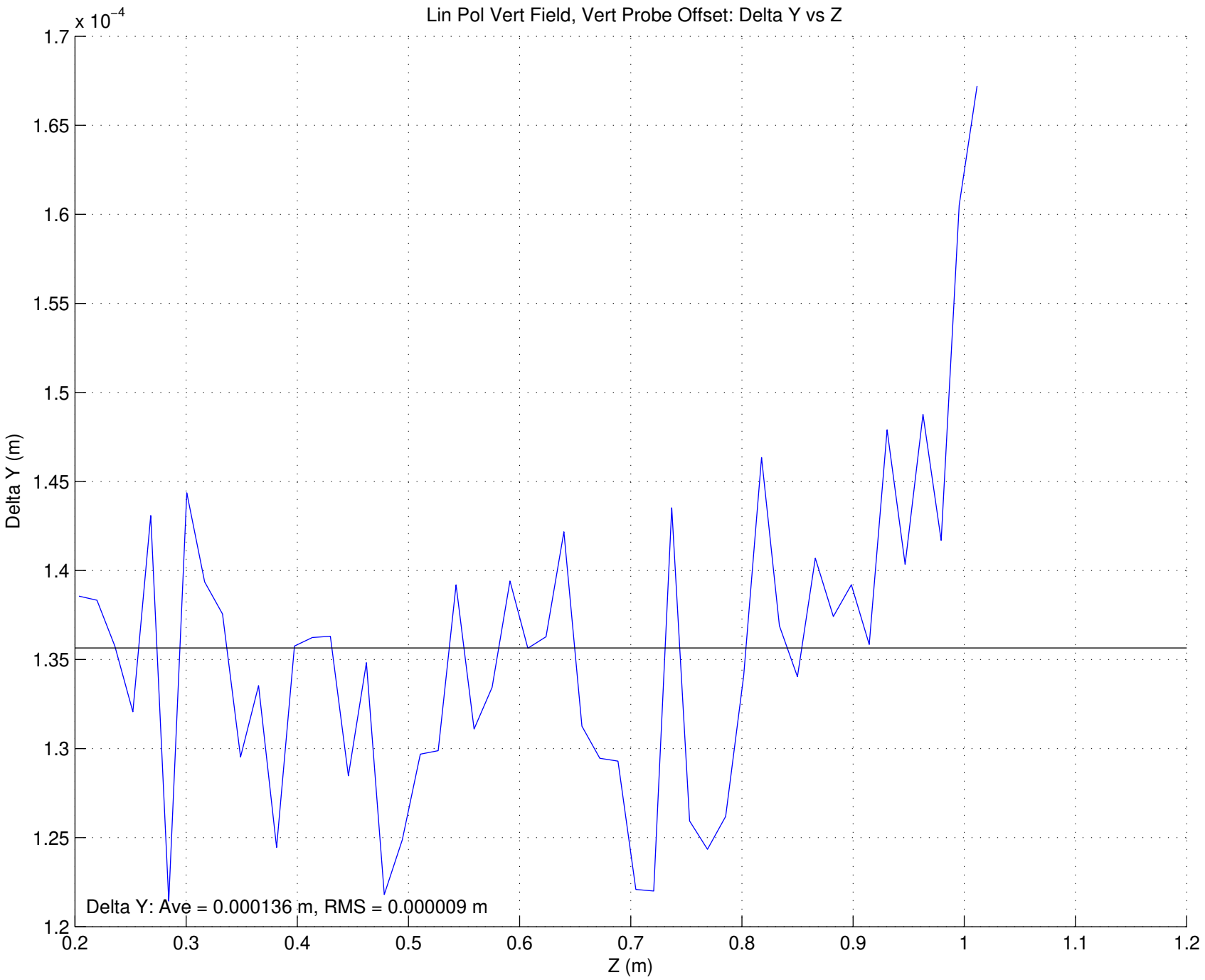

dBx vs z, By vs z, dBx At By Peaks: dB vs Z With Fitted Values At Bmain Peaks
dB, Probe 2 – Probe 1
Scaled Bmain
dB at Bmain Peaks
dB (T)
Z (m)
0.015
0.01
0.005
0
−0.005
−0.01
−0.015
0
0.2
0.4
0.6
0.8
1
1.2
1.4

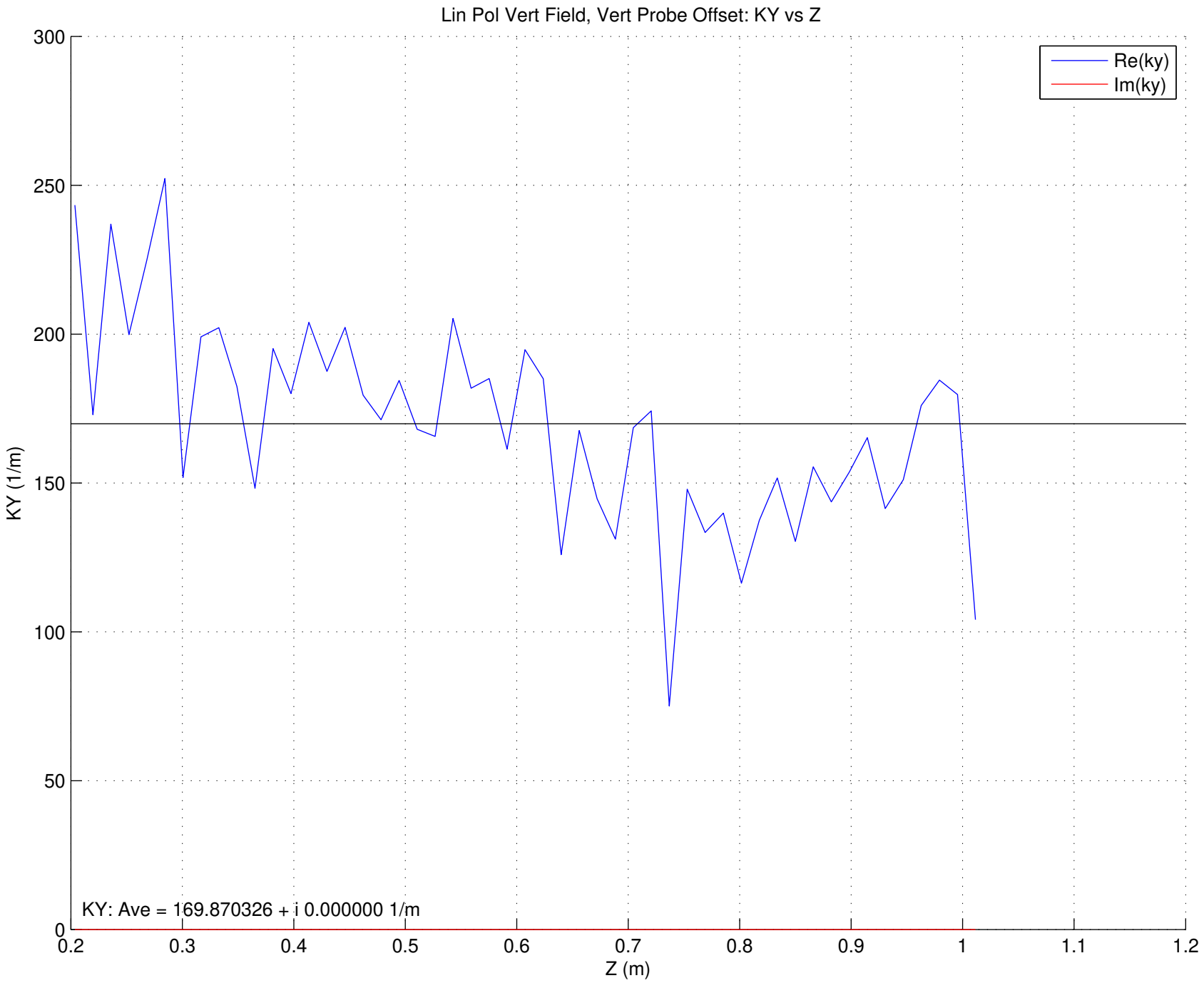

dBy vs z, By vs z, dBy At By Peaks: dB vs Z With Fitted Values At Bmain Peaks
dB, Probe 2 – Probe 1
Scaled Bmain
dB at Bmain Peaks
dB (T)
Z (m)
0.01
0.008
0.006
0.004
0.002
0
−0.002
−0.004
−0.006
−0.008
−0.01
0
0.2
0.4
0.6
0.8
1
1.2
1.4

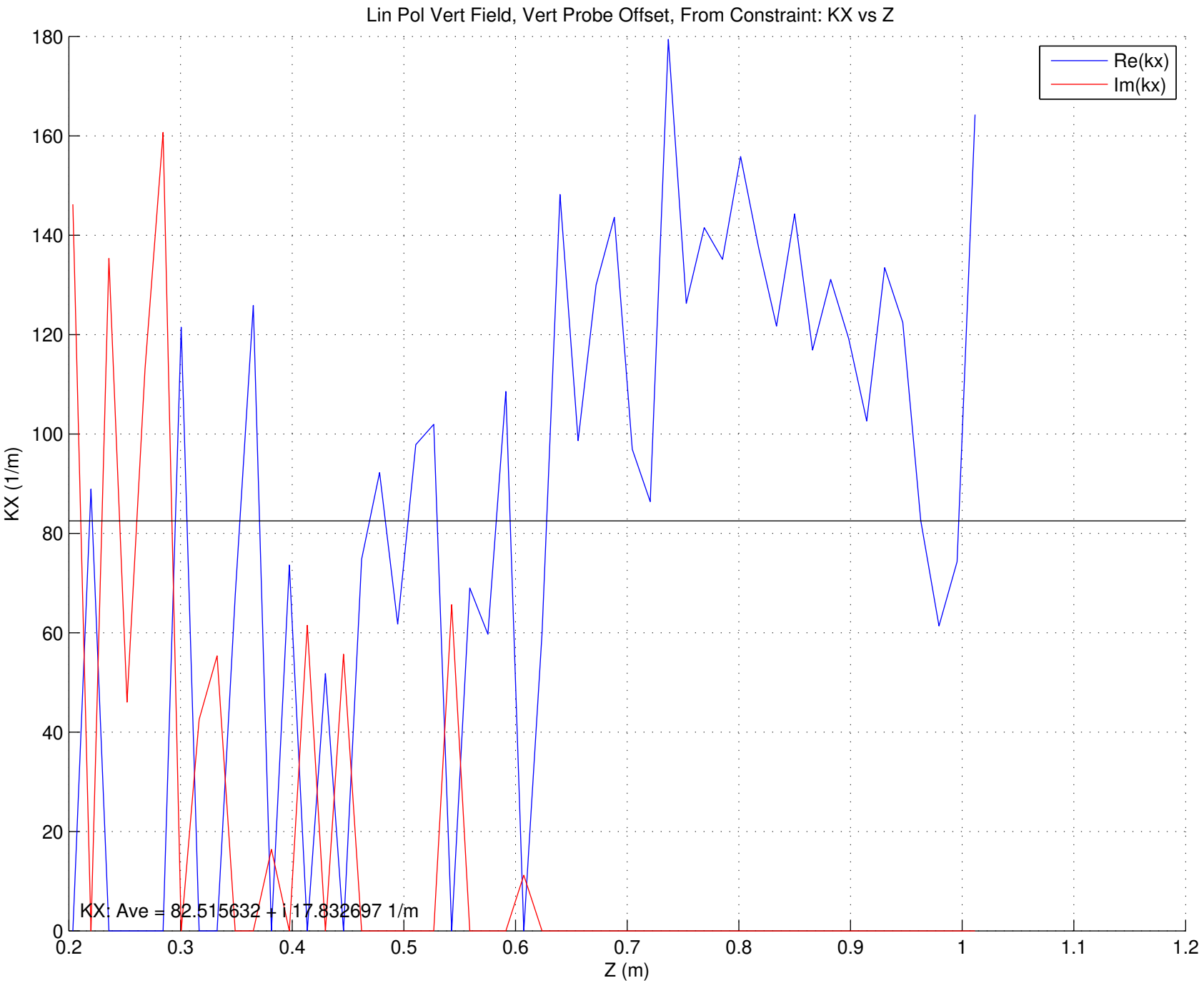

Probe 1 Bz, Bz at By Zeros: B vs Z With Fitted Peaks
B (T)
Z (m)
0.25
0.2
0.15
0.1
0.05
0
−0.05
−0.1
−0.15
−0.2
−0.25
0
0.2
0.4
0.6
0.8
1
1.2
1.4

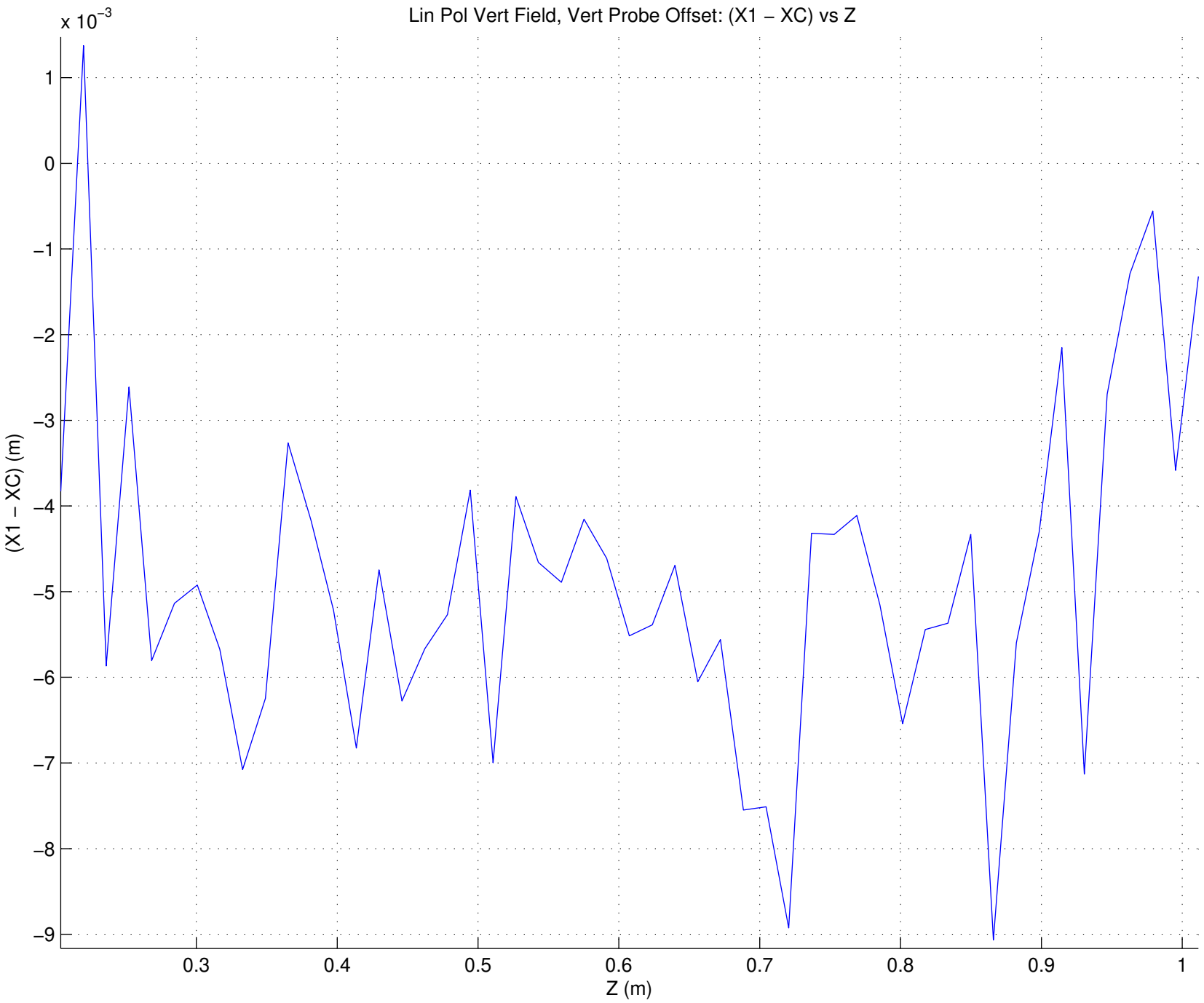

Probe 2 Bz, Bz at By Zeros: B vs Z With Fitted Peaks
B (T)
Z (m)
0.25
0.2
0.15
0.1
0.05
0
−0.05
−0.1
−0.15
−0.2
−0.25
0
0.2
0.4
0.6
0.8
1
1.2
1.4

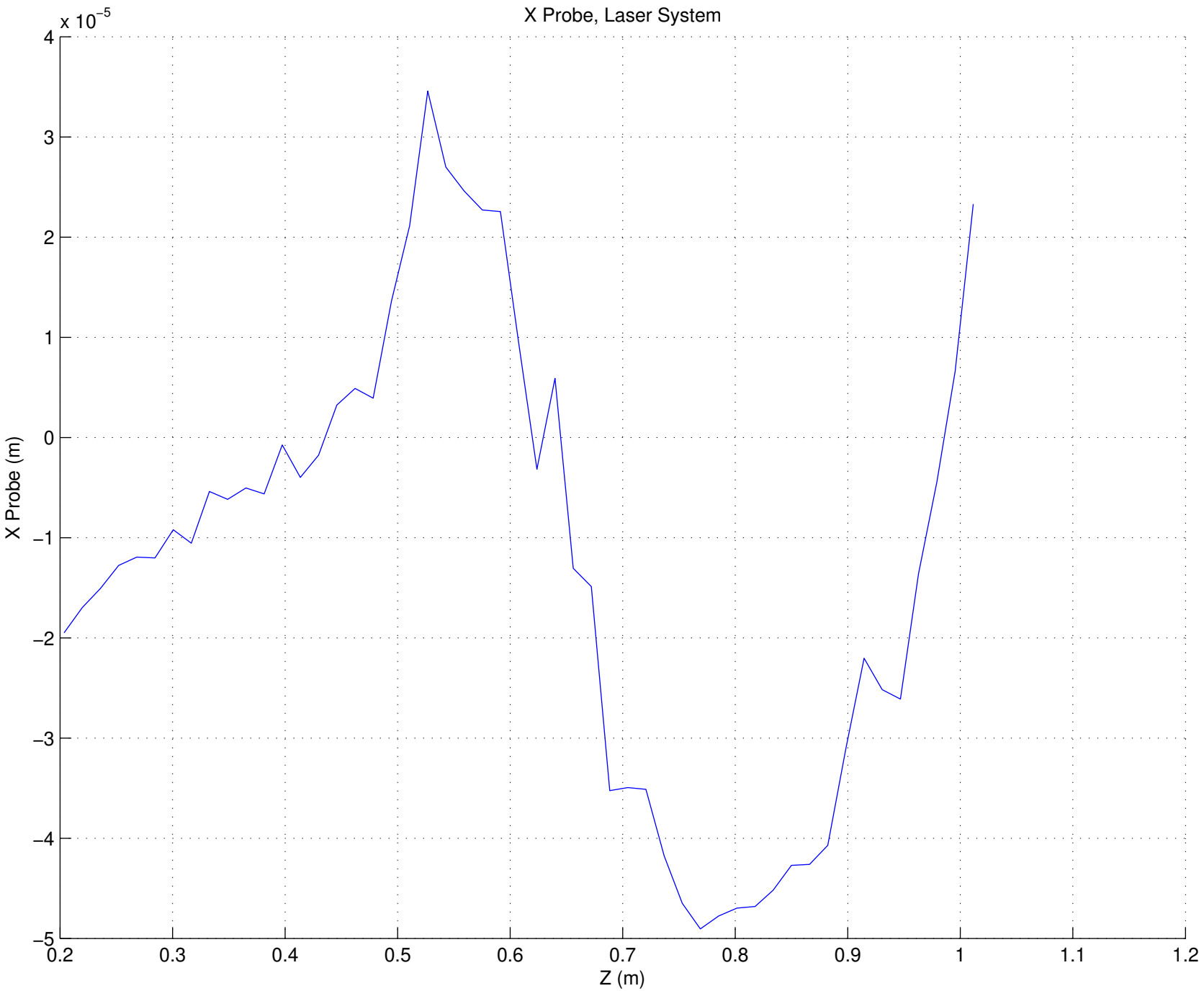

Lin Pol Vert Field, Vert Probe Offset: (Y1 – YC) vs Z
x 10^-4
5.5
5
4.5
4
3.5
3
2.5
2
1.5
(Y1 – YC) (m)
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
Z (m)

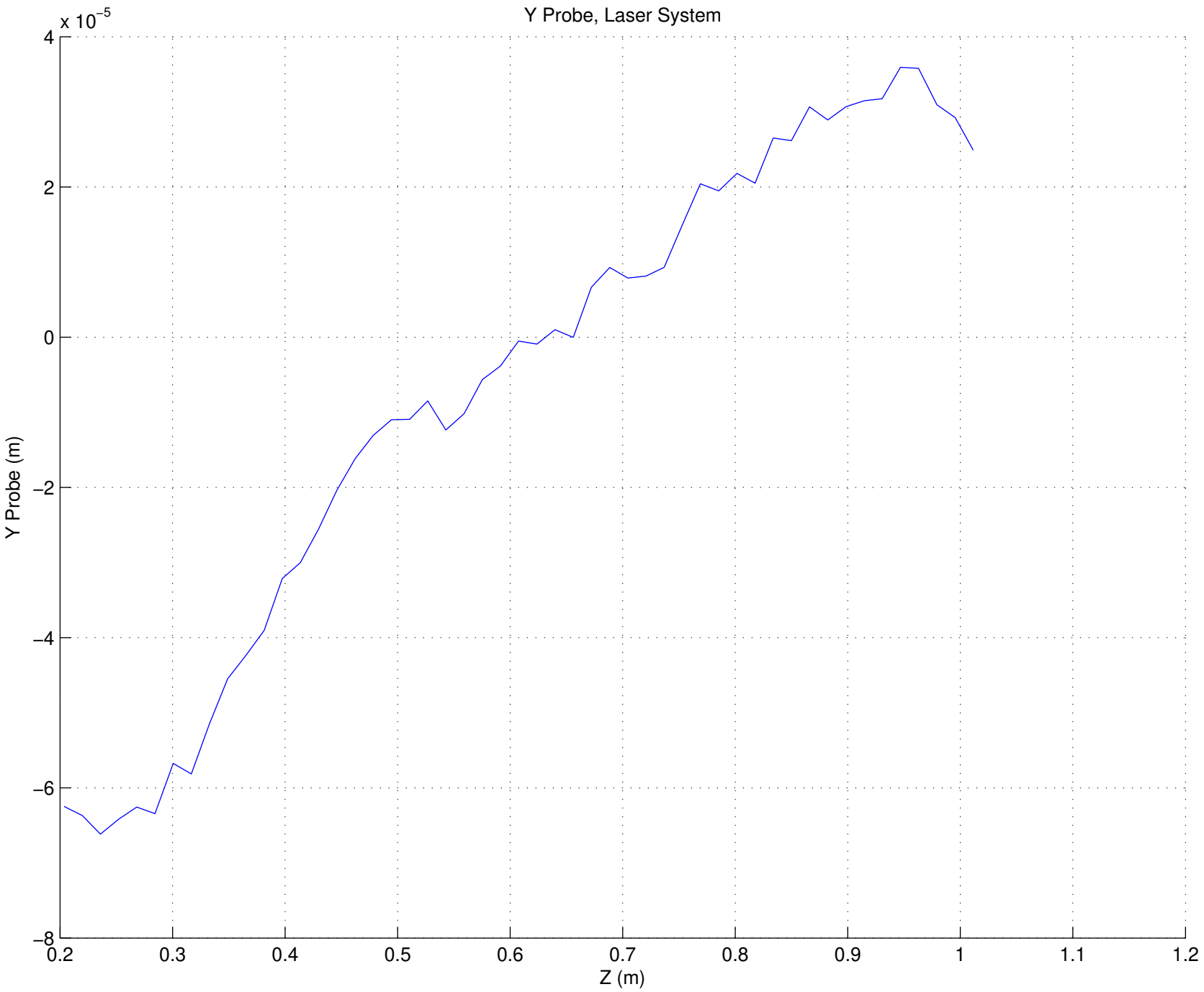

Lin Pol Vert Field, Vert Probe Offset: Delta Y vs Z
x 10^-4
1.7
1.65
1.6
1.55
1.5
1.45
1.4
1.35
1.3
1.25
1.2
Delta Y (m)
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
1.1
1.2
Z (m)
Delta Y: Ave = 0.000136 m, RMS = 0.000009 m

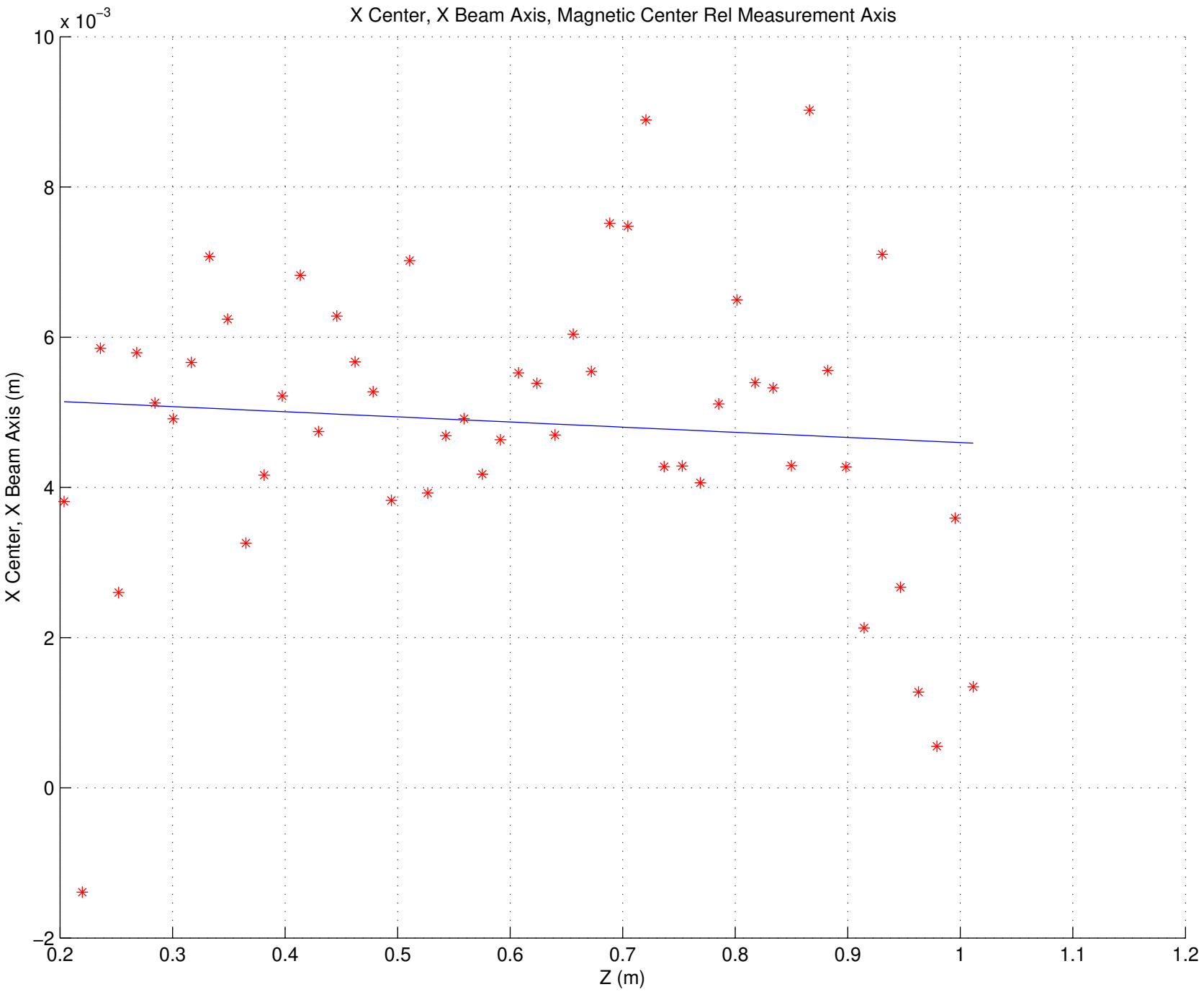

Lin Pol Vert Field, Vert Probe Offset: KY vs Z
Re(ky)
Im(ky)
KY (1/m)
Z (m)
KY: Ave = 169.870326 + i 0.000000 1/m
300
250
200
150
100
50
0
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
1.1
1.2

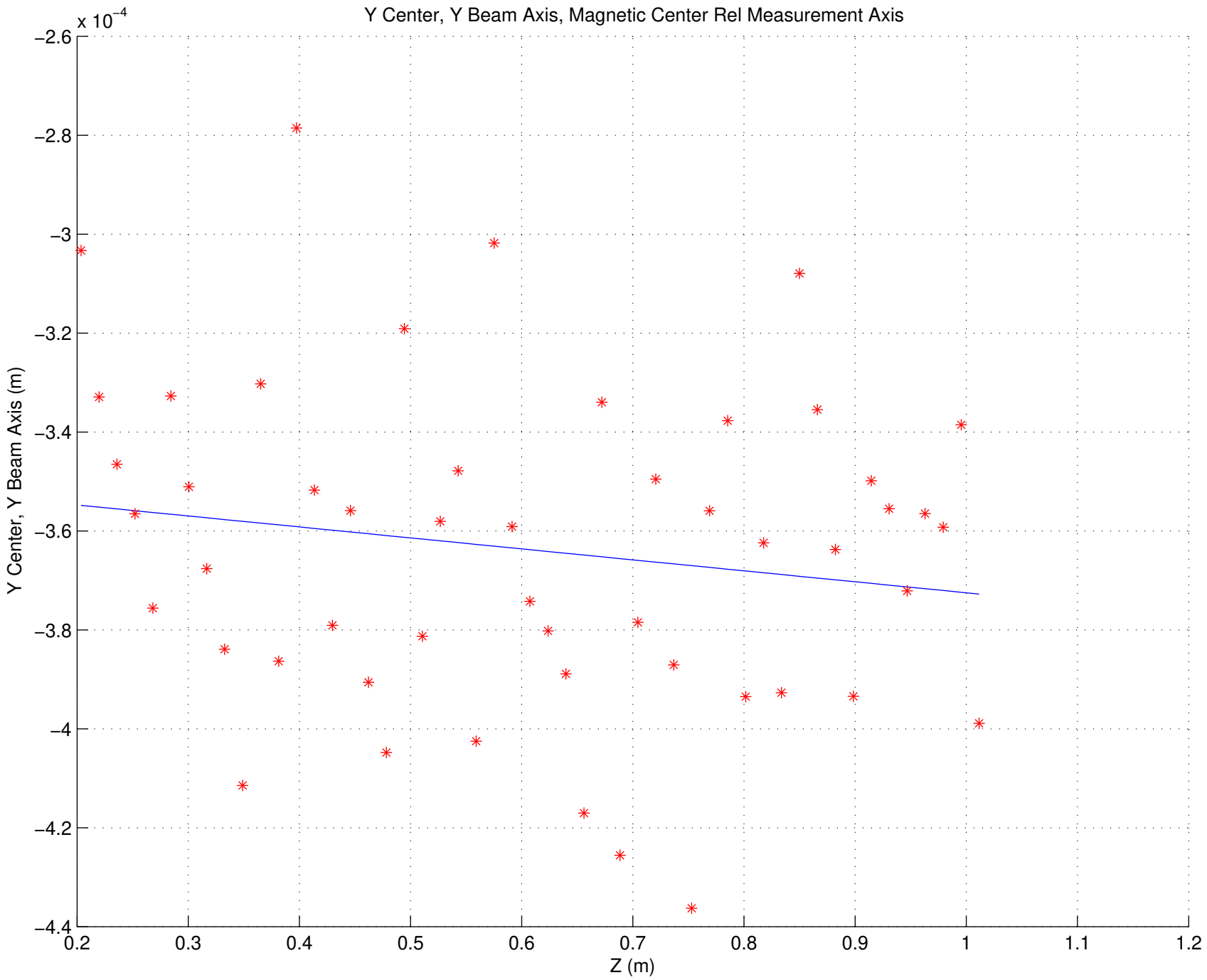

Lin Pol Vert Field, Vert Probe Offset, From Constraint: KX vs Z
Re(kx)
Im(kx)
KX (1/m)
Z (m)
KX: Ave = 82.515632 + i 17.832697 1/m
180
160
140
120
100
80
60
40
20
0
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
1.1
1.2

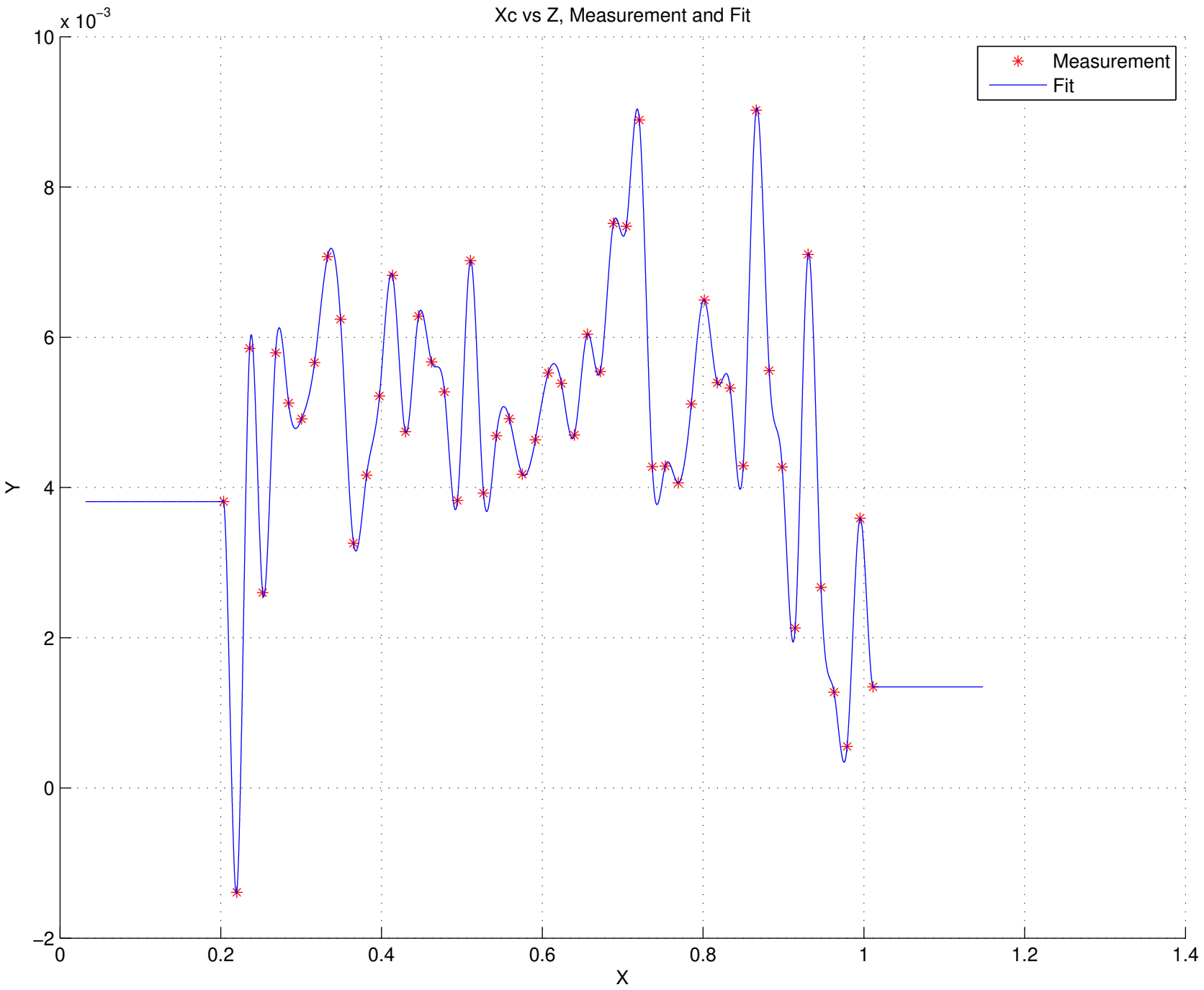

Lin Pol Vert Field, Vert Probe Offset: (X1 – XC) vs Z
x 10^-3
1
0
–1
–2
–3
–4
–5
–6
–7
–8
–9
(X1 – XC) (m)
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
Z (m)

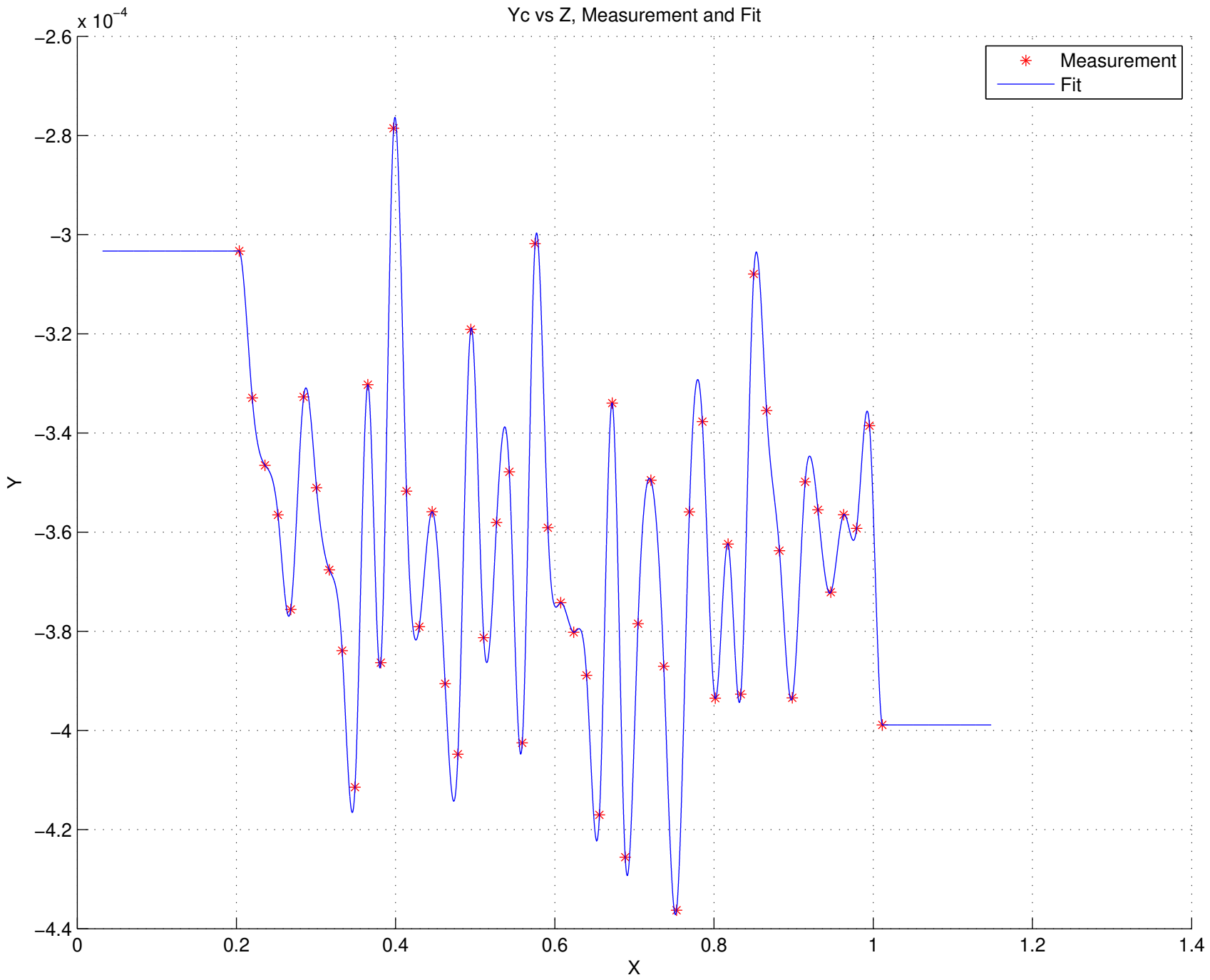

X Probe, Laser System
x 10^-5
4
3
2
1
0
−1
−2
−3
−4
−5
X Probe (m)
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
1.1
1.2
Z (m)

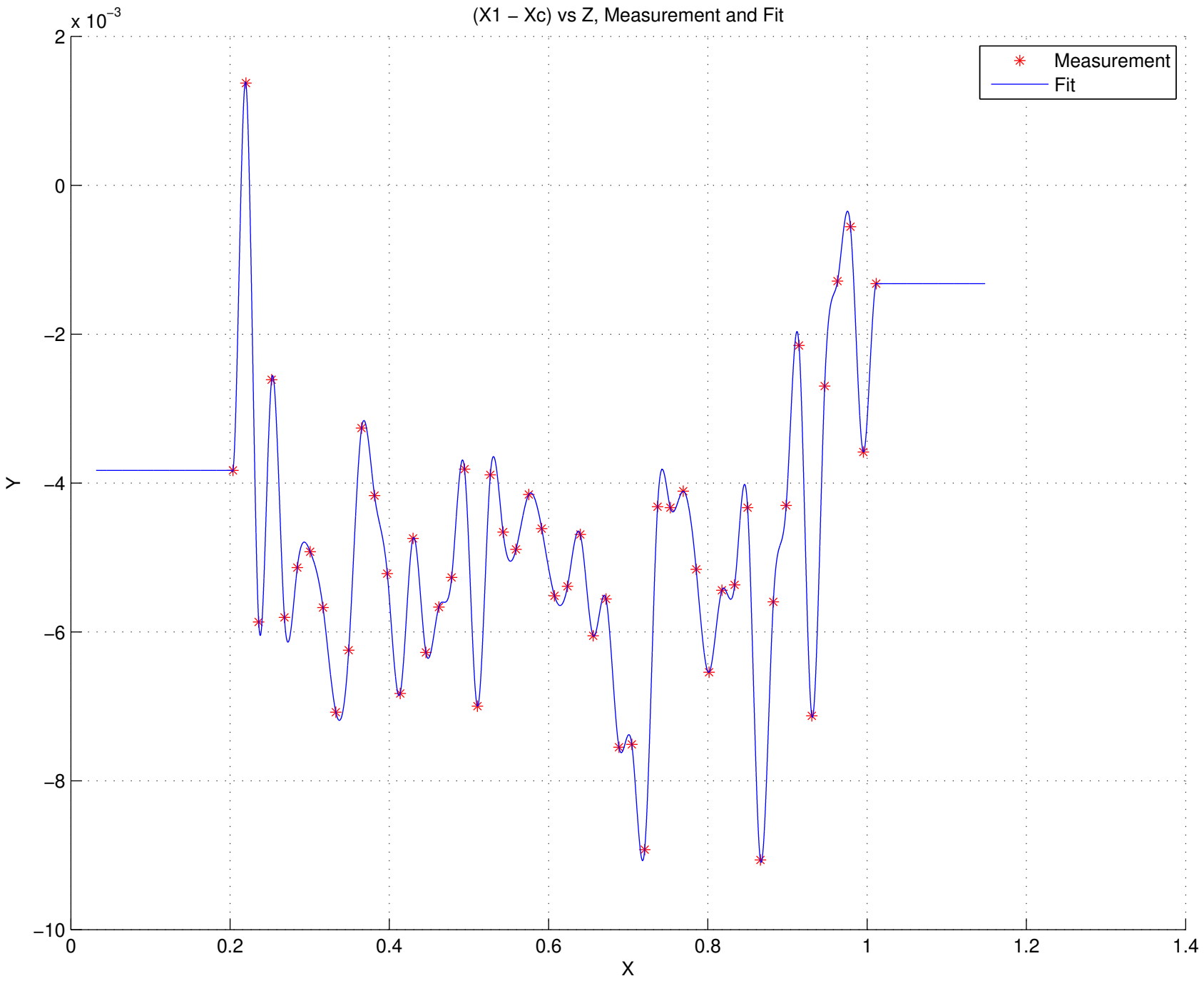

Y Probe, Laser System
x 10^-5
4
2
0
−2
−4
−6
−8
Y Probe (m)
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
1.1
1.2
Z (m)

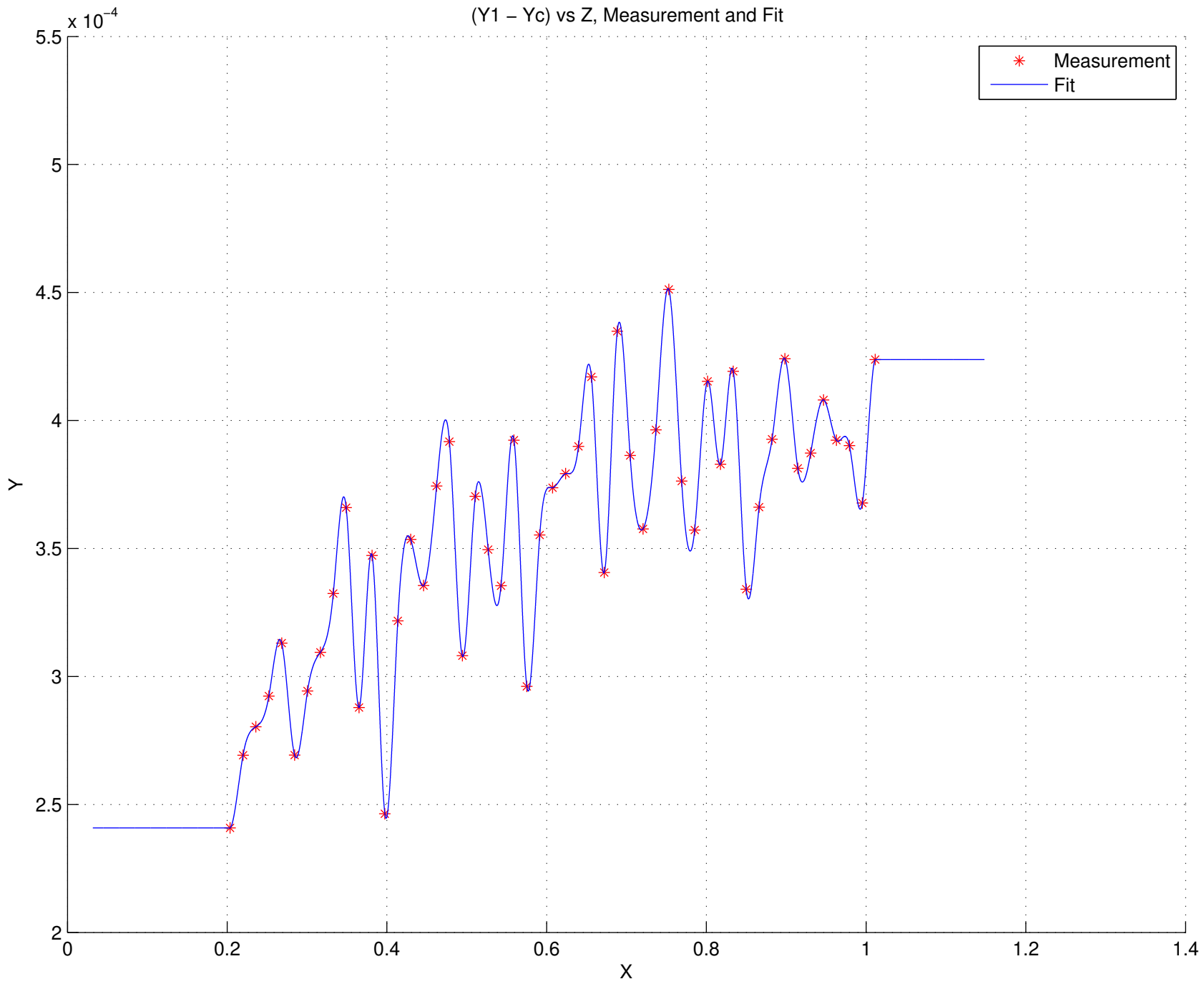

X Center, X Beam Axis, Magnetic Center Rel Measurement Axis
x 10^-3
10
8
6
4
2
0
−2
X Center, X Beam Axis (m)
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
1.1
1.2
Z (m)

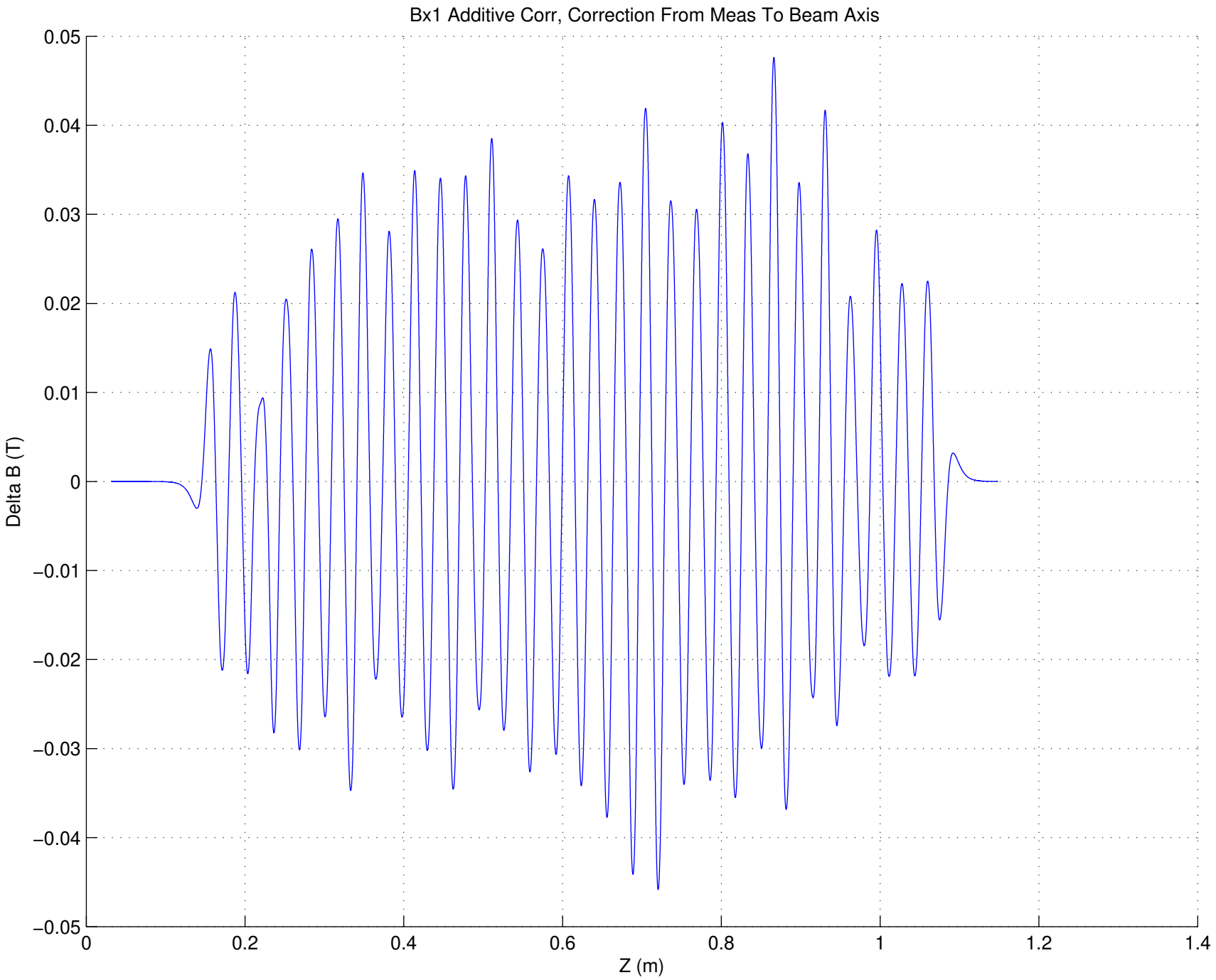

Y Center, Y Beam Axis, Magnetic Center Rel Measurement Axis
x 10^-4
−2.6
−2.8
−3
−3.2
−3.4
−3.6
−3.8
−4
−4.2
−4.4
Y Center, Y Beam Axis (m)
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
1.1
1.2
Z (m)

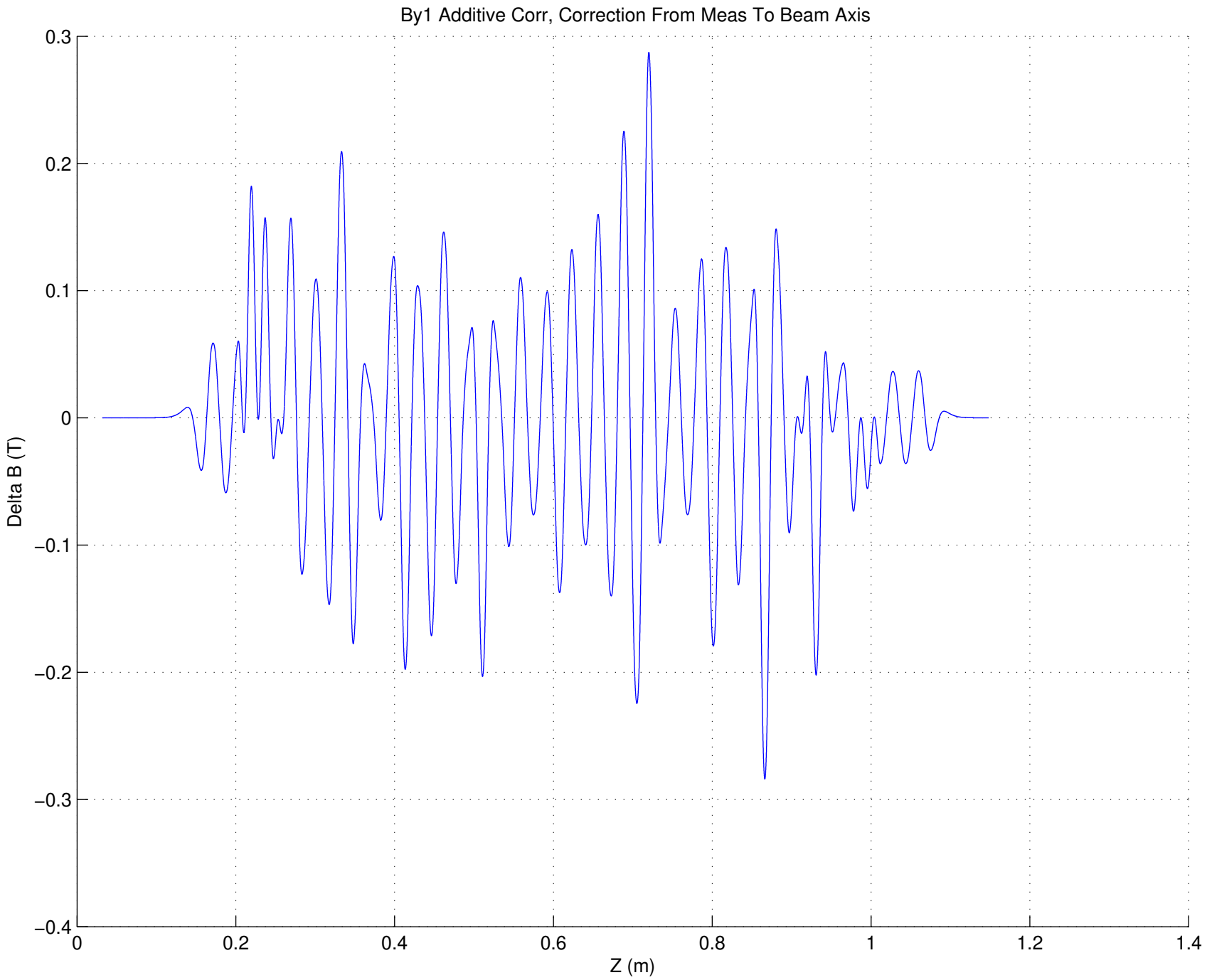

Xc vs Z, Measurement and Fit
x 10^-3
10
8
6
4
2
0
−2
Y
0
0.2
0.4
0.6
0.8
1
1.2
1.4
X
Measurement
Fit

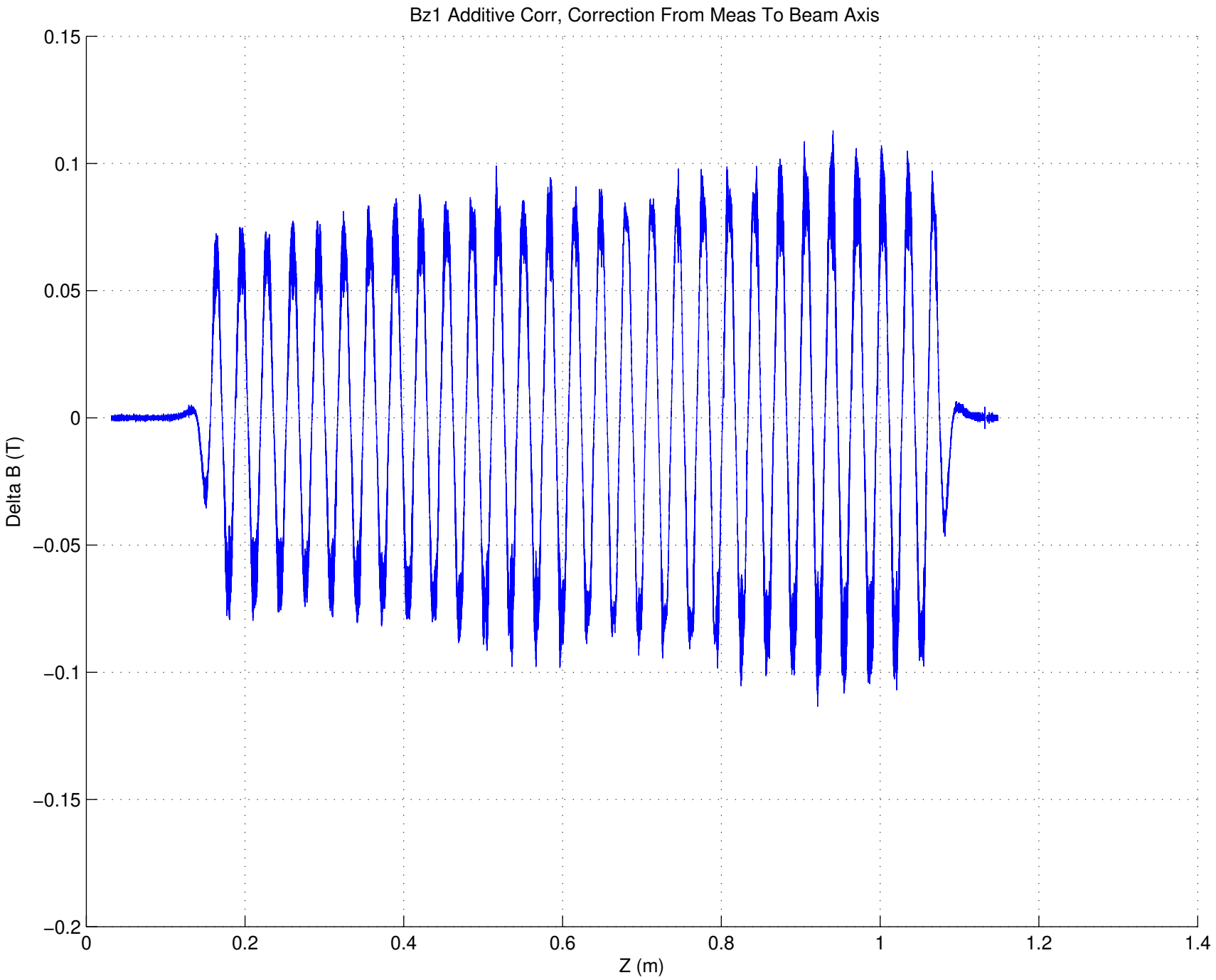

Yc vs Z, Measurement and Fit
x 10^-4
−2.6
−2.8
−3
−3.2
−3.4
−3.6
−3.8
−4
−4.2
−4.4
Y
0
0.2
0.4
0.6
0.8
1
1.2
1.4
X
Measurement
Fit

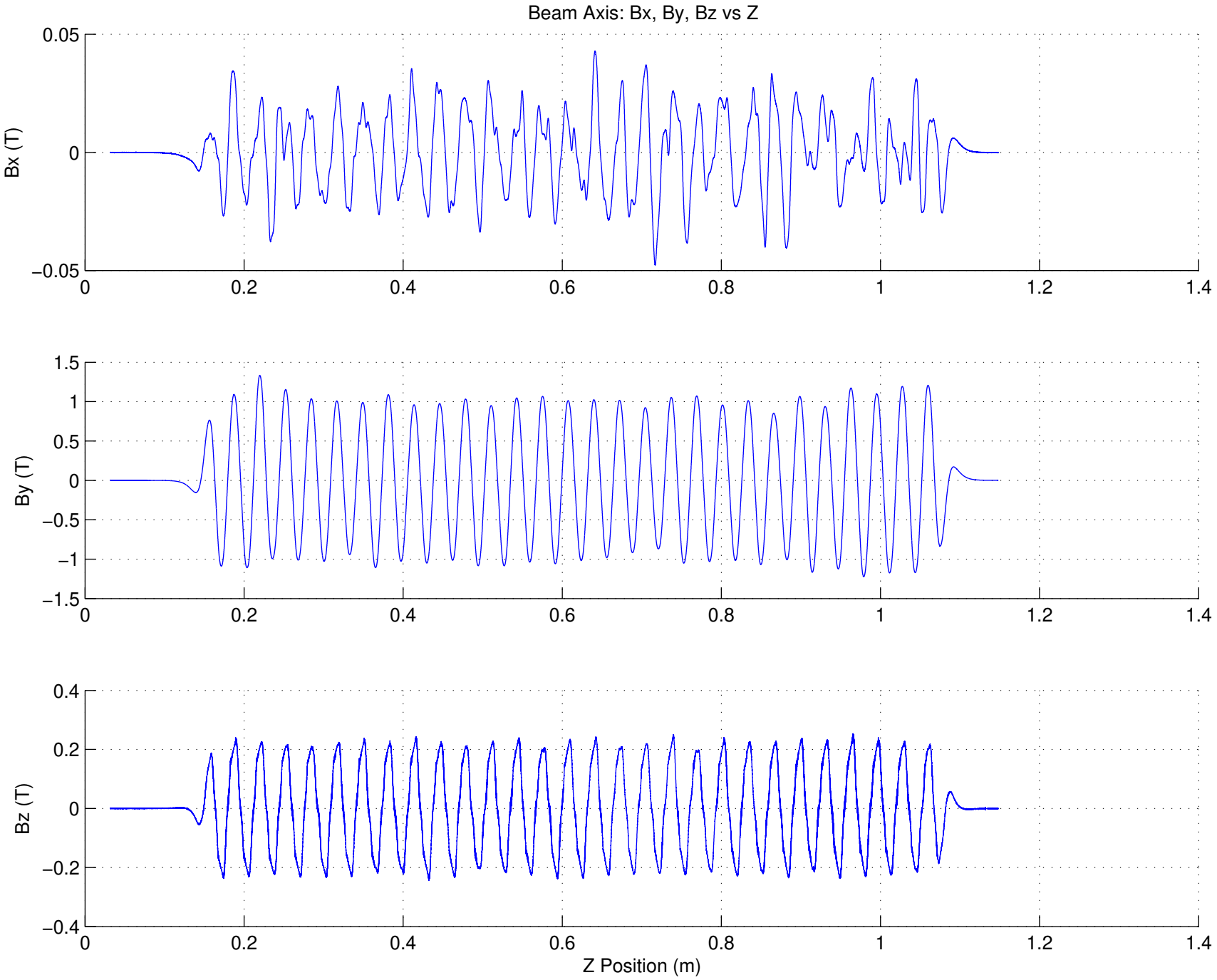

(X1 – Xc) vs Z, Measurement and Fit
x 10^-3
2
0
−2
−4
−6
−8
−10
Y
0
0.2
0.4
0.6
0.8
1
1.2
1.4
X
Measurement
Fit


(Y1 – Yc) vs Z, Measurement and Fit
x 10^-4
5.5
5
4.5
4
3.5
3
2.5
2
Y
0
0.2
0.4
0.6
0.8
1
1.2
1.4
X
Measurement
Fit


Bx1 Additive Corr, Correction From Meas To Beam Axis
Delta B (T)
Z (m)
0.05
0.04
0.03
0.02
0.01
0
−0.01
−0.02
−0.03
−0.04
−0.05
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)
0.3
0.2
0.1
0
−0.1
−0.2
−0.3
−0.4
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)
0.15
0.1
0.05
0
−0.05
−0.1
−0.15
−0.2
0
0.2
0.4
0.6
0.8
1
1.2
1.4


Beam Axis: Bx, By, Bz vs Z
Bx (T)
0.05
0
−0.05
By (T)
1.5
1
0.5
0
−0.5
−1
−1.5
Bz (T)
0.4
0.2
0
−0.2
−0.4
0
0.2
0.4
0.6
0.8
1
1.2
1.4
Z Position (m)