SLAC Magnetic Measurements

Hall Probe Array Analysis
****

Parameters:
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INPUT-FILE-NAME =DUTestOutput.dat
INPUT-FILE-TYPE =ZVXYZVXYZH
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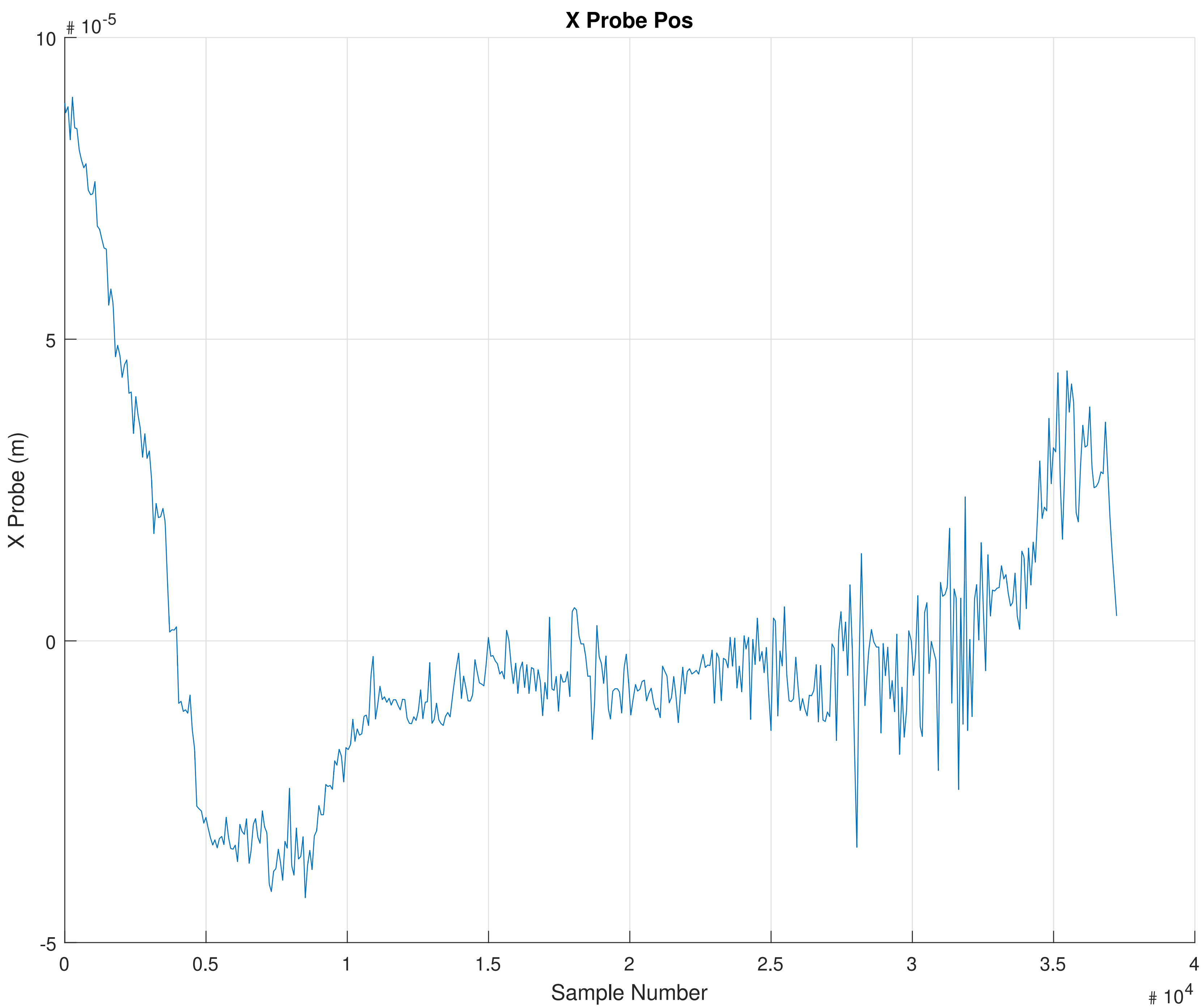
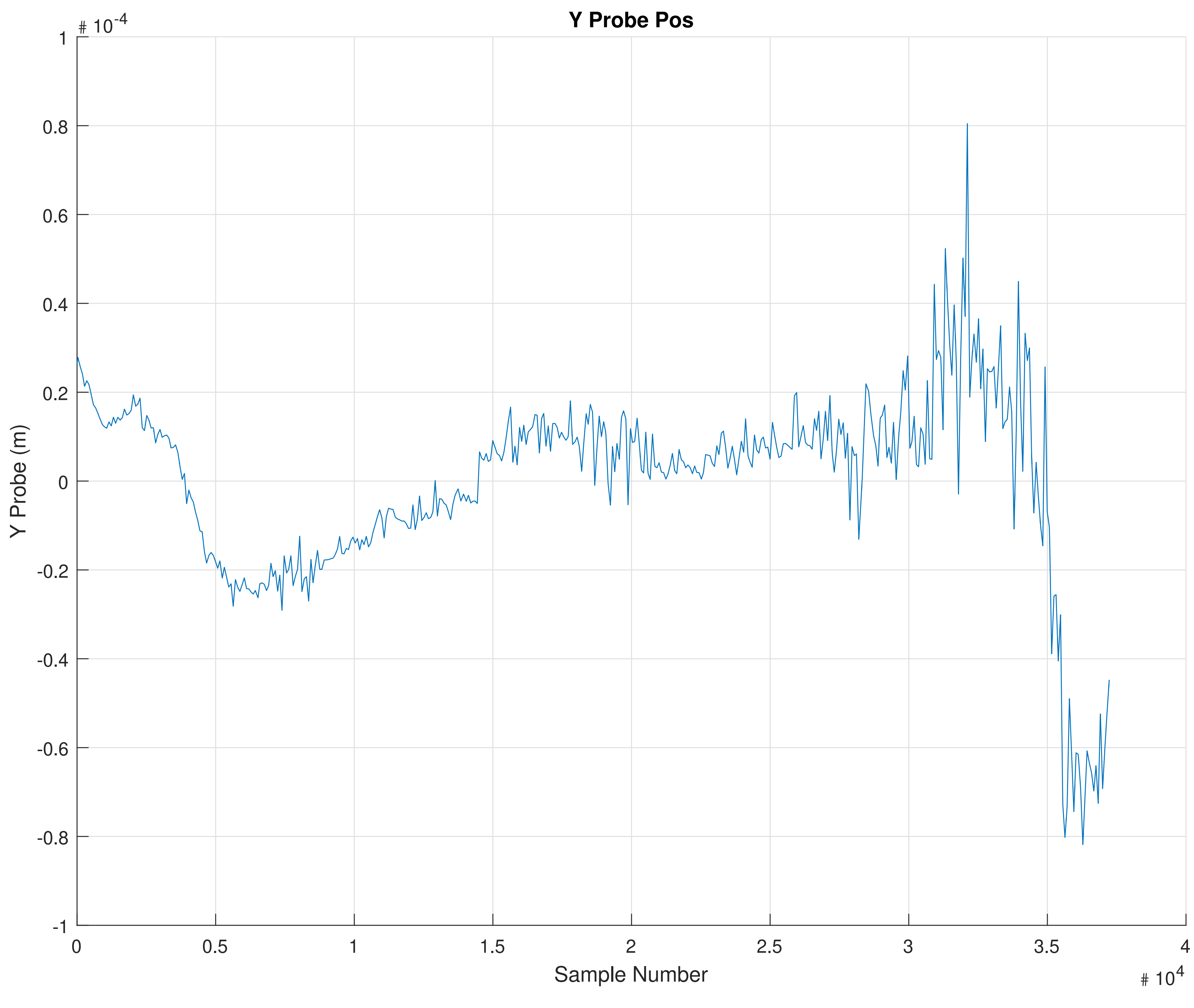
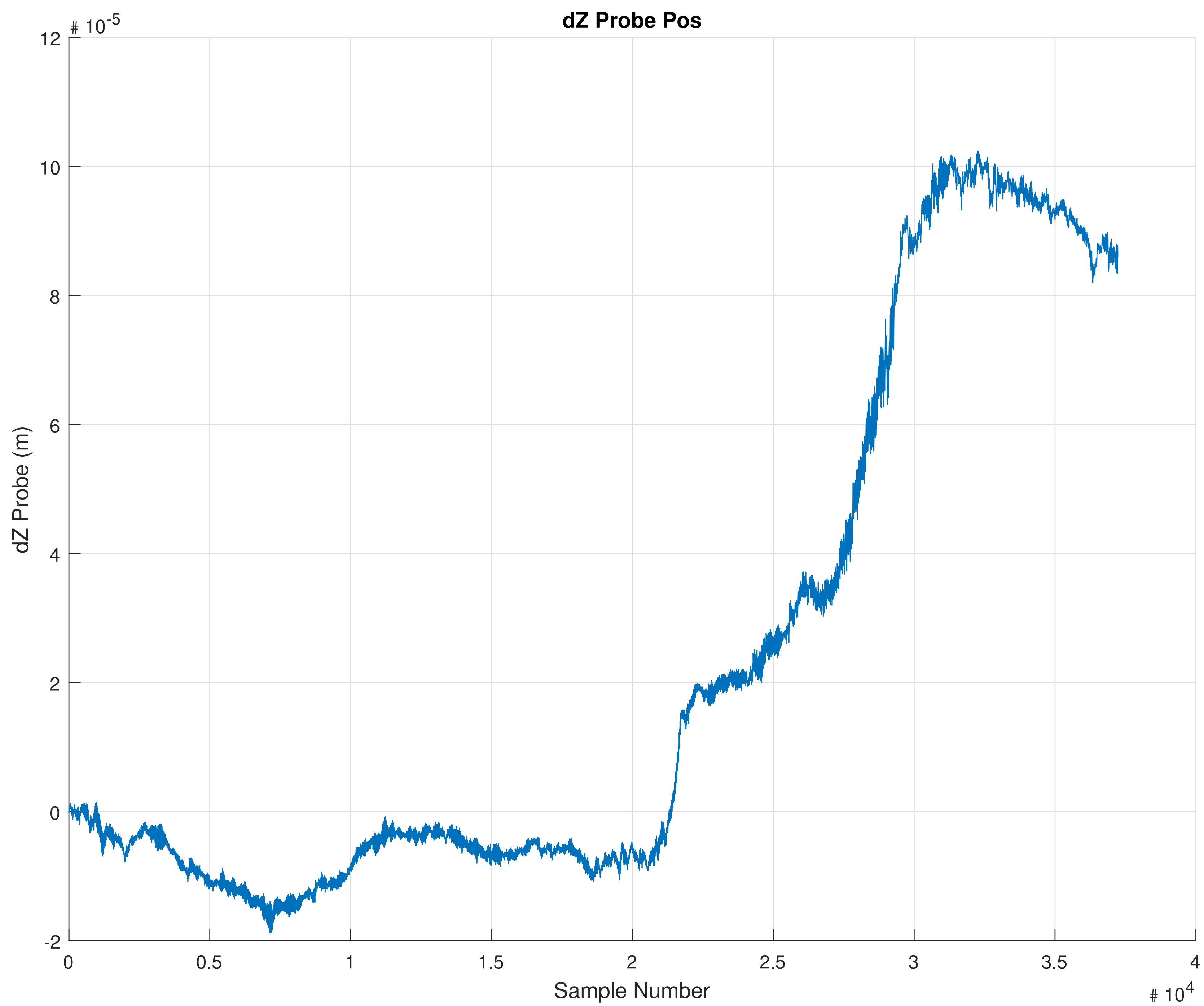
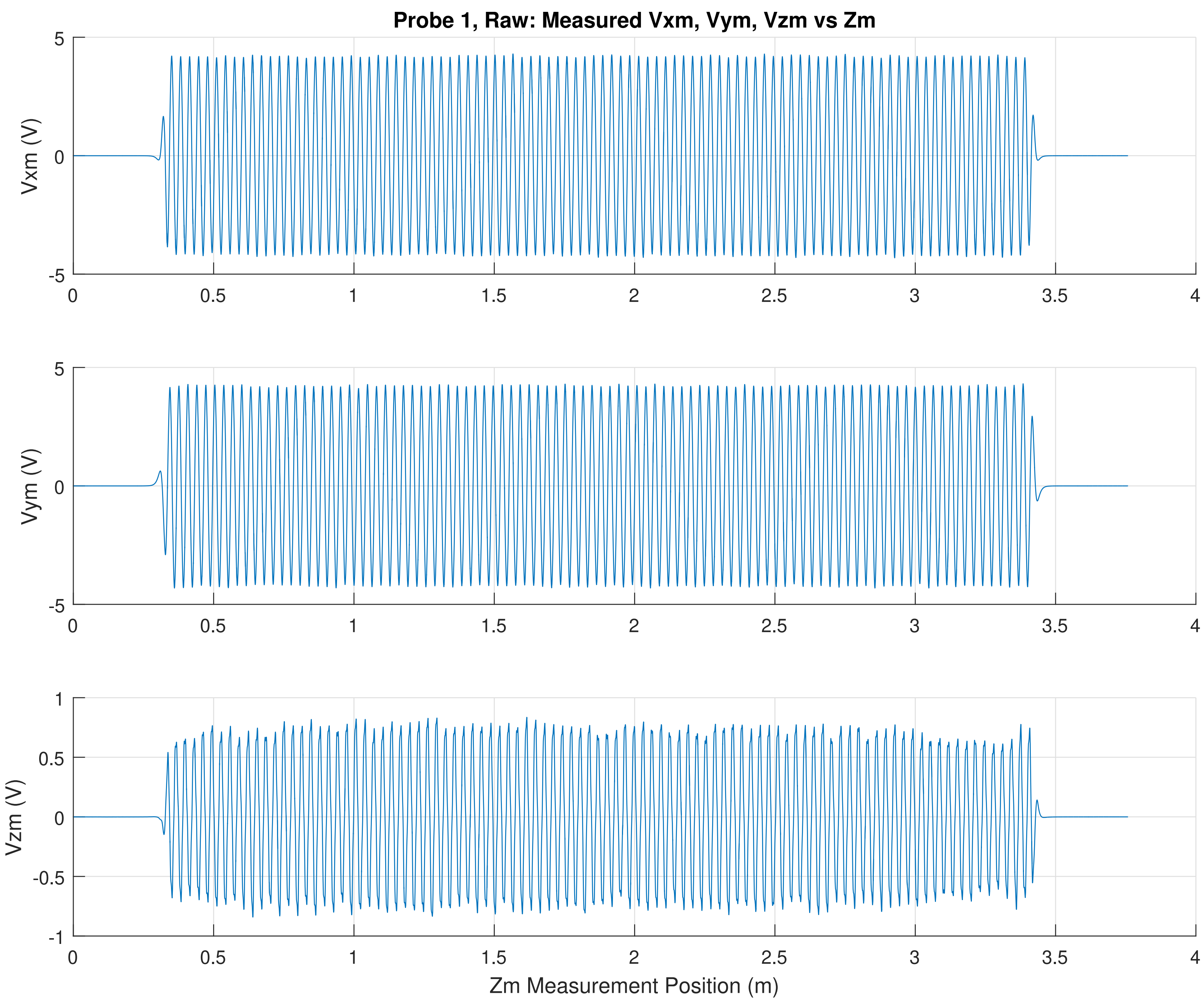
PROBE1-BY-CALIB-FILE =V:\MET\MagServe\MagData\DELTA\Delta Data 2015\New Measurements\Yurii Hall Probe Calibrations\SENIS-119-12-Y.ini
PROBE2-BX-CALIB-FILE =V:\MET\MagServe\MagData\DELTA\Delta Data 2015\New Measurements\Yurii Hall Probe Calibrations\SENIS-120-12-X.ini
PROBE2-BY-CALIB-FILE =V:\MET\MagServe\MagData\DELTA\Delta Data 2015\New Measurements\Yurii Hall Probe Calibrations\SENIS-120-12-Y.ini
NUM-ZERO-GAUSS-MEAS =200
PROBE2-OFFSET-DIR =Y

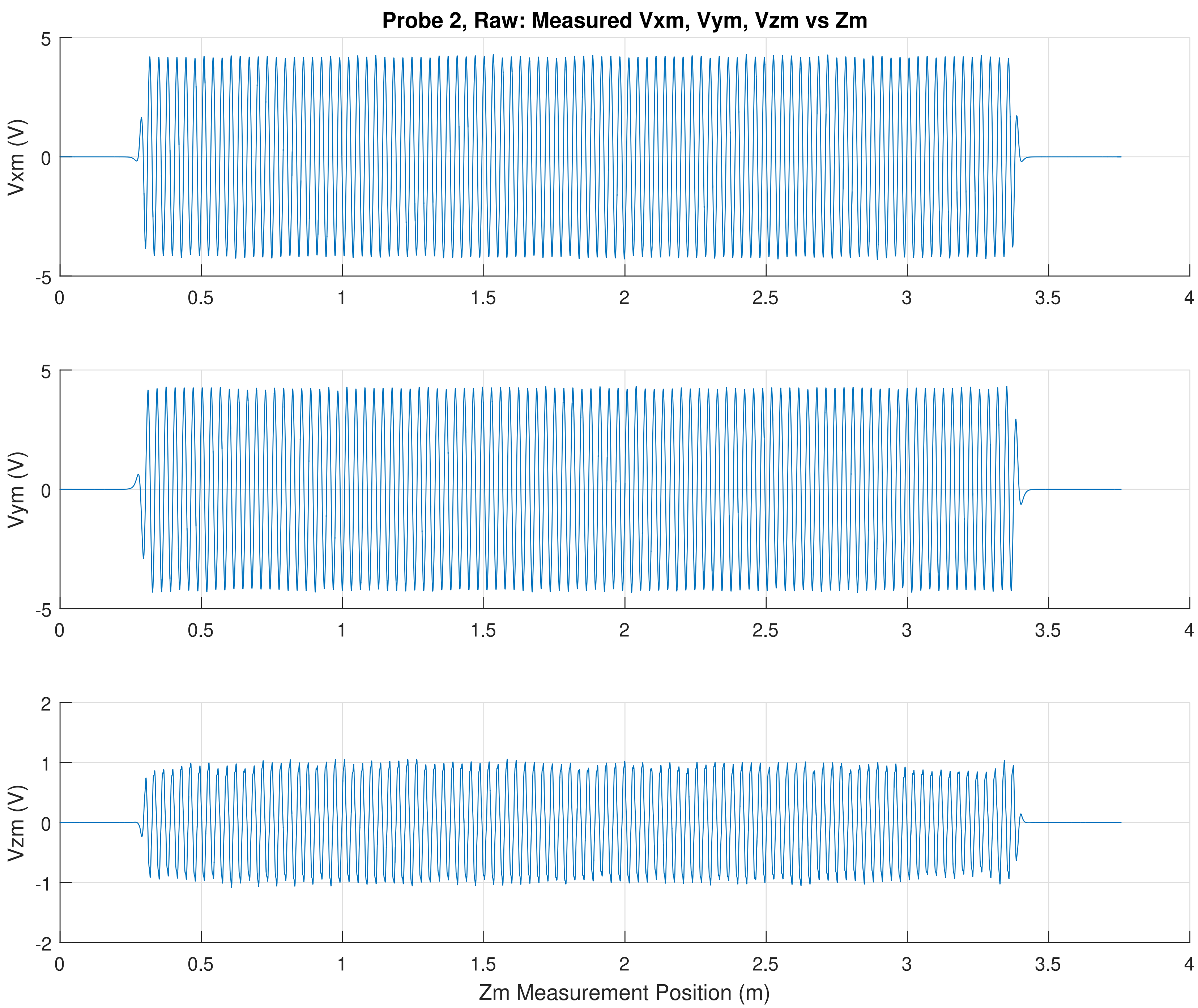

X Probe Pos
10^-5
10
5
0
-5
X Probe (m)
0
0.5
1
1.5
2
2.5
3
3.5
4
Sample Number
10^4


Y Probe Pos
10-4
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
Y Probe (m)
0
0.5
1
1.5
2
2.5
3
3.5
4
Sample Number
10^4

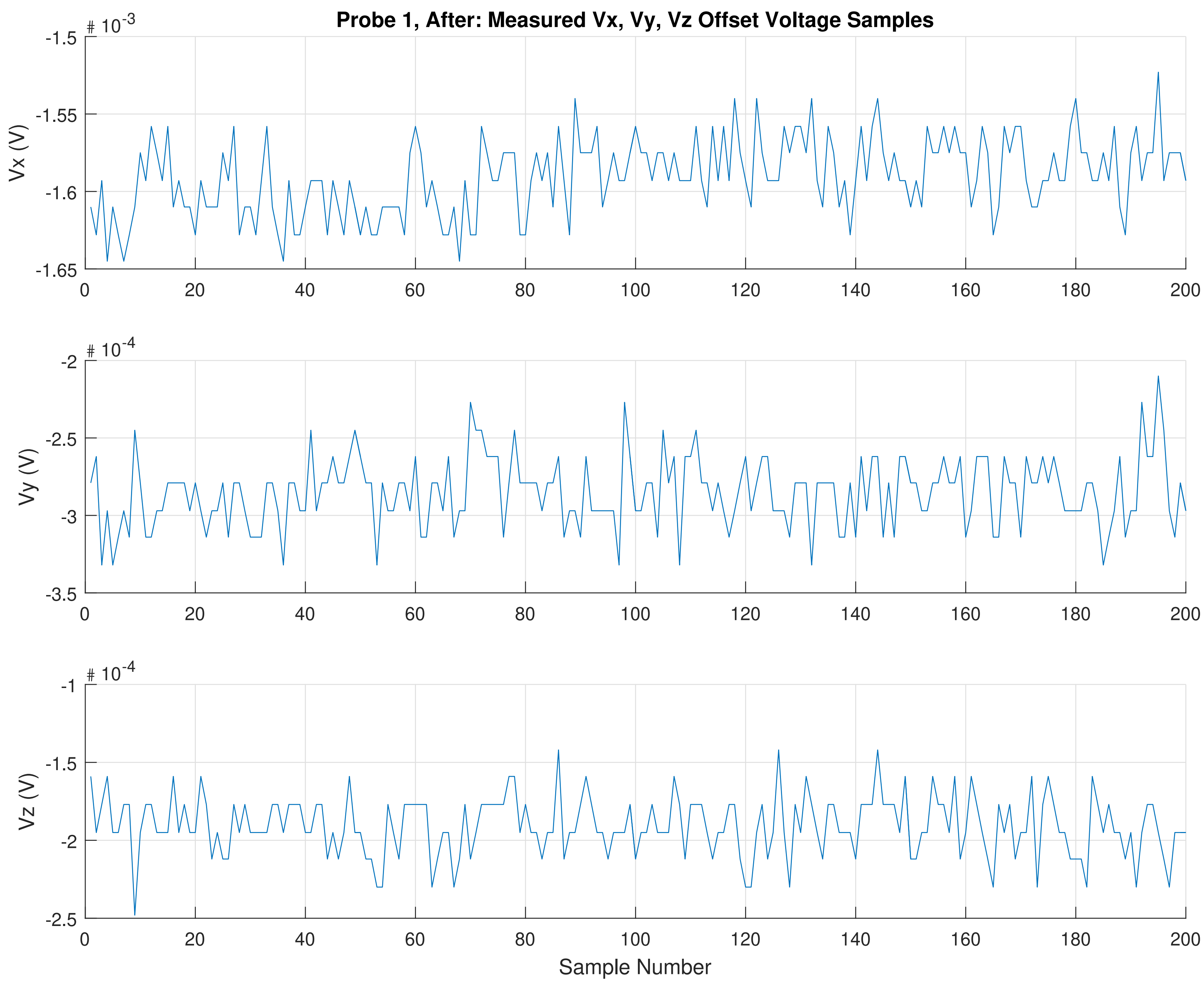

dZ Probe Pos
10-5
12
10
8
6
4
2
0
-2
dZ Probe (m)
0
0.5
1
1.5
2
2.5
3
3.5
4
Sample Number
104



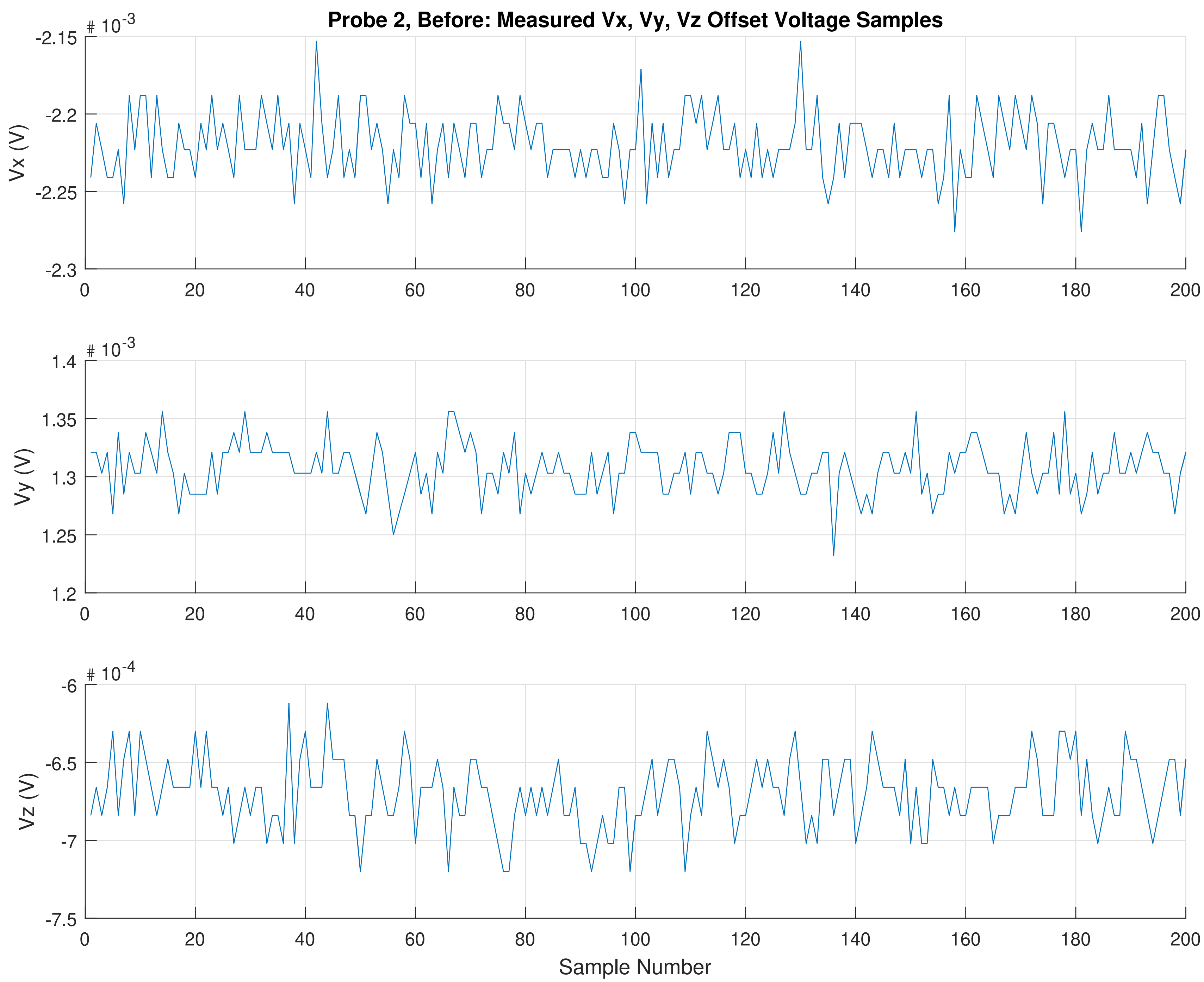
Probe 1, Raw: Measured Vxm, Vym, Vzm vs Zm
Vxm (V)
Vym (V)
Vzm (V)
Zm Measurement Position (m)

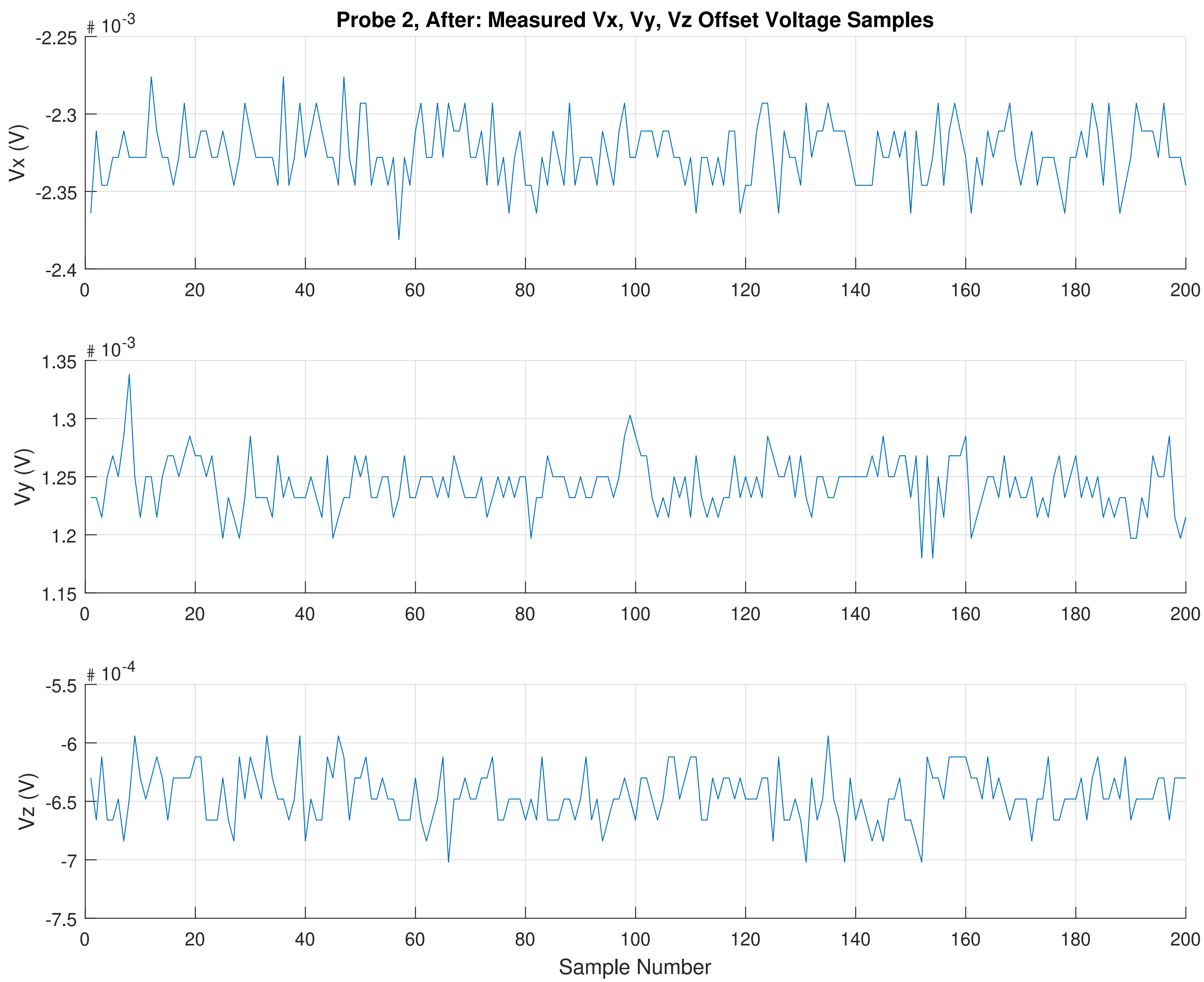

Probe 2, Raw: Measured Vxm, Vym, Vzm vs Zm
Vxm (V)
Vym (V)
Vzm (V)
Zm Measurement Position (m)

Probe 1, Before: Measured Vx, Vy, Vz Offset Voltage Samples
10^-3
-1.55
-1.6
-1.65
-1.7
Vx (V)
10^-4
-1
-1.5
-2
-2.5
Vy (V)
10^-4
-3.5
-4
-4.5
-5
-5.5
Vz (V)
0 20 40 60 80 100 120 140 160 180 200
Sample Number

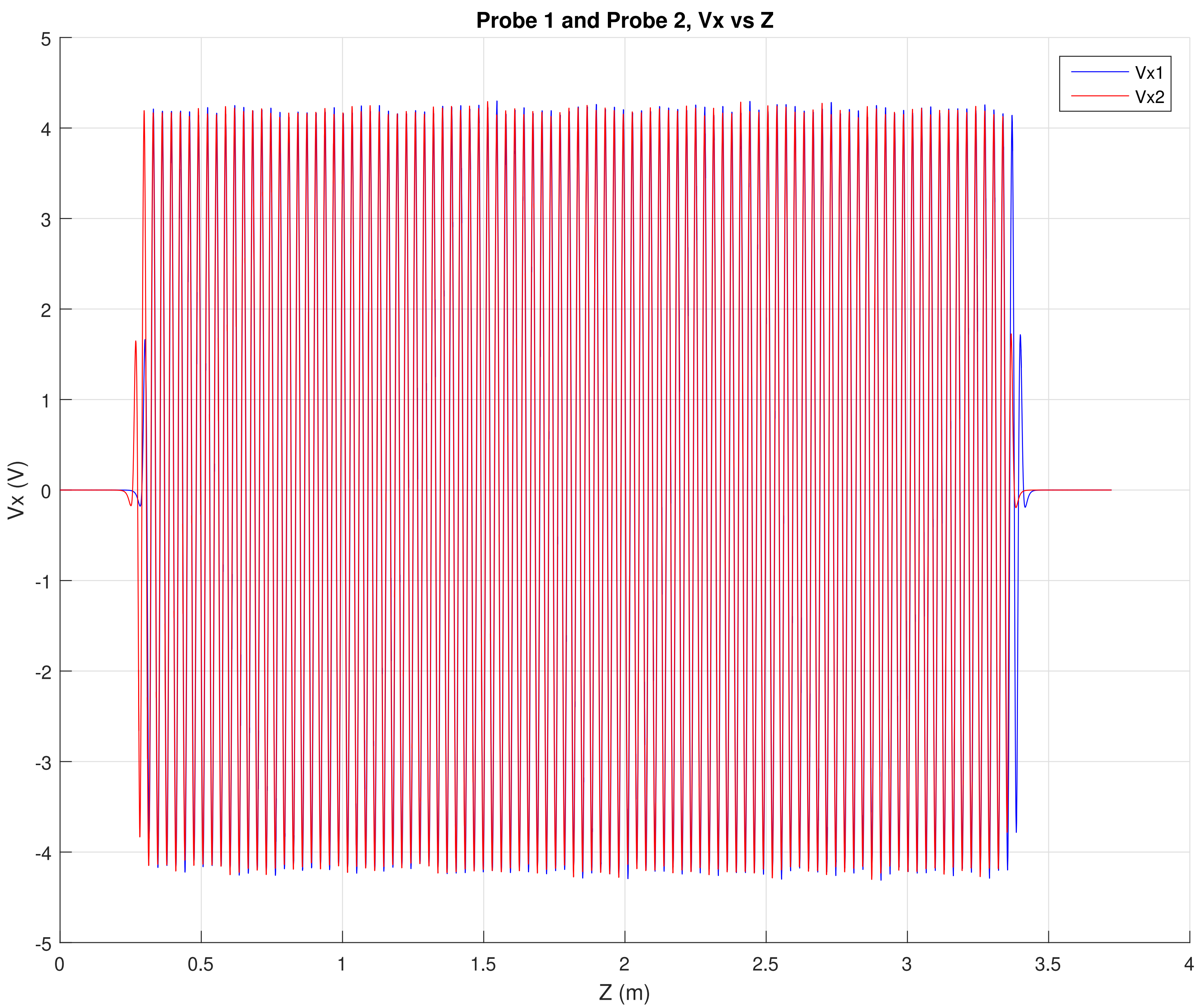


Probe 1, After: Measured Vx, Vy, Vz Offset Voltage Samples
10-3
-1.5
-1.55
-1.6
-1.65
Vx (V)
0
20
40
60
80
100
120
140
160
180
200
10-4
-2
-2.5
-3
-3.5
Vy (V)
0
20
40
60
80
100
120
140
160
180
200
10-4
-1
-1.5
-2
-2.5
Vz (V)
0
20
40
60
80
100
120
140
160
180
200
Sample Number

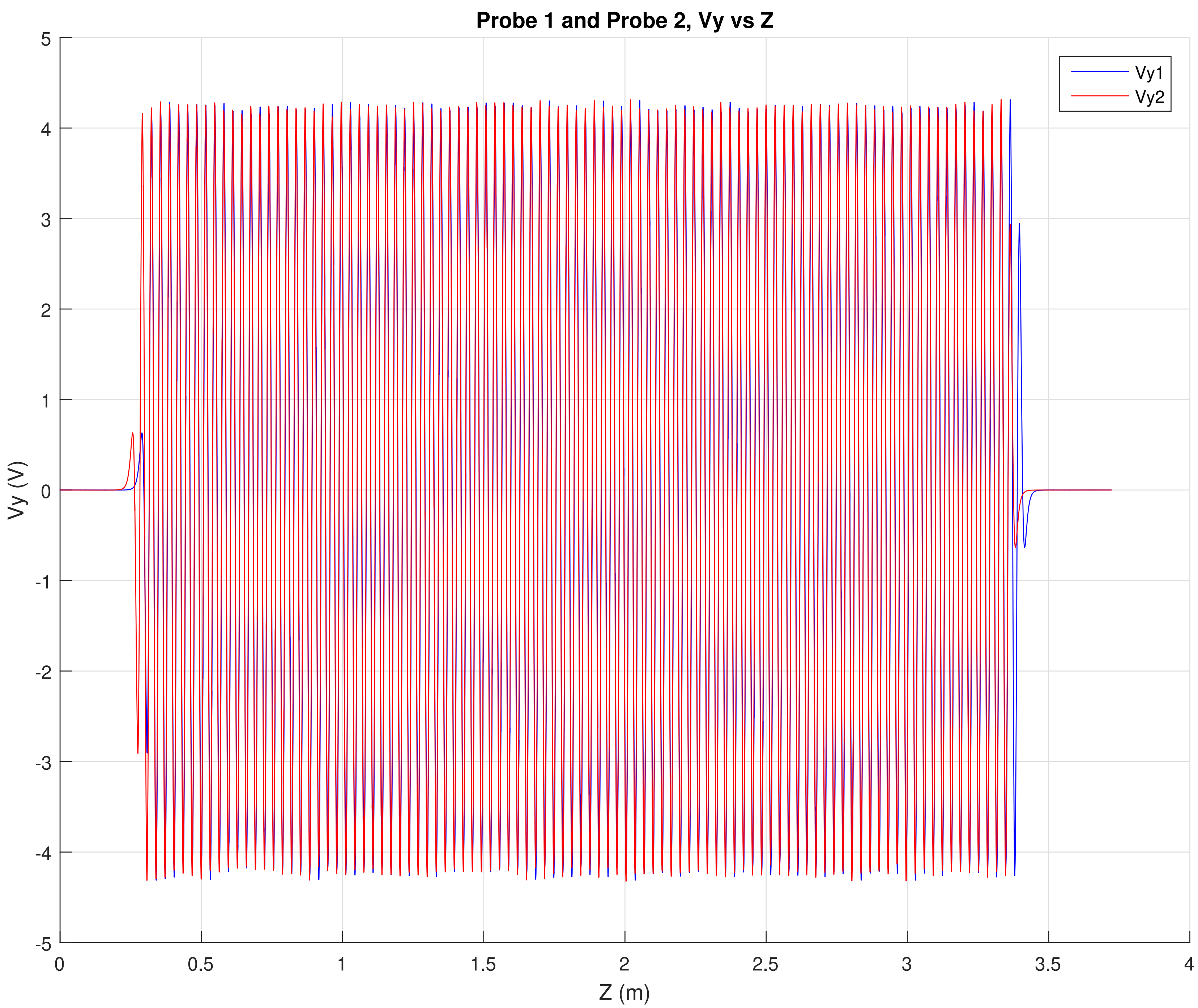

Probe 2, Before: Measured Vx, Vy, Vz Offset Voltage Samples
10-3
-2.15
-2.2
-2.25
-2.3
Vx (V)
0
20
40
60
80
100
120
140
160
180
200
10-3
1.4
1.35
1.3
1.25
1.2
Vy (V)
0
20
40
60
80
100
120
140
160
180
200
10-4
-6
-6.5
-7
-7.5
Vz (V)
0
20
40
60
80
100
120
140
160
180
200
Sample Number



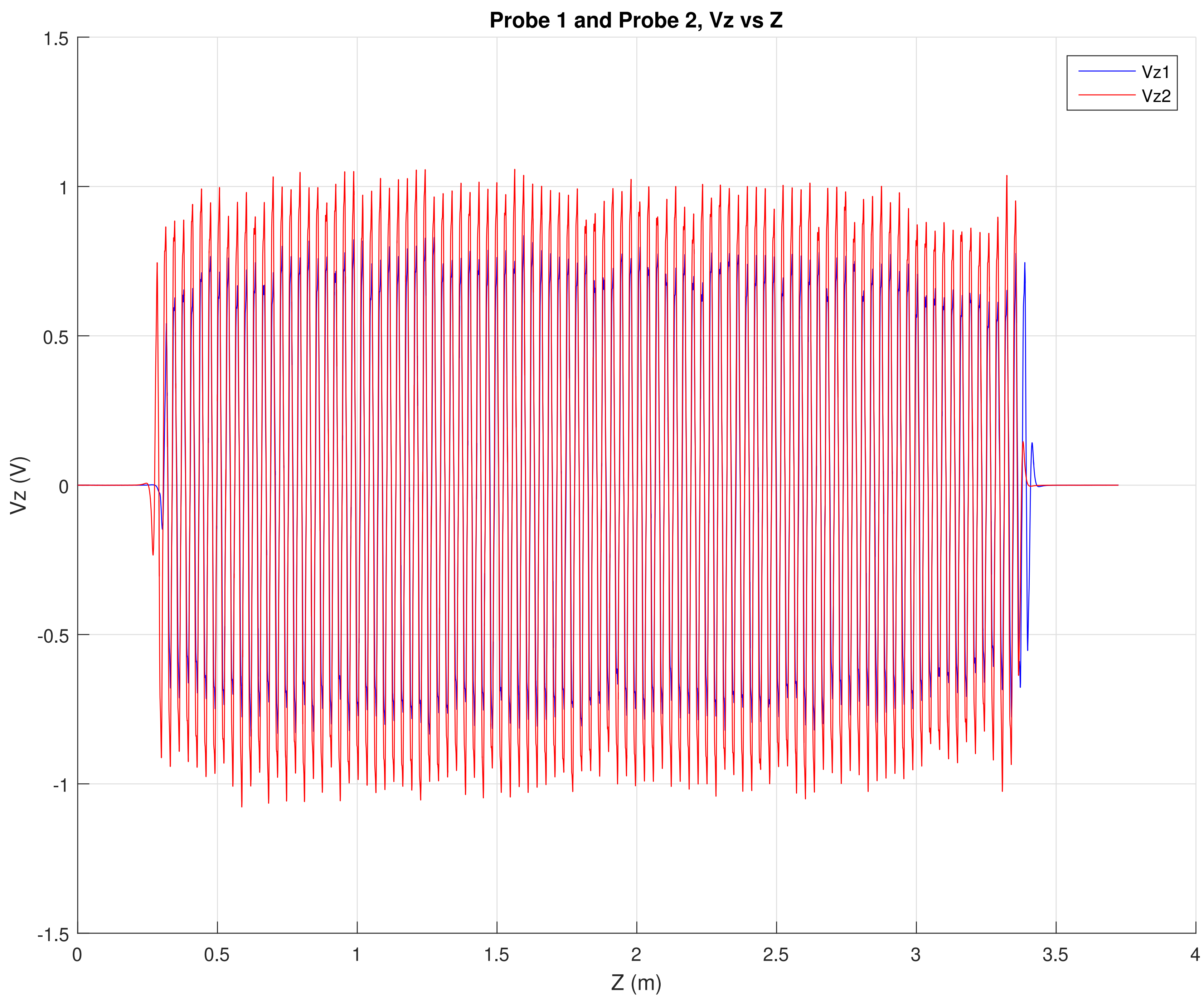
Probe 2, After: Measured Vx, Vy, Vz Offset Voltage Samples
10-3
-2.25
-2.3
-2.35
-2.4
Vx (V)
0
20
40
60
80
100
120
140
160
180
200
10-3
1.35
1.3
1.25
1.2
1.15
Vy (V)
0
20
40
60
80
100
120
140
160
180
200
10-4
-5.5
-6
-6.5
-7
-7.5
Vz (V)
0
20
40
60
80
100
120
140
160
180
200
Sample Number

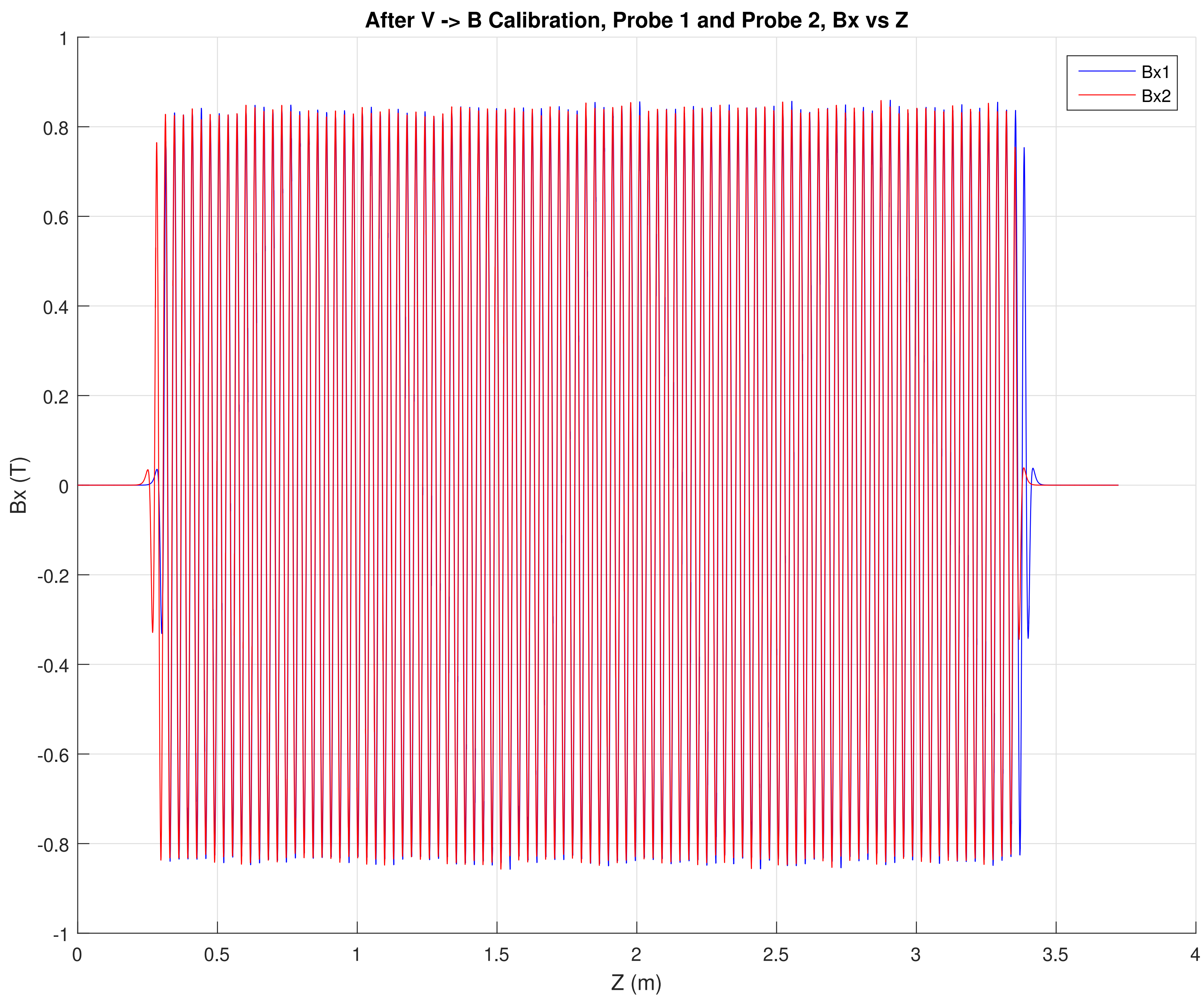


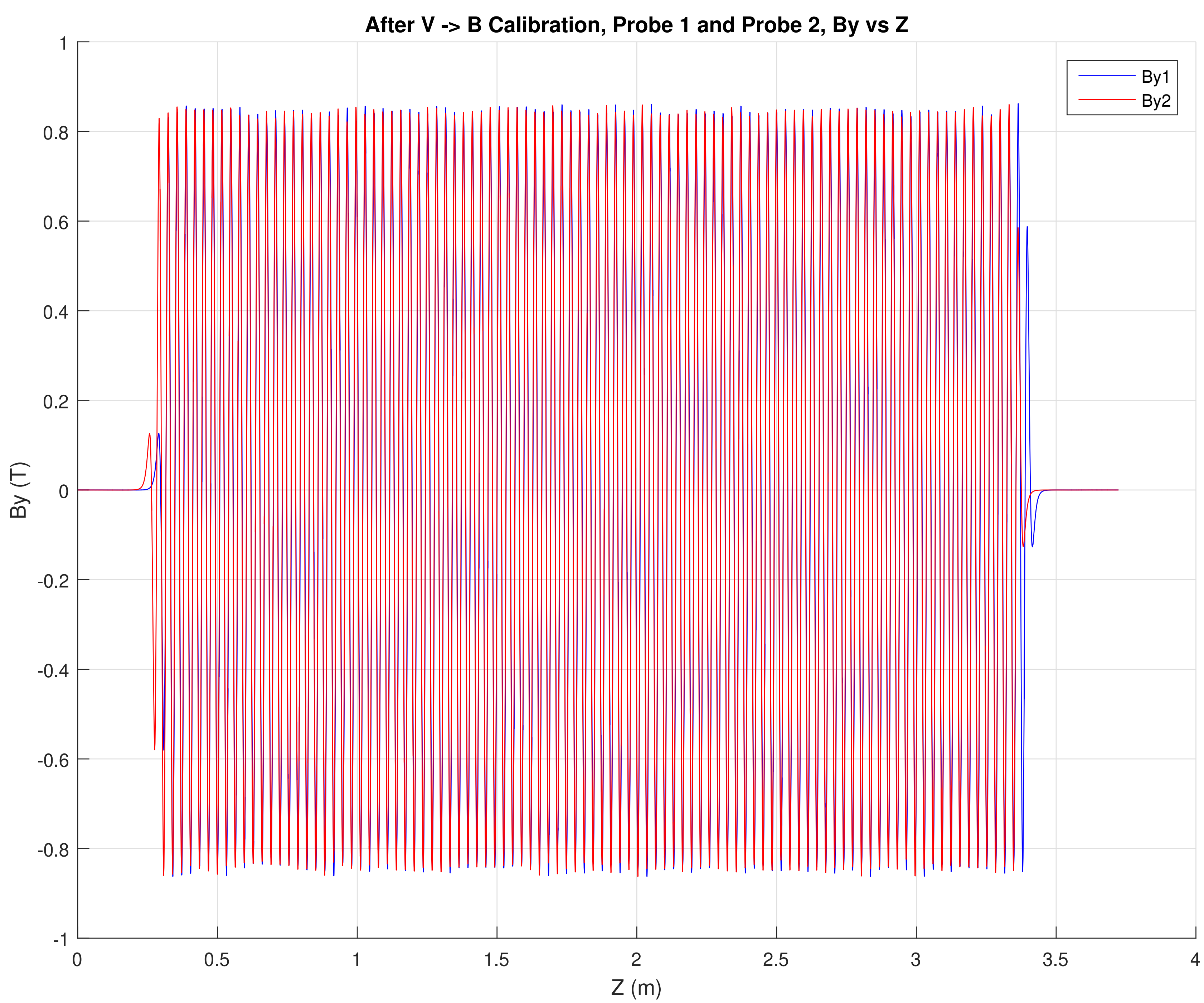
Probe 1 and Probe 2, Vx vs Z
Vx1
Vx2
Vx (V)
Z (m)
5
4
3
2
1
0
-1
-2
-3
-4
-5
0
0.5
1
1.5
2
2.5
3
3.5
4

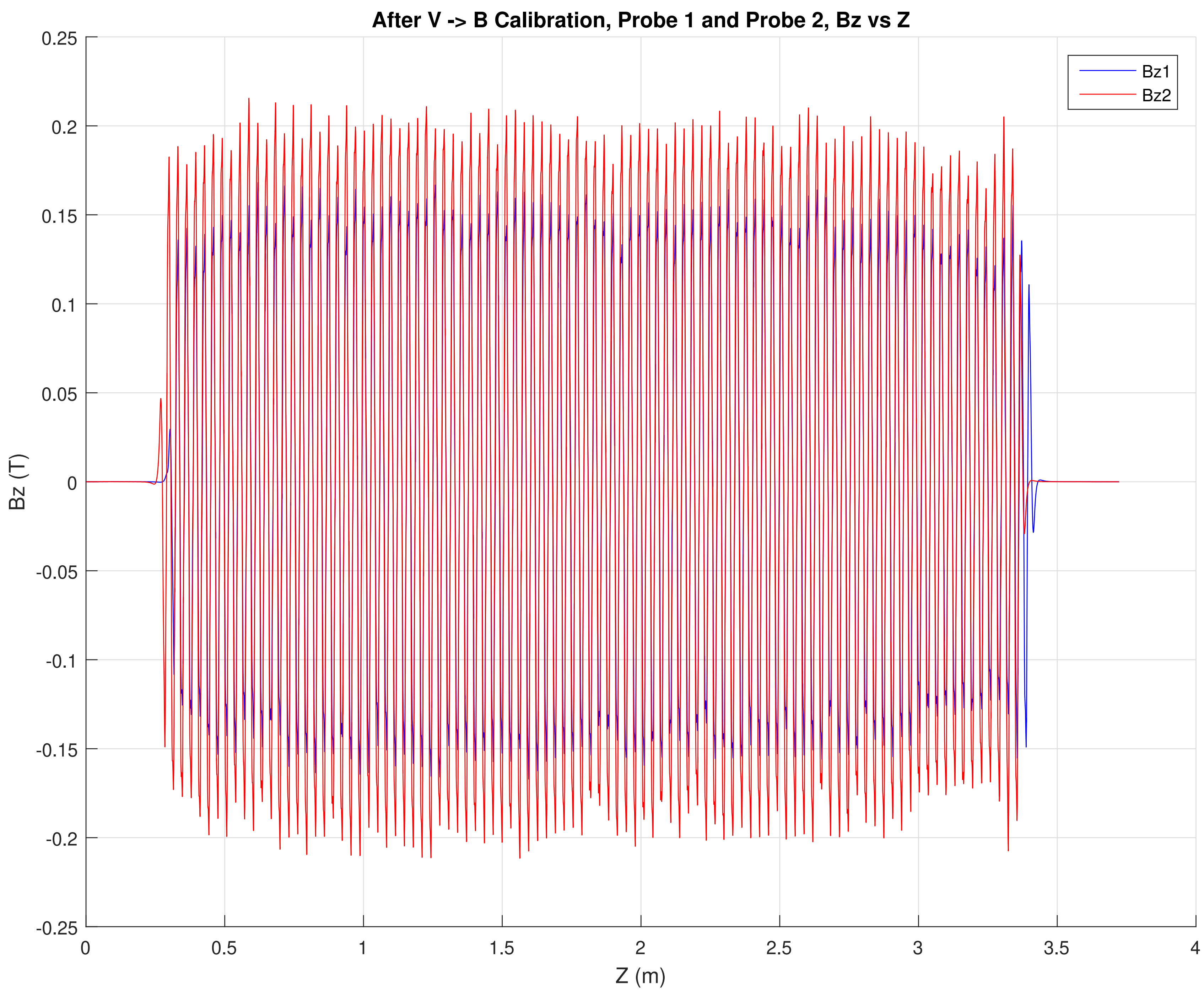


Probe 1 and Probe 2, Vy vs Z
Vy1
Vy2
Vy (V)
Z (m)
5
4
3
2
1
0
-1
-2
-3
-4
-5
0
0.5
1
1.5
2
2.5
3
3.5
4

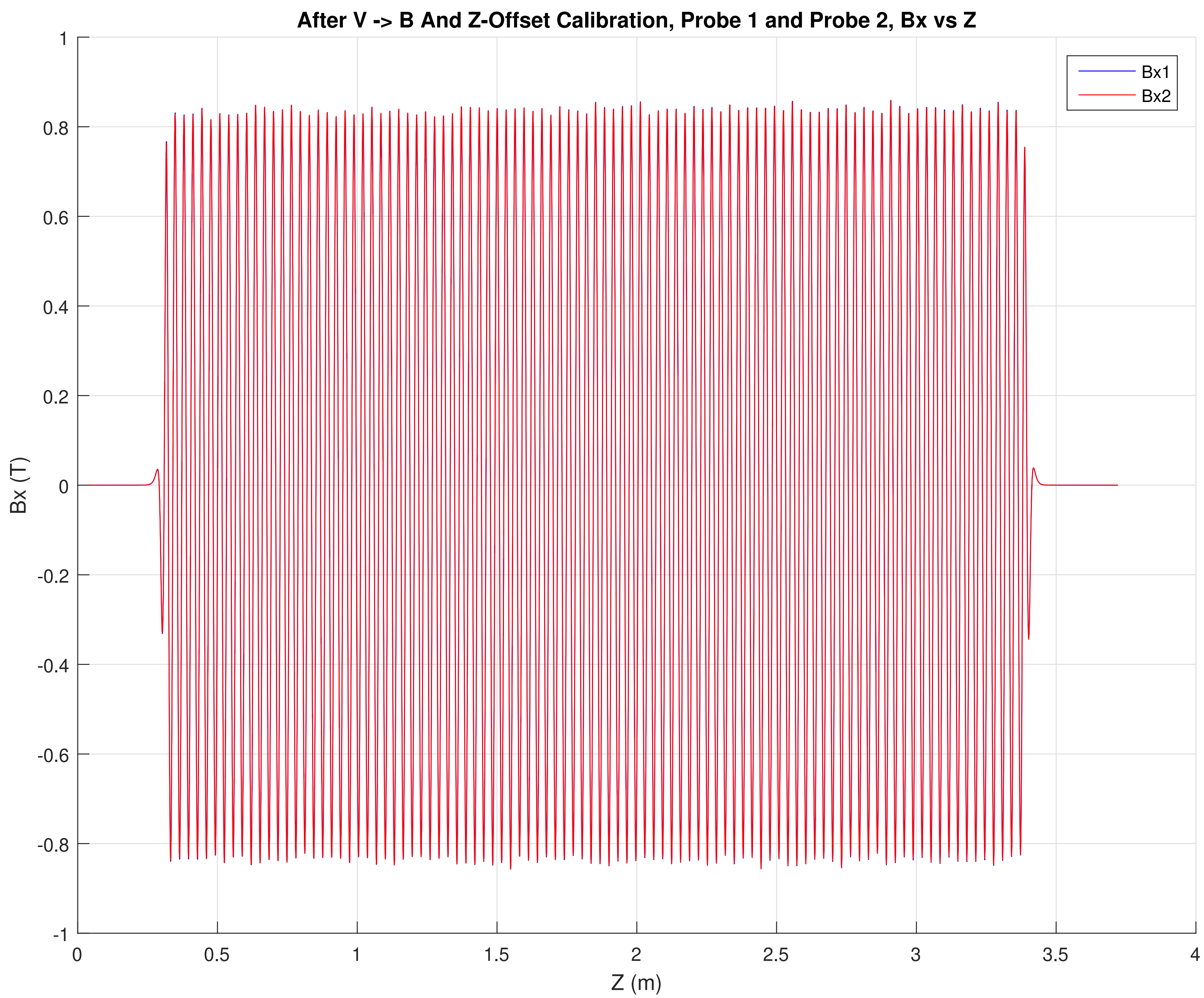

Probe 1 and Probe 2, Vz vs Z
Vz1
Vz2
Vz (V)
Z (m)
1.5
1
0.5
0
-0.5
-1
-1.5
0
0.5
1
1.5
2
2.5
3
3.5
4

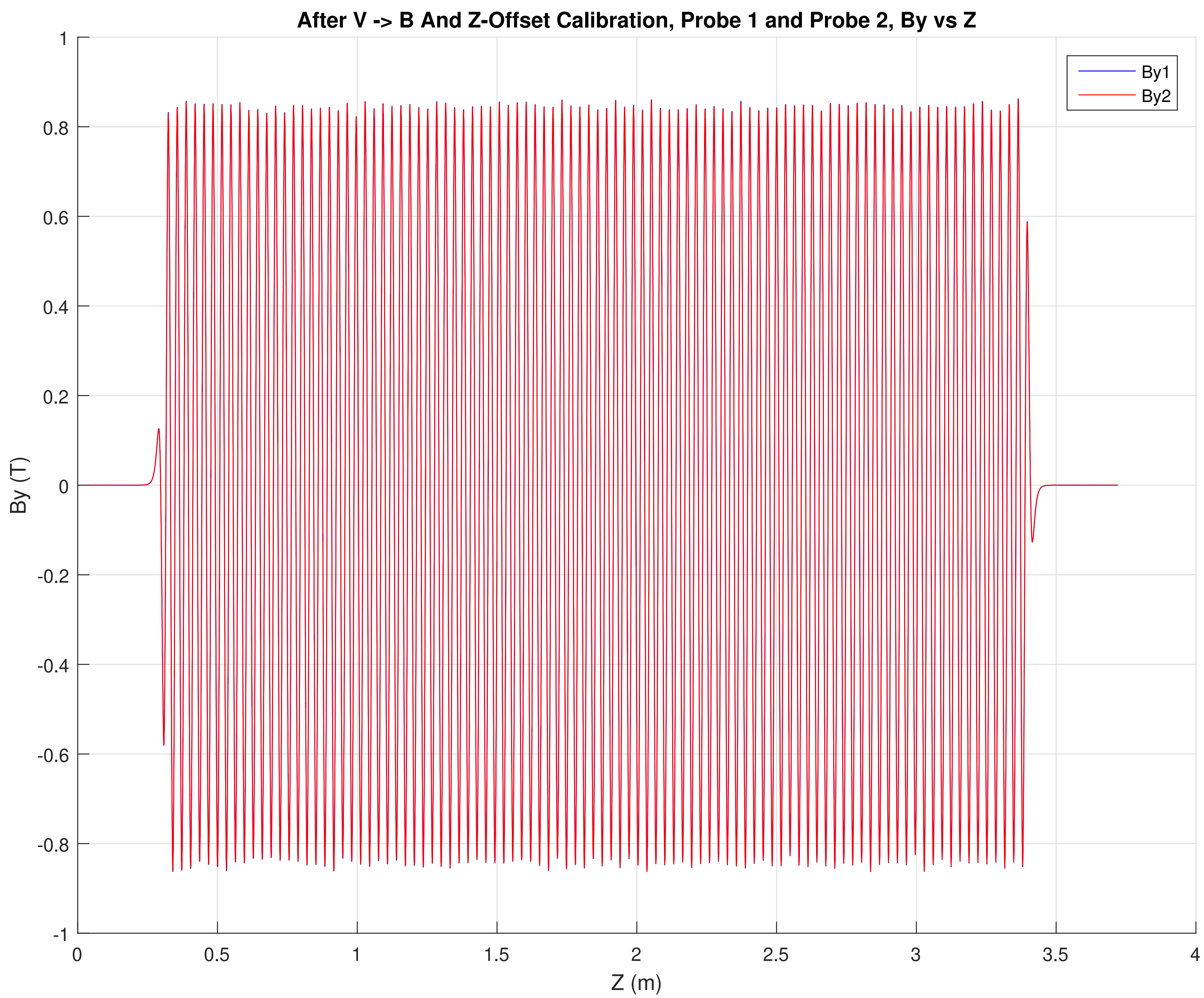

After V -> B Calibration, Probe 1 and Probe 2, Bx vs Z
Bx (T)
Z (m)
Bx1
Bx2
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
0
0.5
1
1.5
2
2.5
3
3.5
4


After V -> B Calibration, Probe 1 and Probe 2, By vs Z
By (T)
Z (m)
By1
By2
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
4

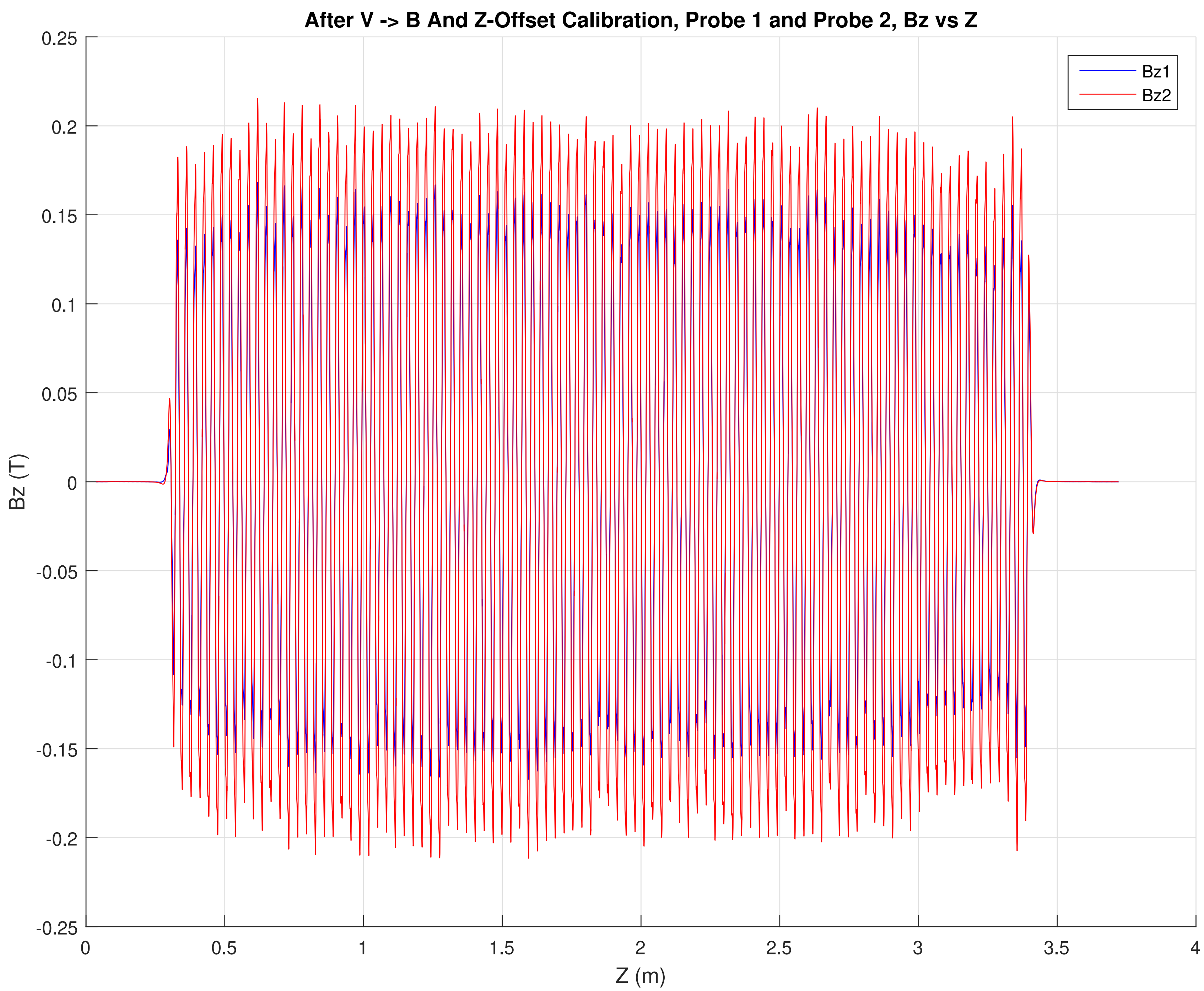


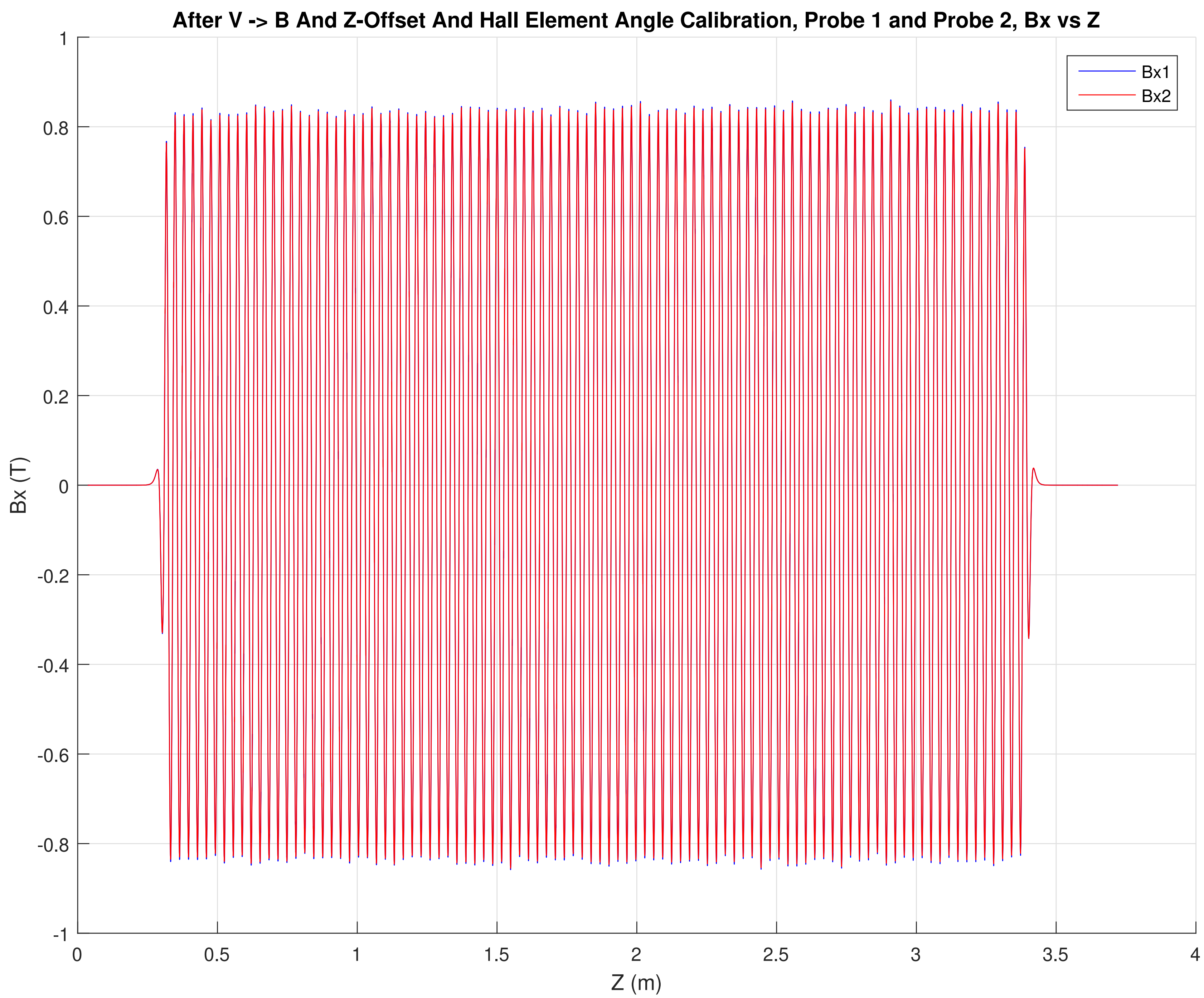
After V -> B Calibration, Probe 1 and Probe 2, Bz vs Z
Bz1
Bz2
Bz (T)
Z (m)
0.25
0.2
0.15
0.1
0.05
0
-0.05
-0.1
-0.15
-0.2
-0.25
0
0.5
1
1.5
2
2.5
3
3.5
4

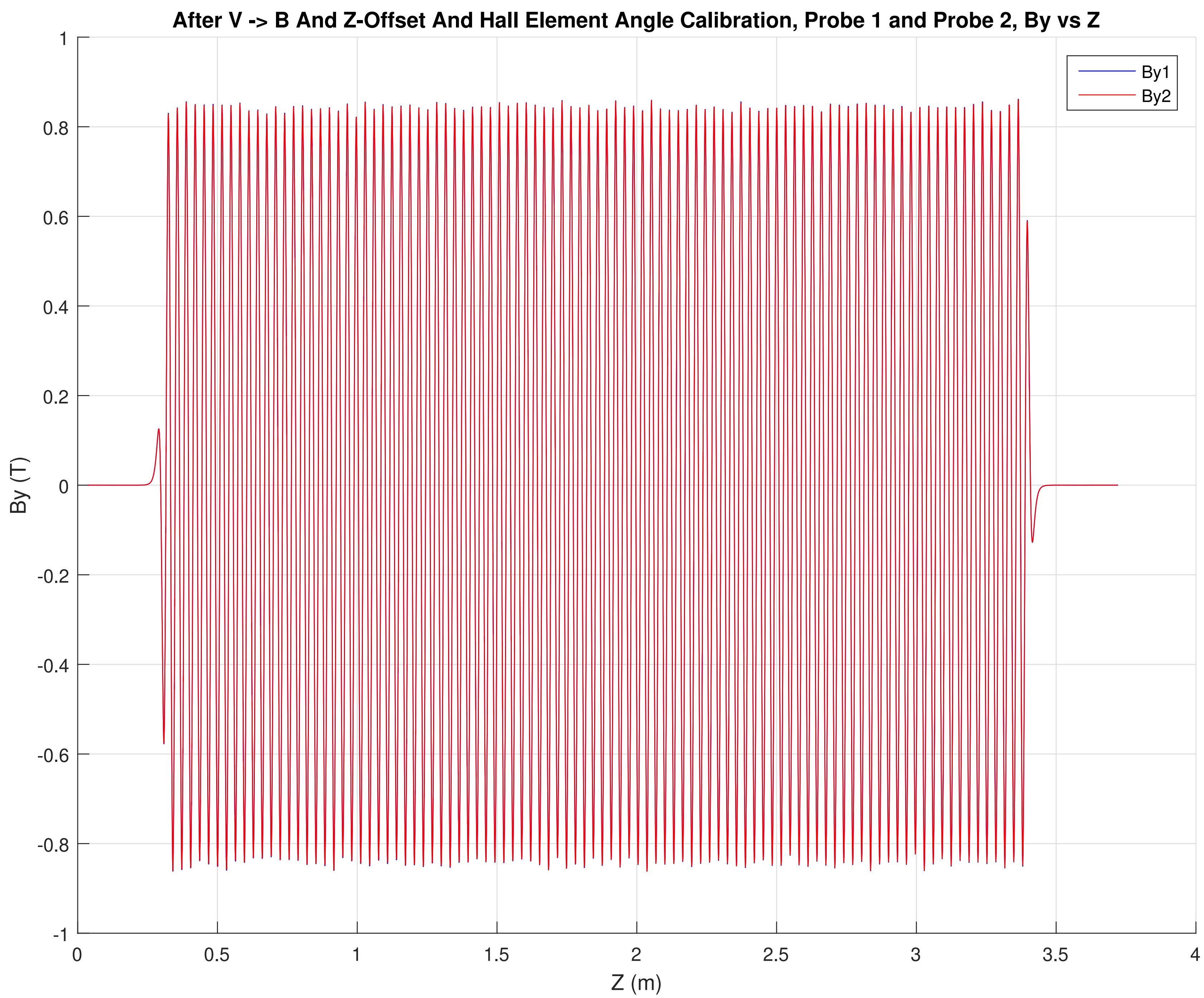

After V -> B And Z-Offset Calibration, Probe 1 and Probe 2, Bx vs Z
Bx1
Bx2
Bx (T)
Z (m)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
0
0.5
1
1.5
2
2.5
3
3.5
4

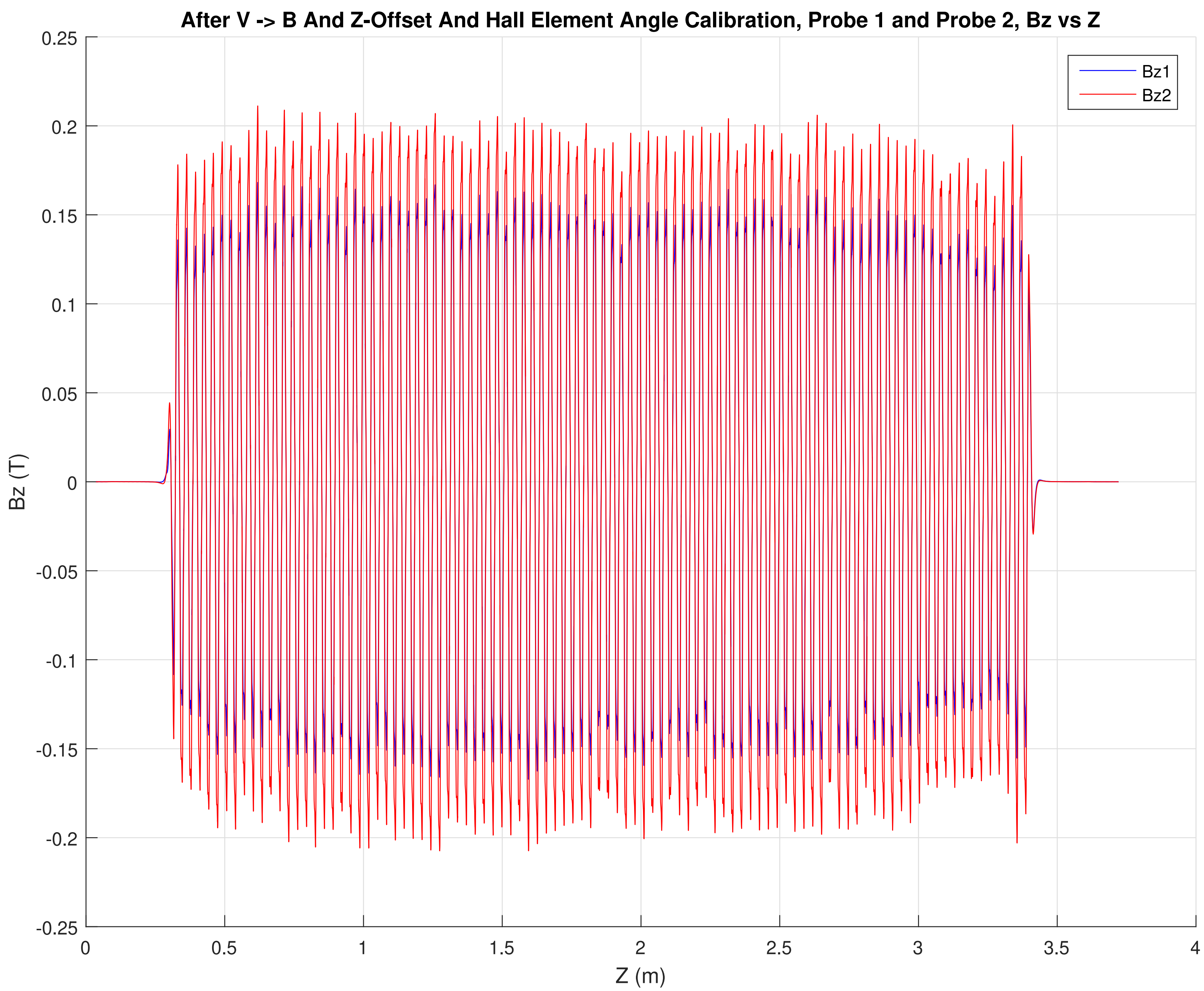


After V -> B And Z-Offset Calibration, Probe 1 and Probe 2, By vs Z
By1
By2
By (T)
Z (m)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
0
0.5
1
1.5
2
2.5
3
3.5
4

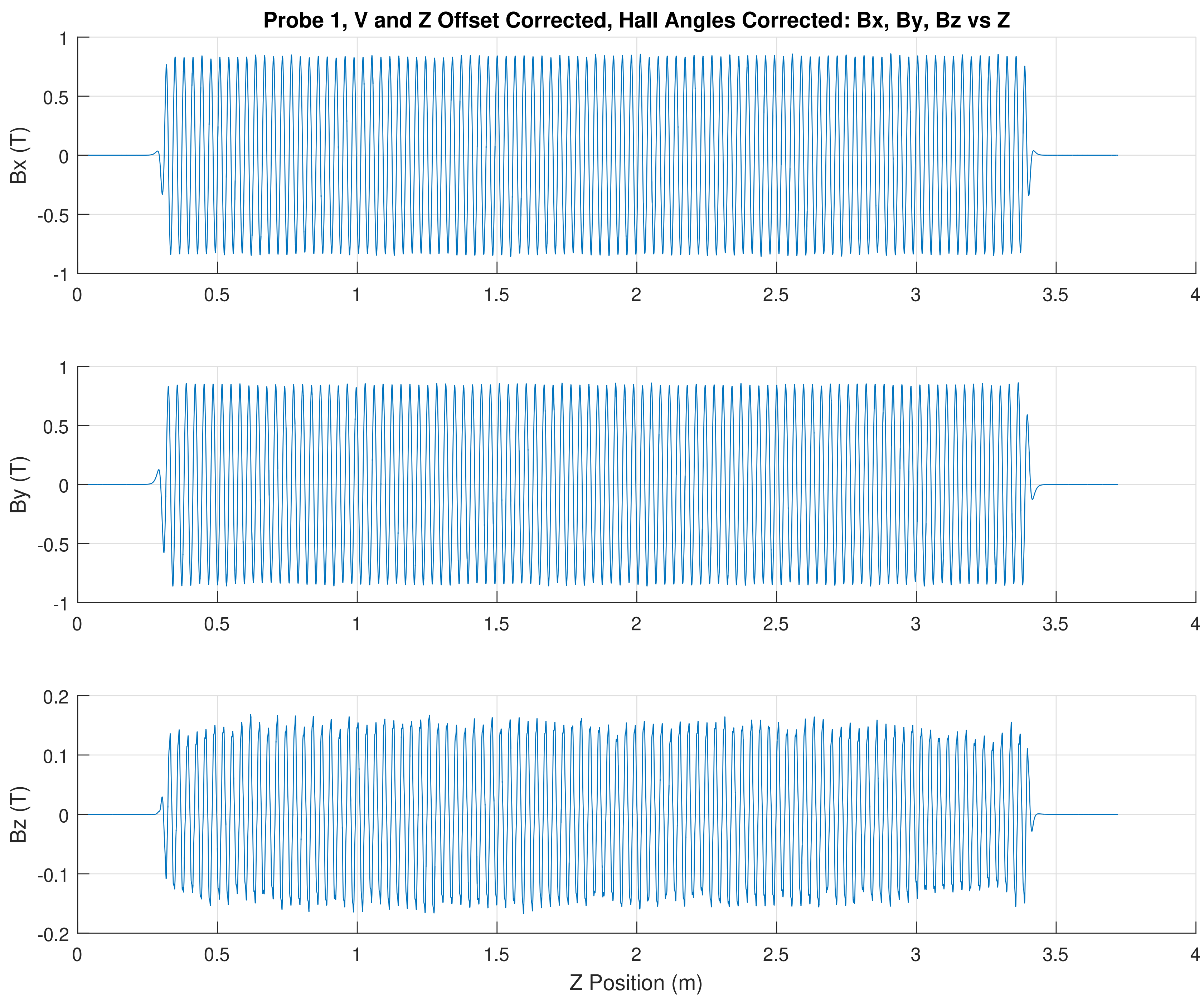

After V -> B And Z-Offset Calibration, Probe 1 and Probe 2, Bz vs Z
Bz1
Bz2
0.25
0.2
0.15
0.1
0.05
0
-0.05
-0.1
-0.15
-0.2
-0.25
Bz (T)
0
0.5
1
1.5
2
2.5
3
3.5
4
Z (m)

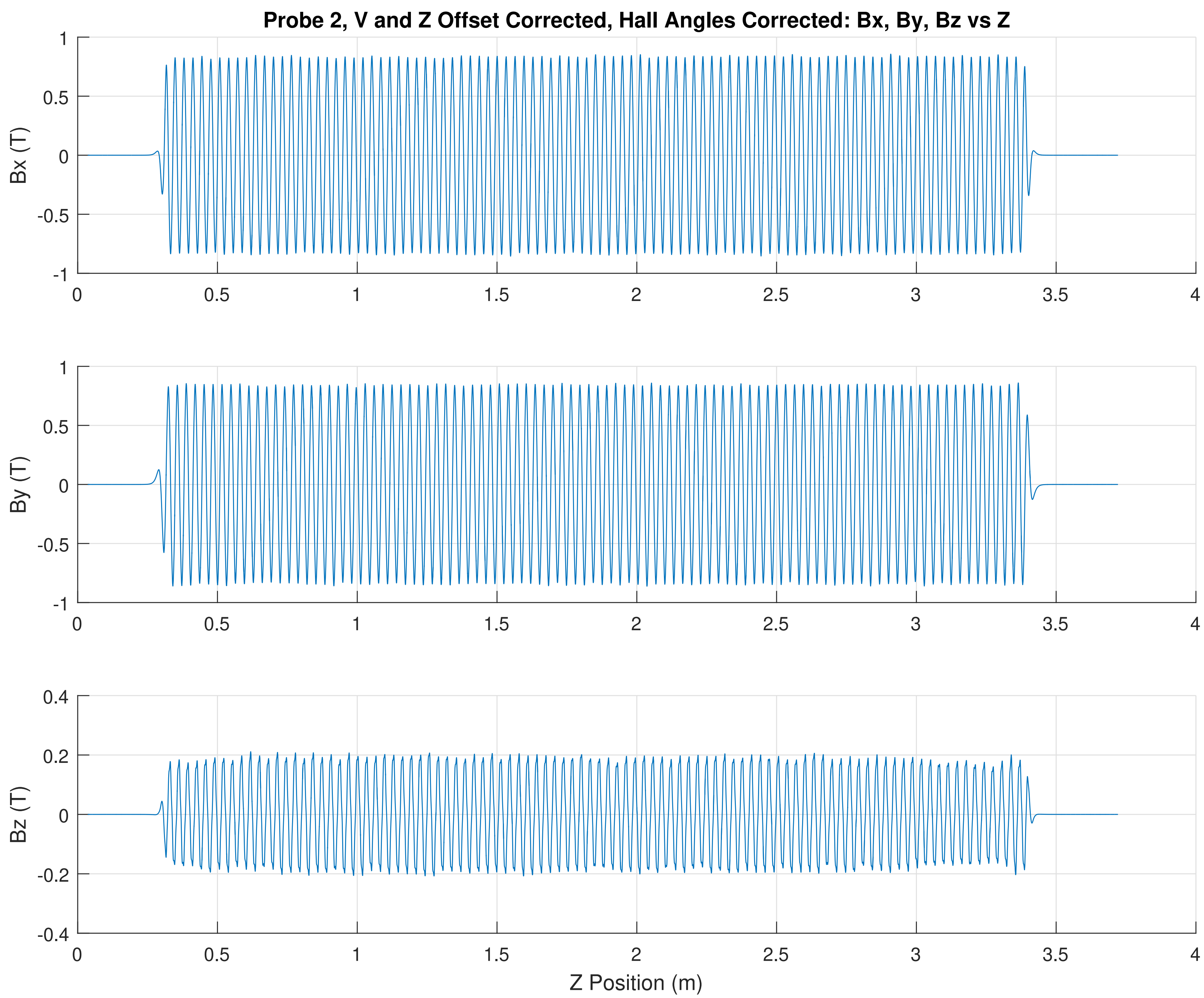

After V -> B And Z-Offset And Hall Element Angle Calibration, Probe 1 and Probe 2, Bx vs Z
Bx1
Bx2
Bx (T)
Z (m)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
0
0.5
1
1.5
2
2.5
3
3.5
4


After V -> B And Z-Offset And Hall Element Angle Calibration, Probe 1 and Probe 2, By vs Z
By1
By2
By (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
4

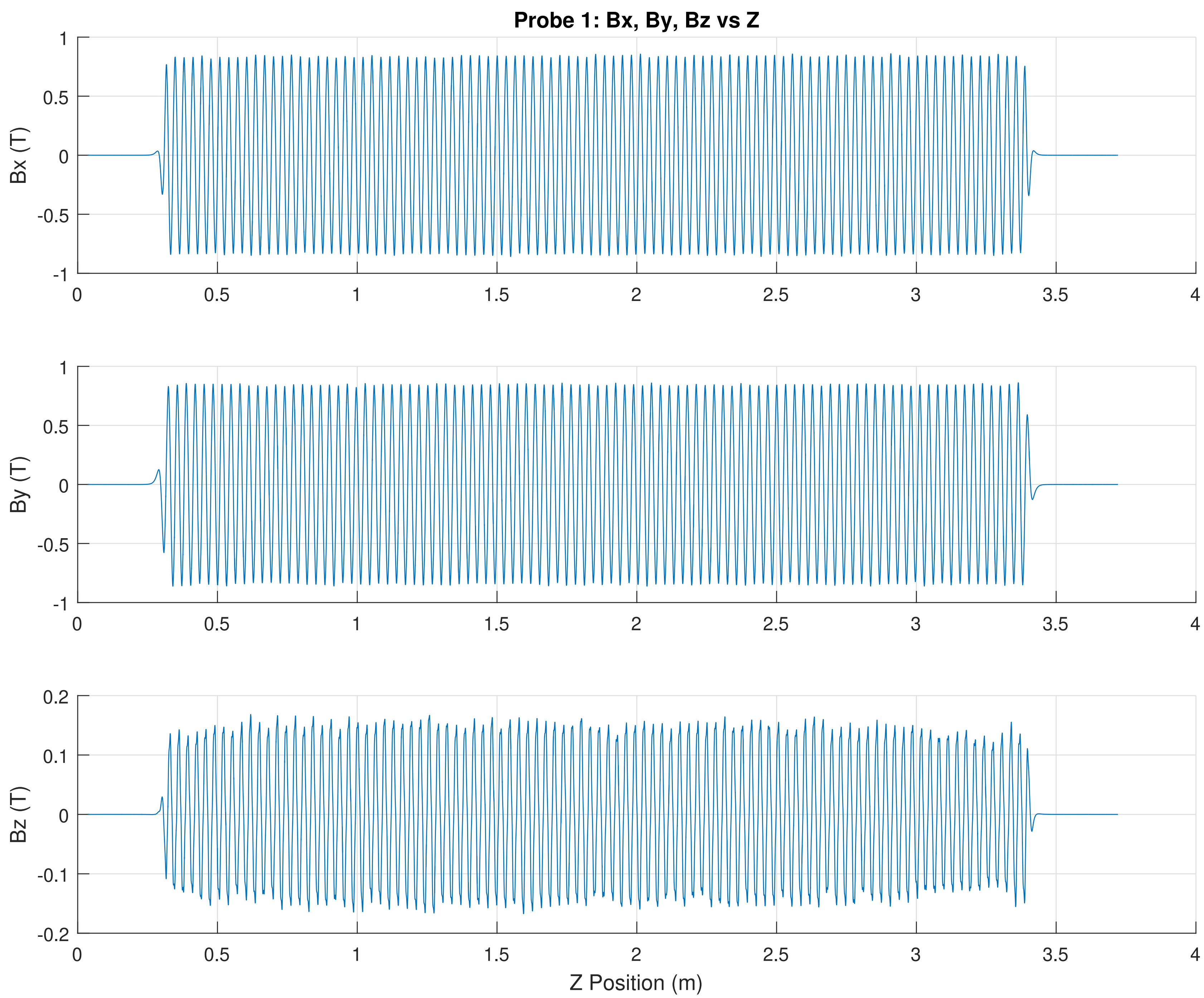


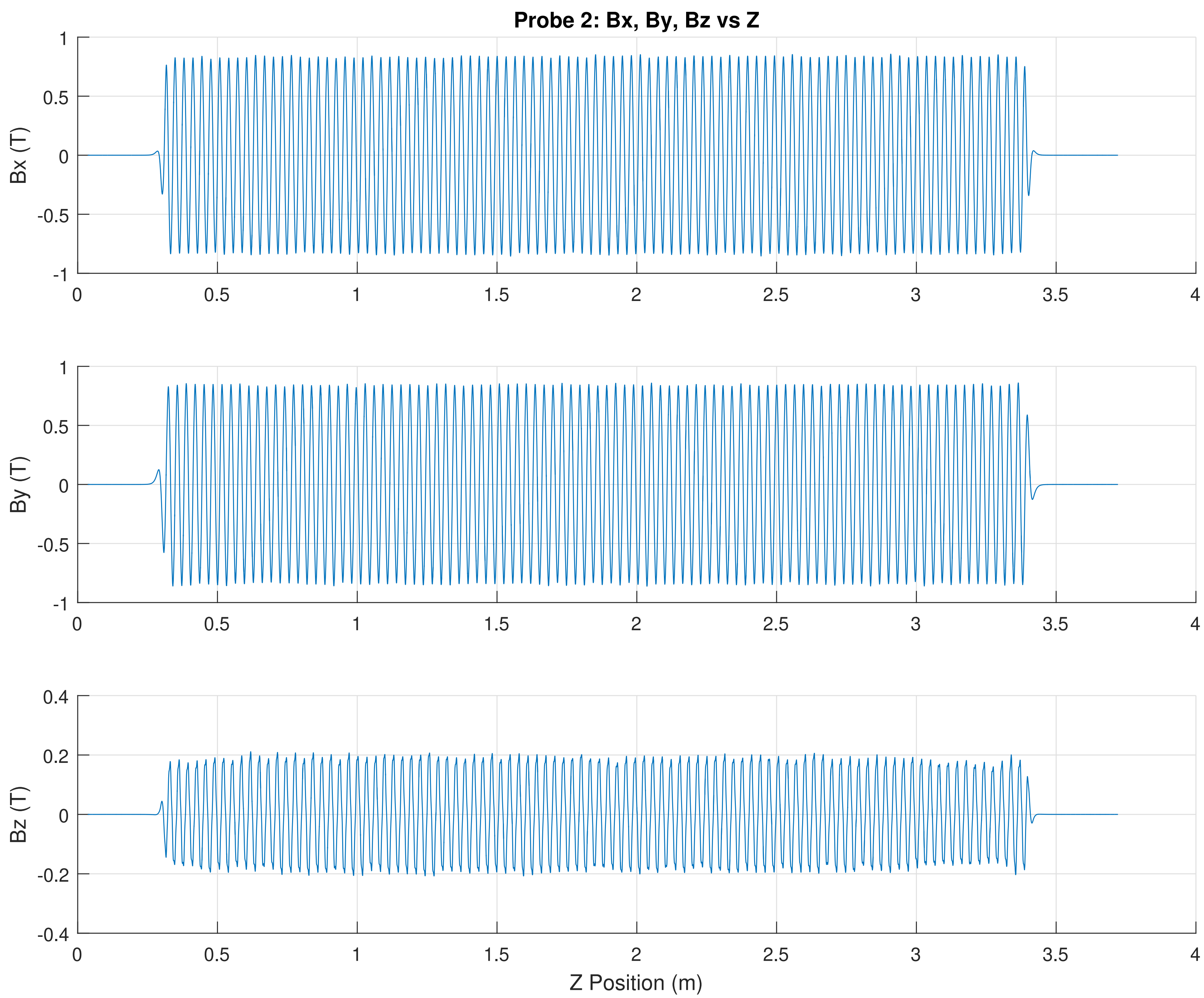
After V -> B And Z-Offset And Hall Element Angle Calibration, Probe 1 and Probe 2, Bz vs Z
Bz1
Bz2
Bz (T)
Z (m)
0.25
0.2
0.15
0.1
0.05
0
-0.05
-0.1
-0.15
-0.2
-0.25
0
0.5
1
1.5
2
2.5
3
3.5
4

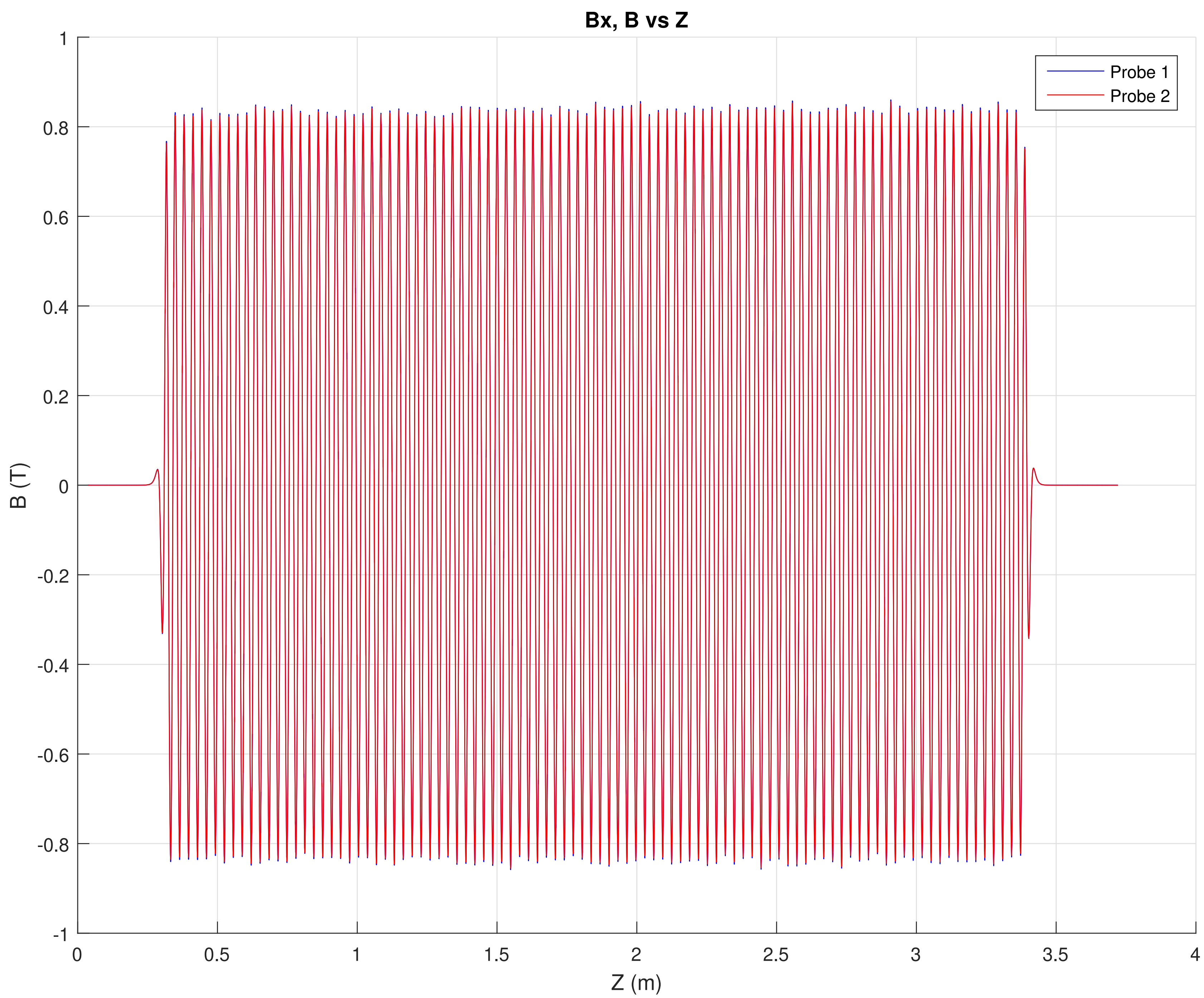

Probe 1, V and Z Offset Corrected, Hall Angles Corrected: Bx, By, Bz vs Z
Bx (T)
By (T)
Bz (T)
Z Position (m)

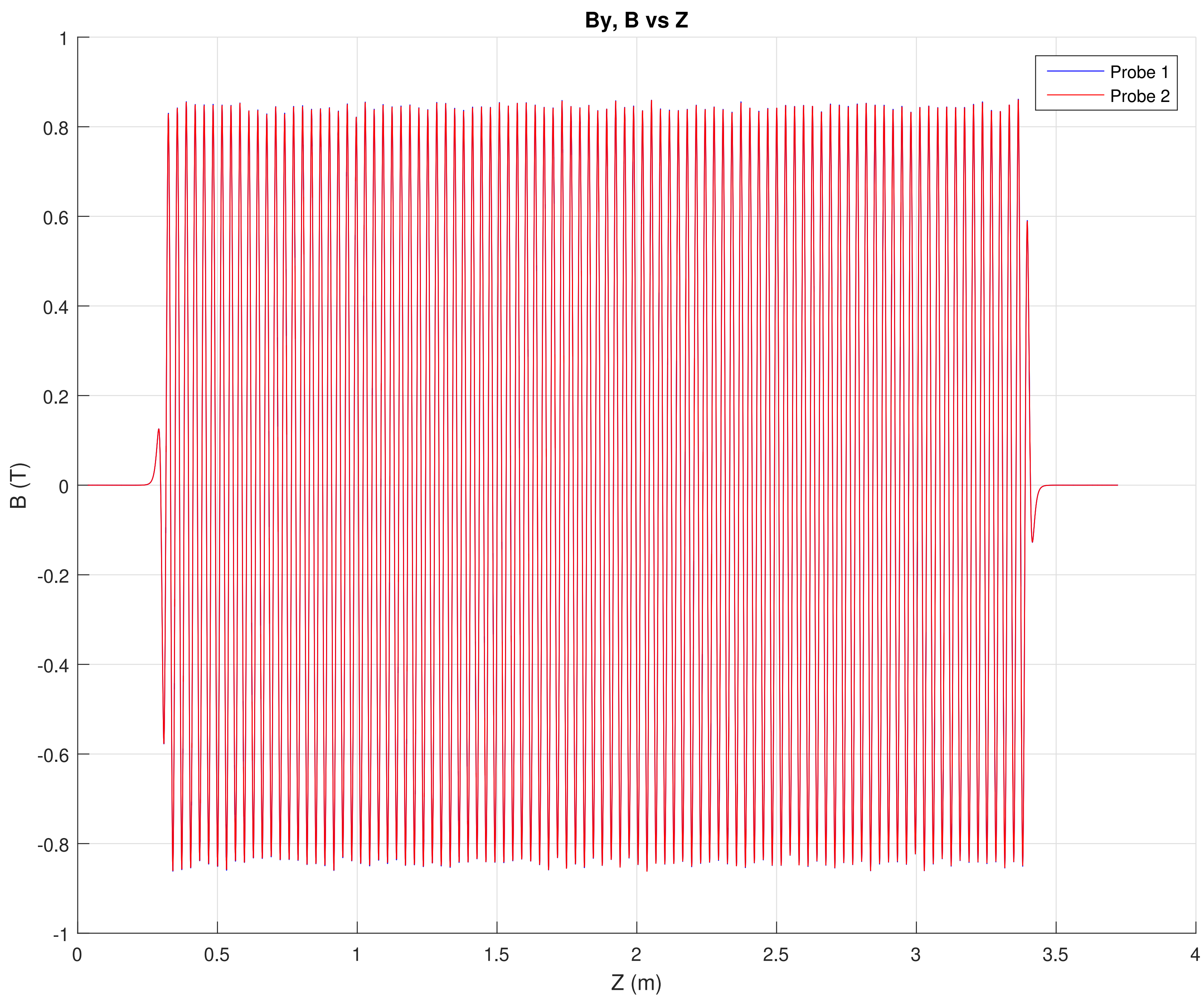


Probe 2, V and Z Offset Corrected, Hall Angles Corrected: Bx, By, Bz vs Z
Bx (T)
By (T)
Bz (T)
Z Position (m)

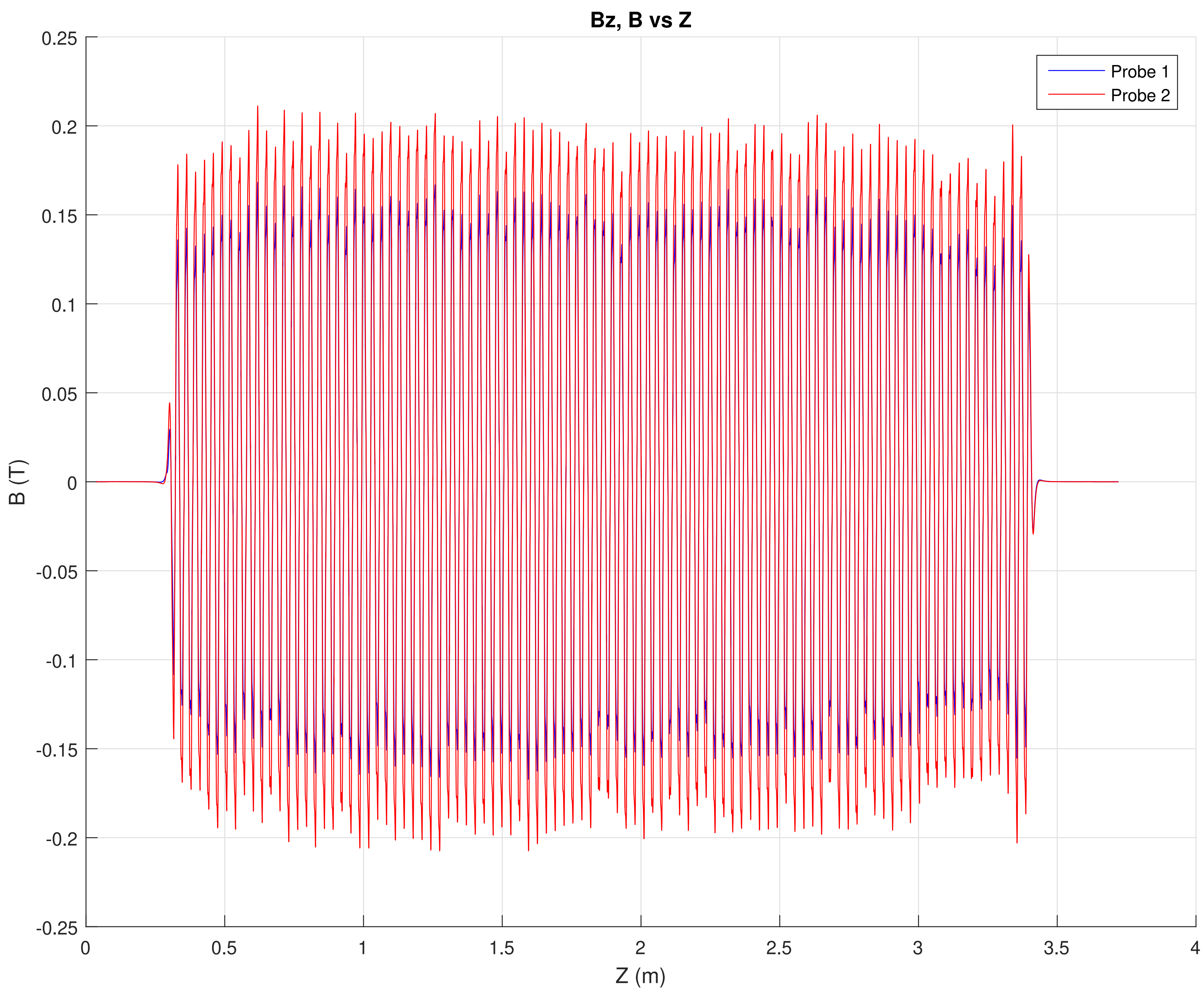

Probe 1: Bx, By, Bz vs Z
Bx (T)
By (T)
Bz (T)
1
0.5
0
-0.5
-1
0.2
0.1
-0.1
-0.2
0
0.5
1
1.5
2
2.5
3
3.5
4
Z Position (m)

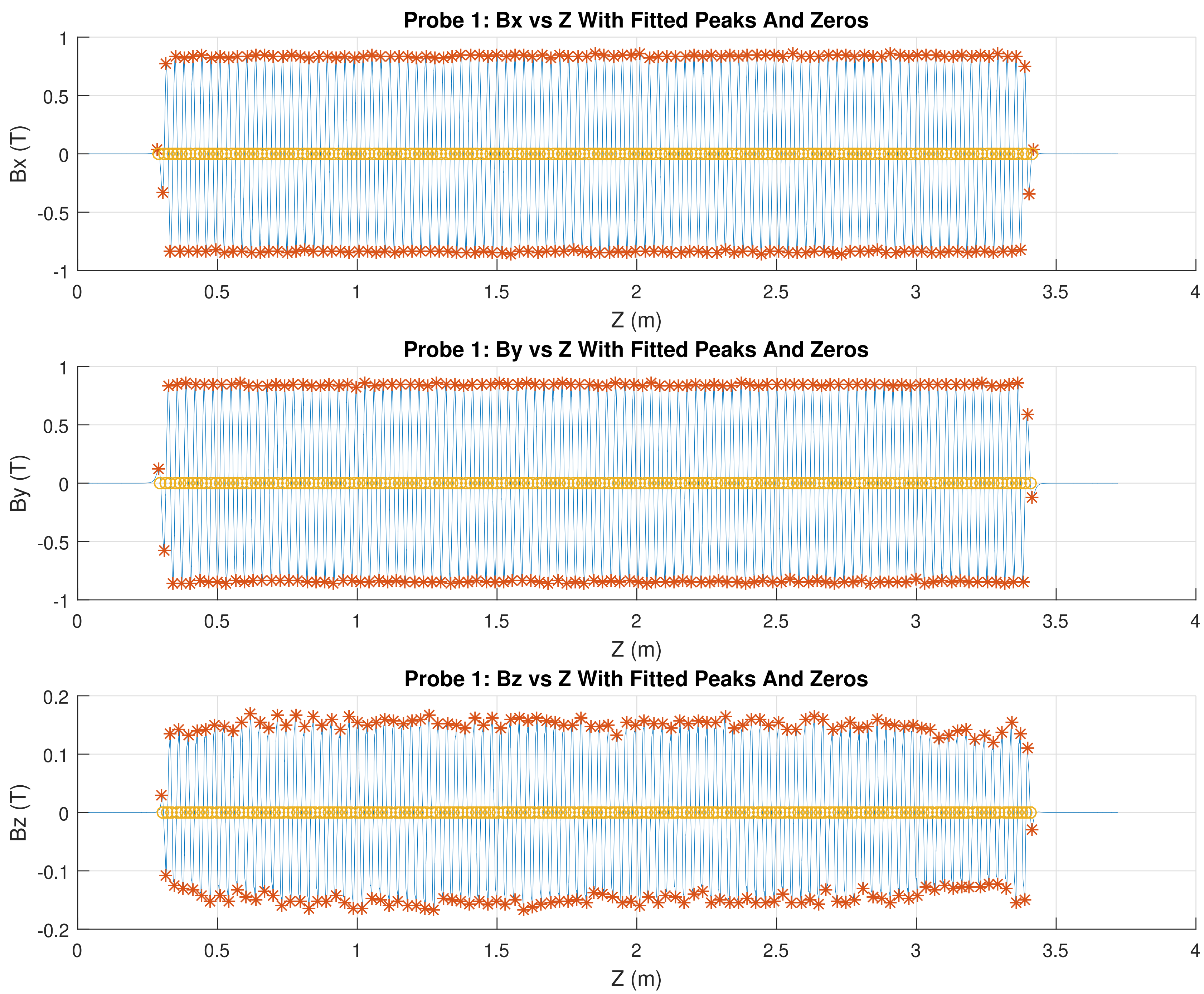

Probe 2: Bx, By, Bz vs Z
Bx (T)
By (T)
Bz (T)
Z Position (m)
1
0.5
0
-0.5
-1
0.4
0.2
-0.2
-0.4
0
0.5
1
1.5
2
2.5
3
3.5
4


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
0.5
1
1.5
2
2.5
3
3.5
4

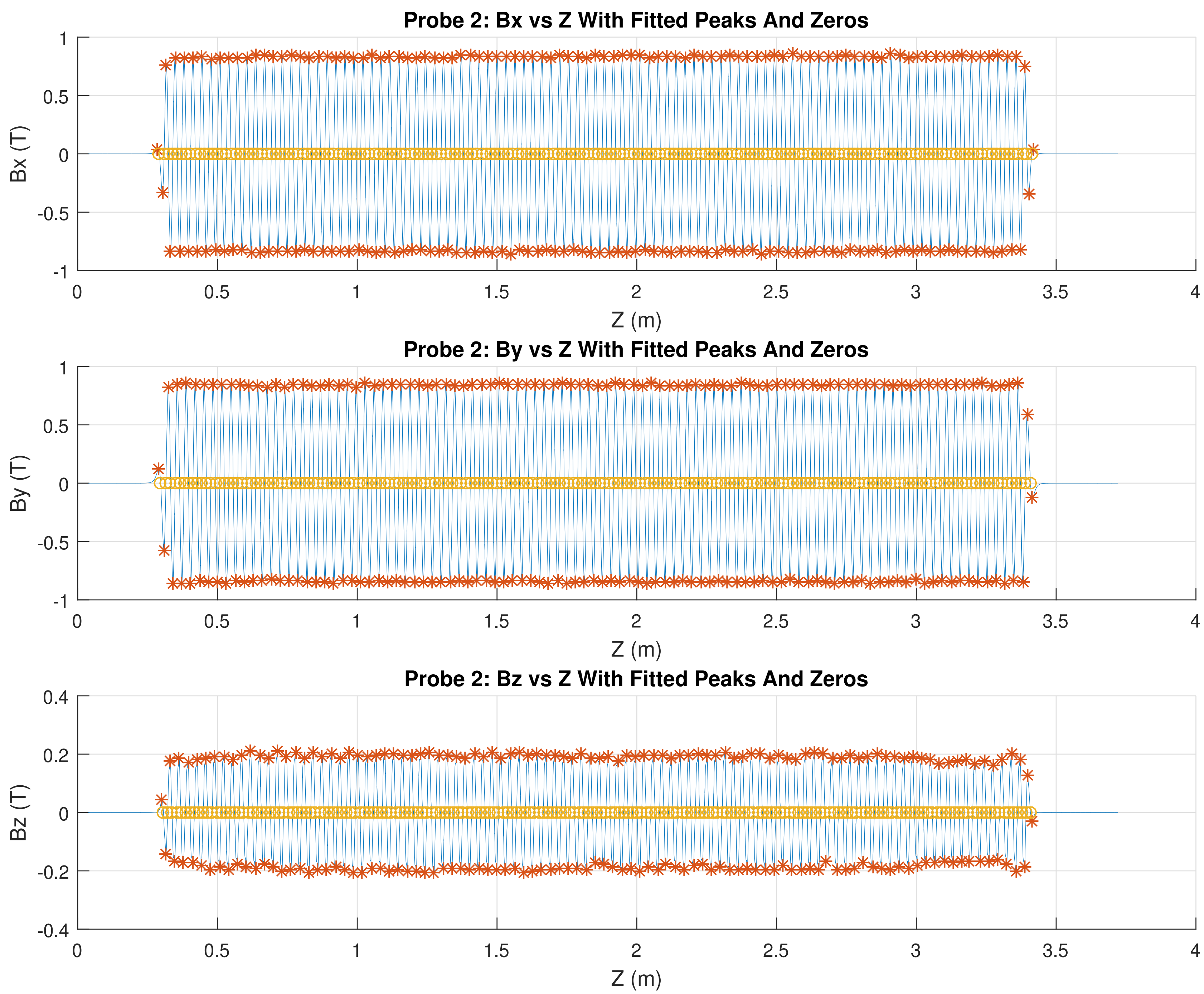


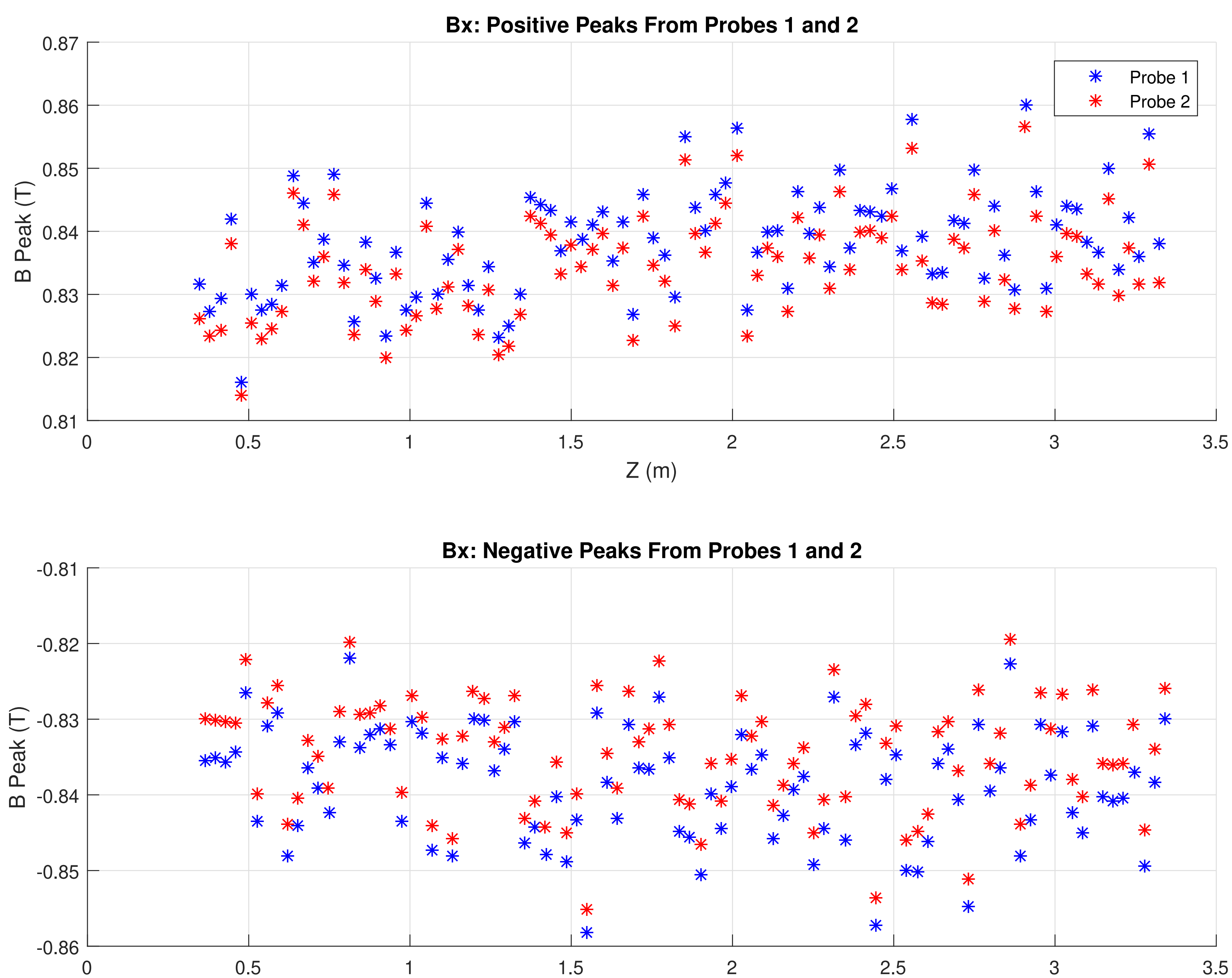
By, B vs Z
Probe 1
Probe 2
B (T)
Z (m)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
0
0.5
1
1.5
2
2.5
3
3.5
4

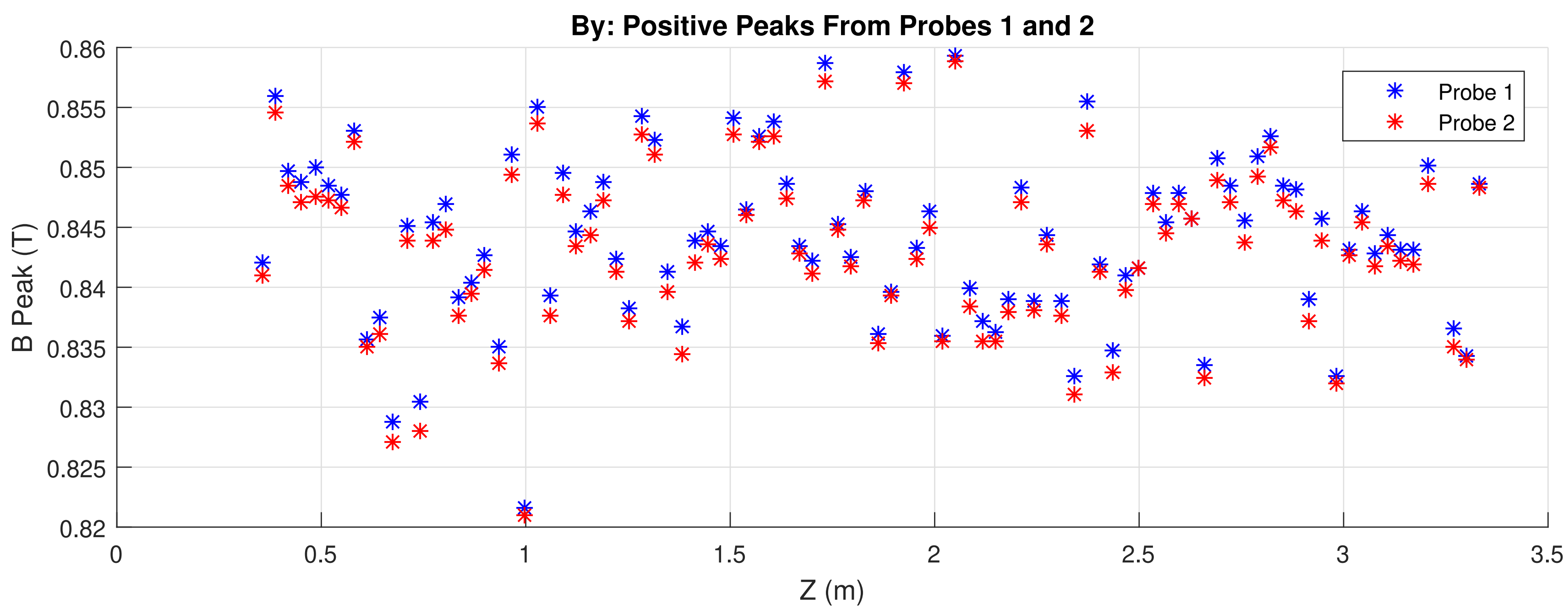

Bz, B vs Z
Probe 1
Probe 2
B (T)
Z (m)
0.25
0.2
0.15
0.1
0.05
0
-0.05
-0.1
-0.15
-0.2
-0.25
0
0.5
1
1.5
2
2.5
3
3.5
4

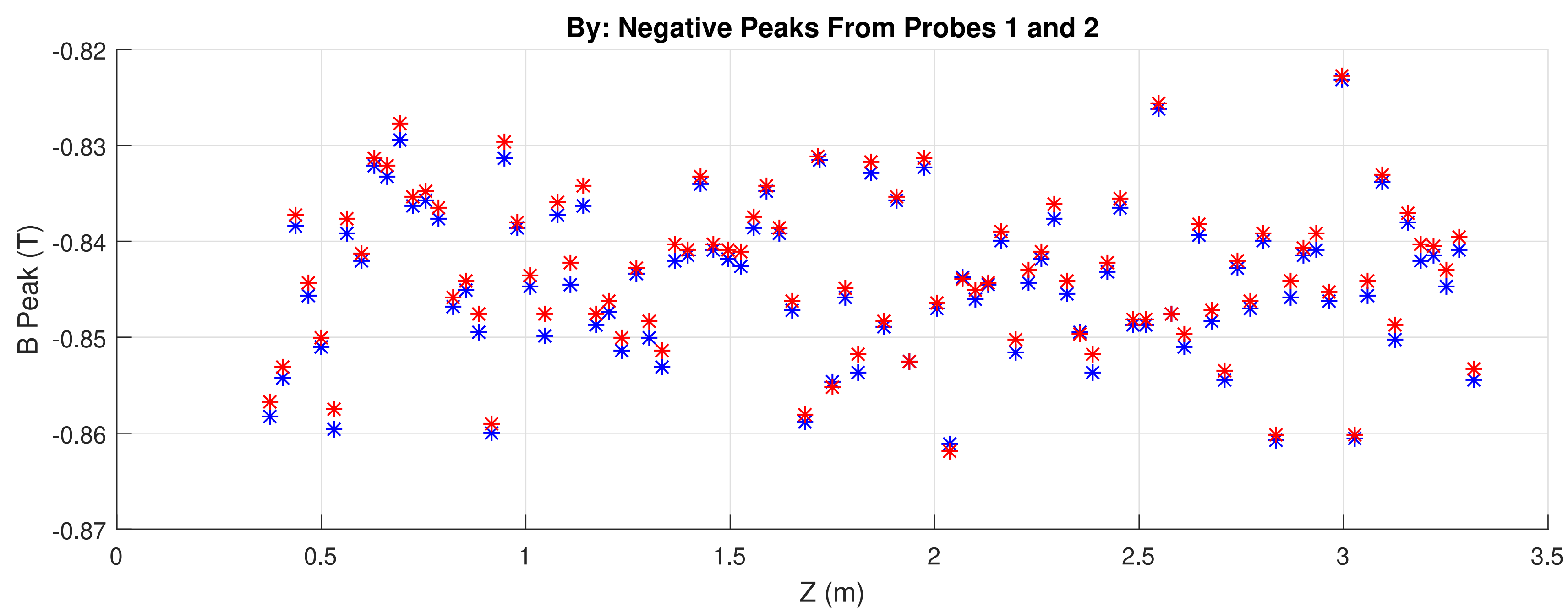


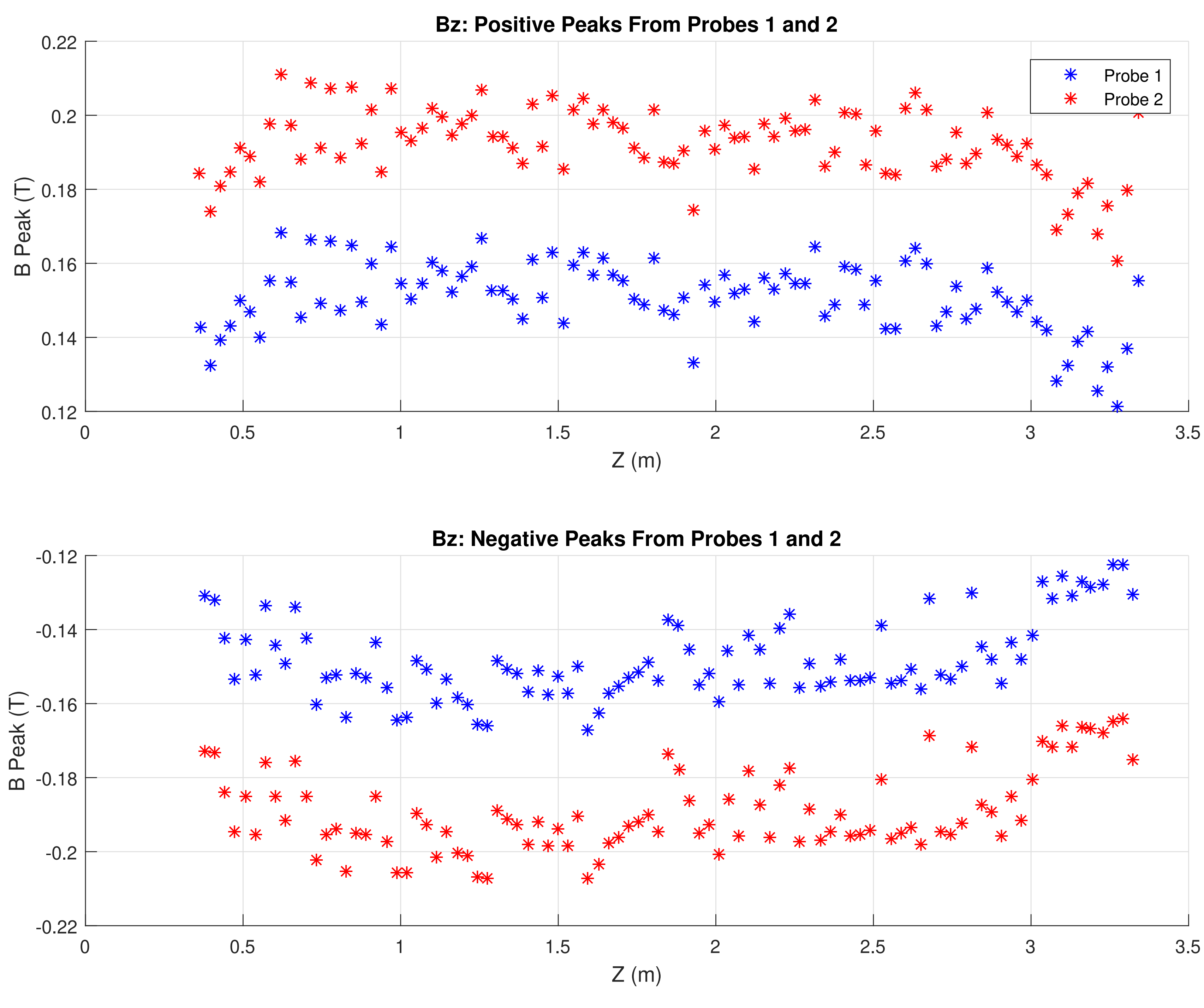
Probe 1: Bx vs Z With Fitted Peaks And Zeros
Bx (T)
Z (m)
Probe 1: By vs Z With Fitted Peaks And Zeros
By (T)
Z (m)
Probe 1: Bz vs Z With Fitted Peaks And Zeros
Bz (T)
Z (m)

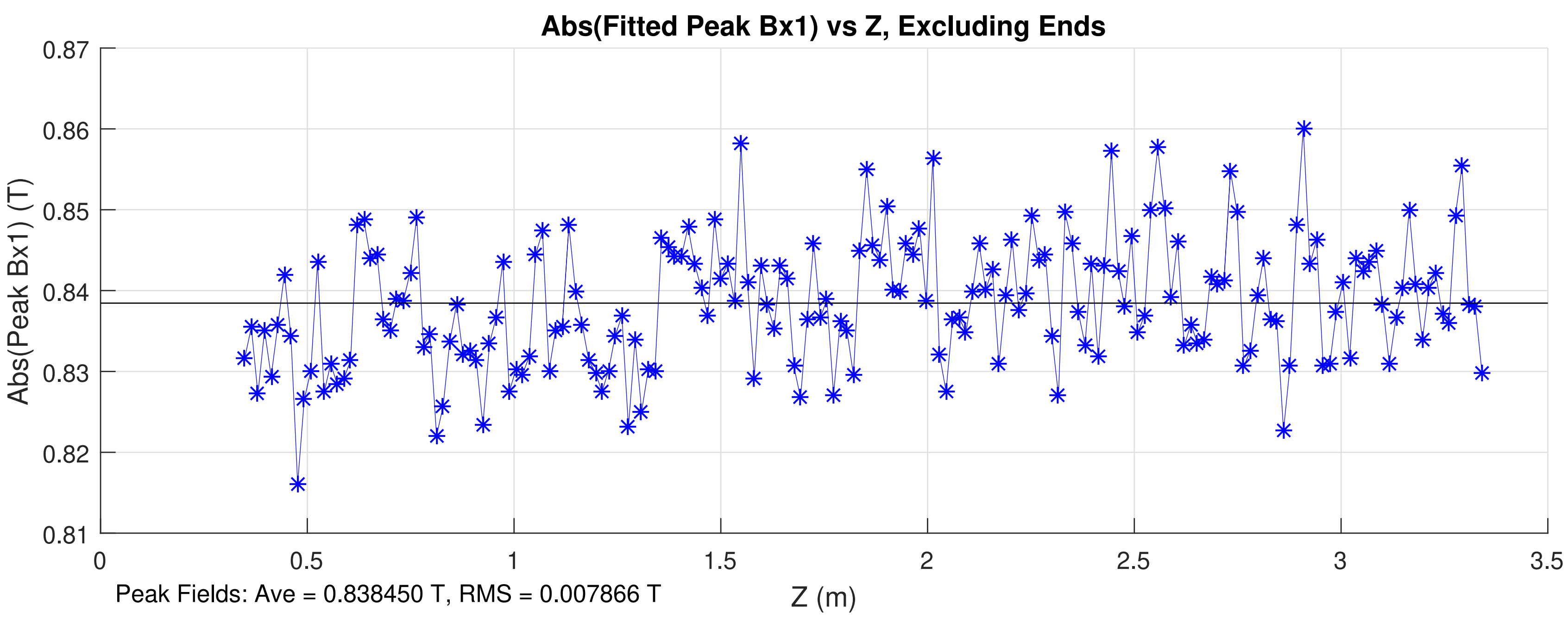

Probe 2: Bx vs Z With Fitted Peaks And Zeros
Bx (T)
Z (m)
Probe 2: By vs Z With Fitted Peaks And Zeros
By (T)
Z (m)
Probe 2: Bz vs Z With Fitted Peaks And Zeros
Bz (T)
Z (m)
1
0.5
0
-0.5
-1
0.4
0.2
-0.2
-0.4
1.5
2
2.5
3
3.5
4

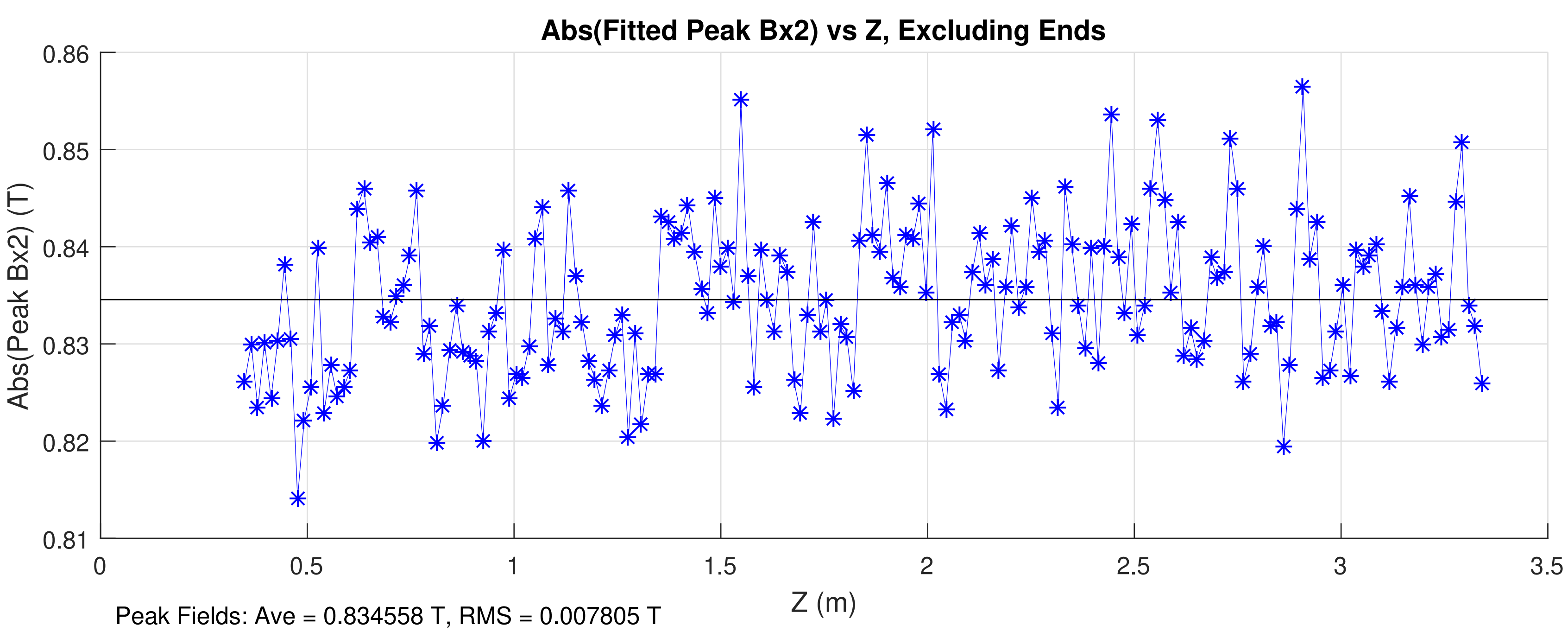

Bx: Positive Peaks From Probes 1 and 2
Probe 1
Probe 2
B Peak (T)
0.87
0.86
0.85
0.84
0.83
0.82
0.81
0
0.5
1
1.5
2
2.5
3
3.5
Z (m)
Bx: Negative Peaks From Probes 1 and 2
B Peak (T)
-0.81
-0.82
-0.83
-0.84
-0.85
-0.86
0
0.5
1
1.5
2
2.5
3
3.5
Z (m)

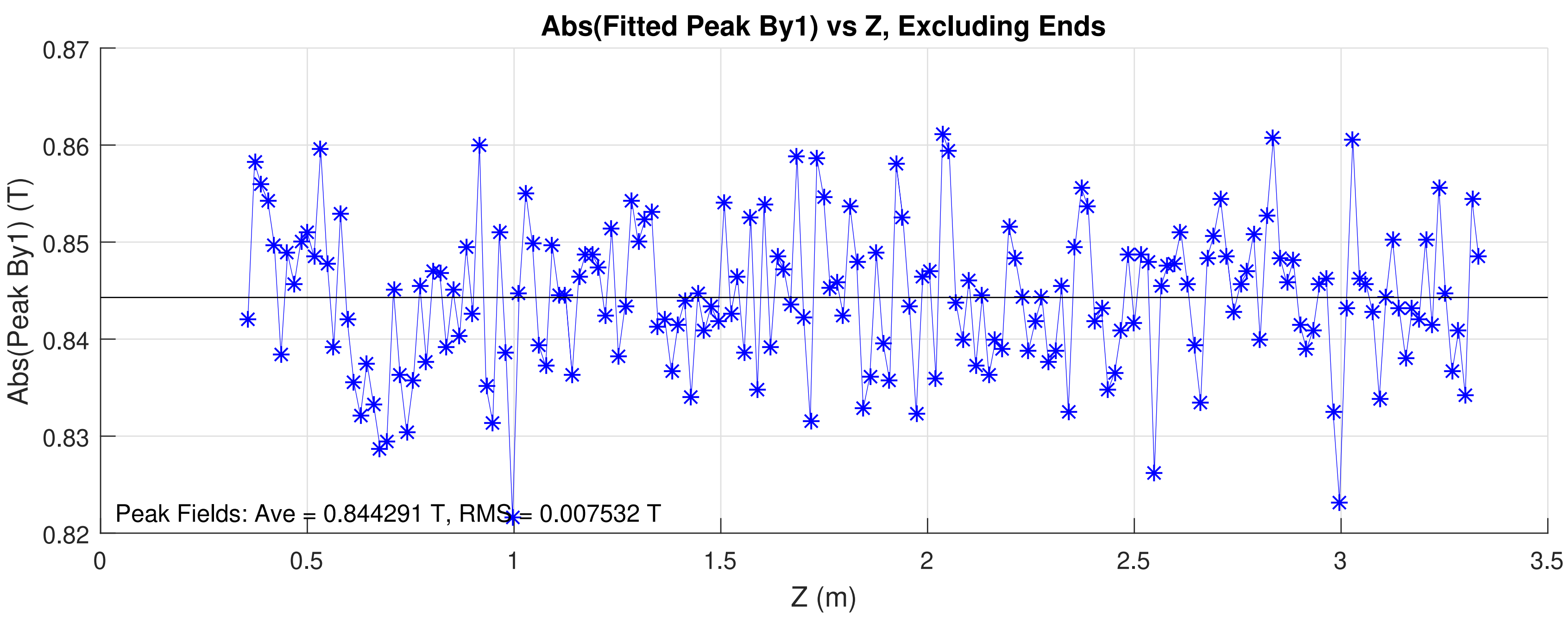

By: Positive Peaks From Probes 1 and 2
B Peak (T)
Z (m)
Probe 1
Probe 2
0.86
0.855
0.85
0.845
0.84
0.835
0.83
0.825
0.82
0
0.5
1
1.5
2
2.5
3
3.5

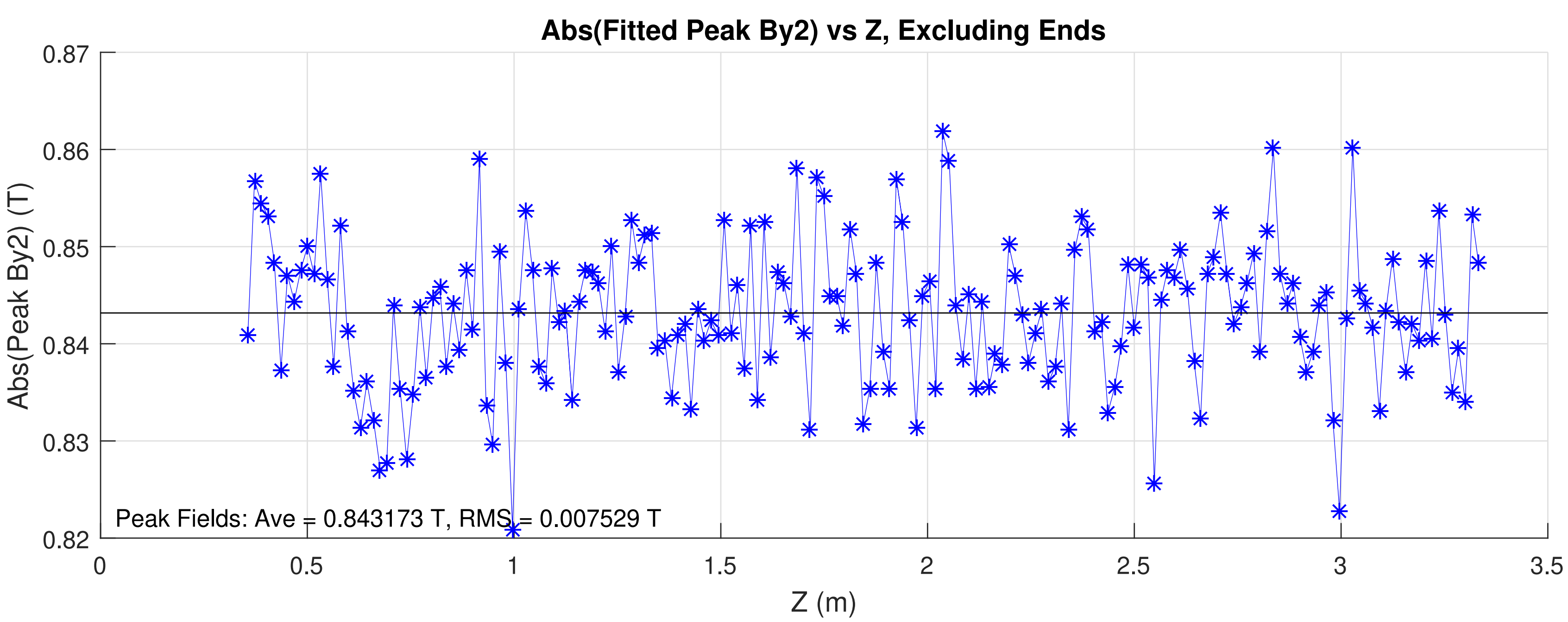

By: Negative Peaks From Probes 1 and 2
B Peak (T)
Z (m)
-0.82
-0.83
-0.84
-0.85
-0.86
-0.87
0
0.5
1
1.5
2
2.5
3
3.5

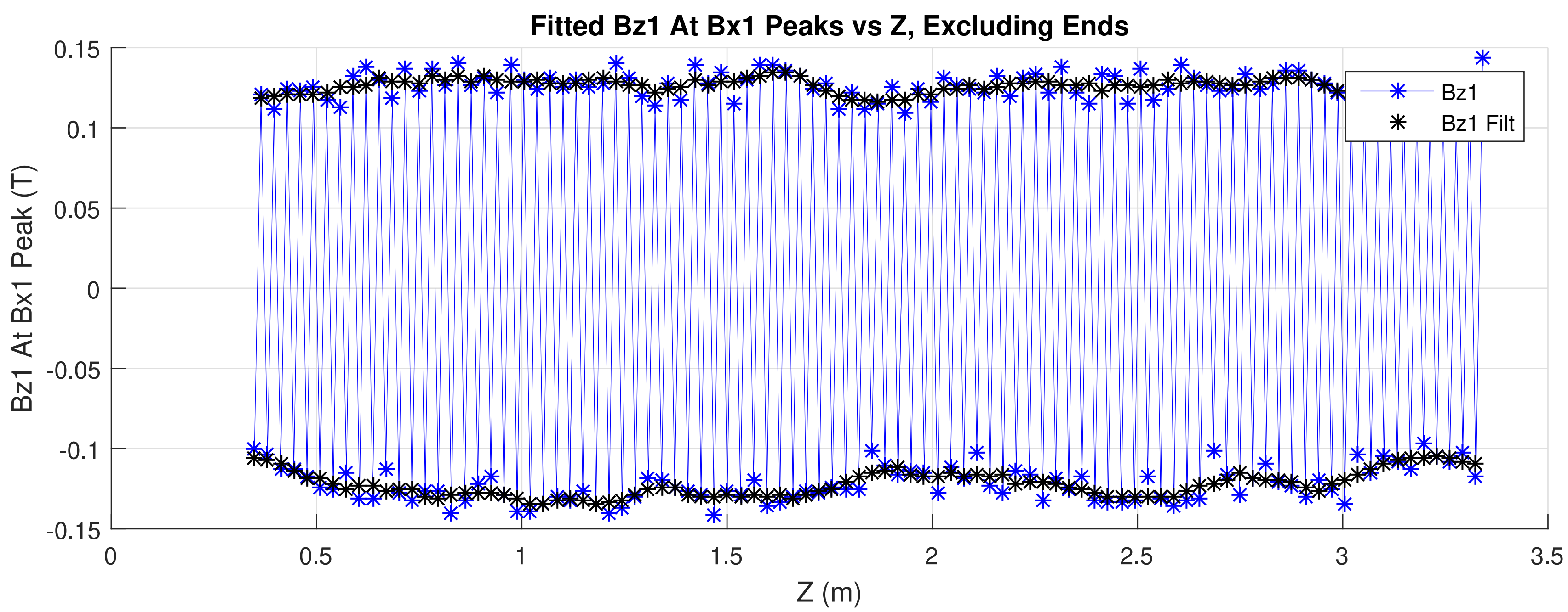

Bz: Positive Peaks From Probes 1 and 2
B Peak (T)
Z (m)
Probe 1
Probe 2
0.22
0.2
0.18
0.16
0.14
0.12
0
0.5
1
1.5
2
2.5
3
3.5
Bz: Negative Peaks From Probes 1 and 2
-0.12
-0.14
-0.16
-0.18
-0.2
-0.22

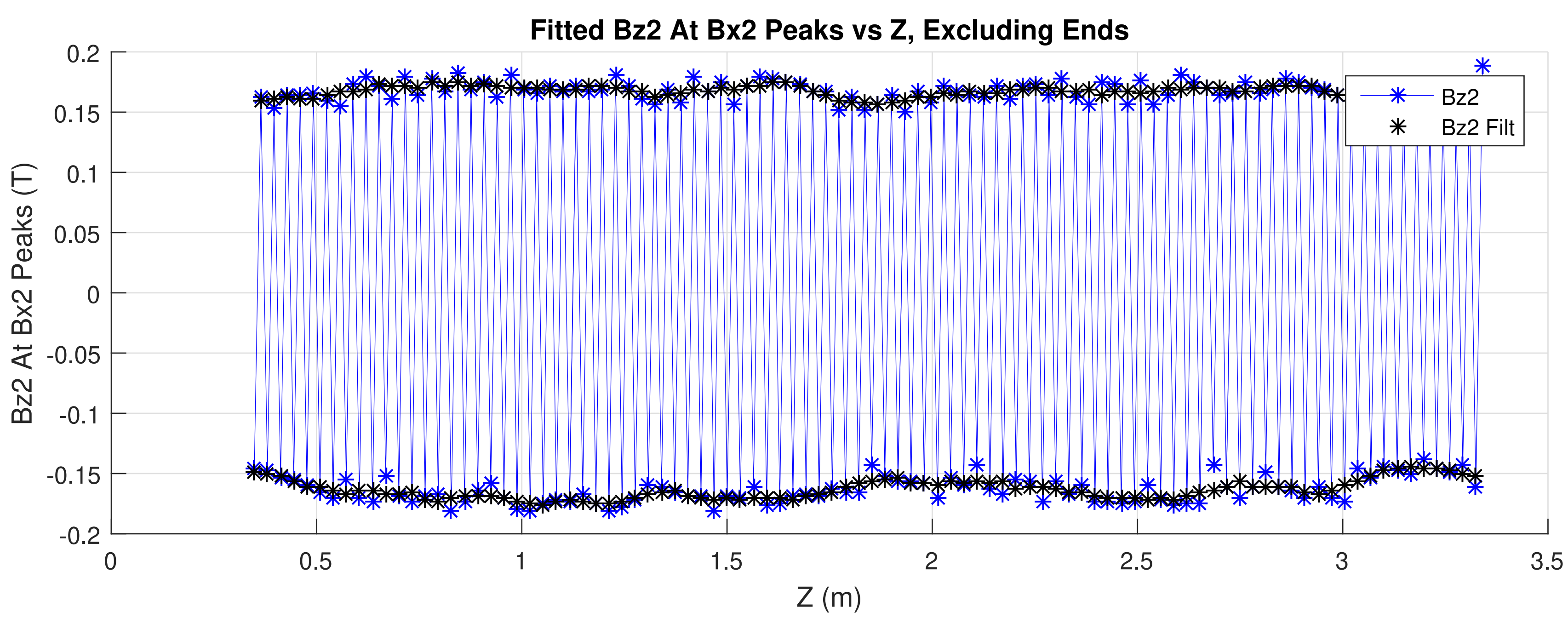

Abs(Fitted Peak Bx1) vs Z, Excluding Ends
Abs(Peak Bx1) (T)
0.87
0.86
0.85
0.84
0.83
0.82
0.81
0
0.5
1
1.5
2
2.5
3
3.5
Z (m)
Peak Fields: Ave = 0.838450 T, RMS = 0.007866 T

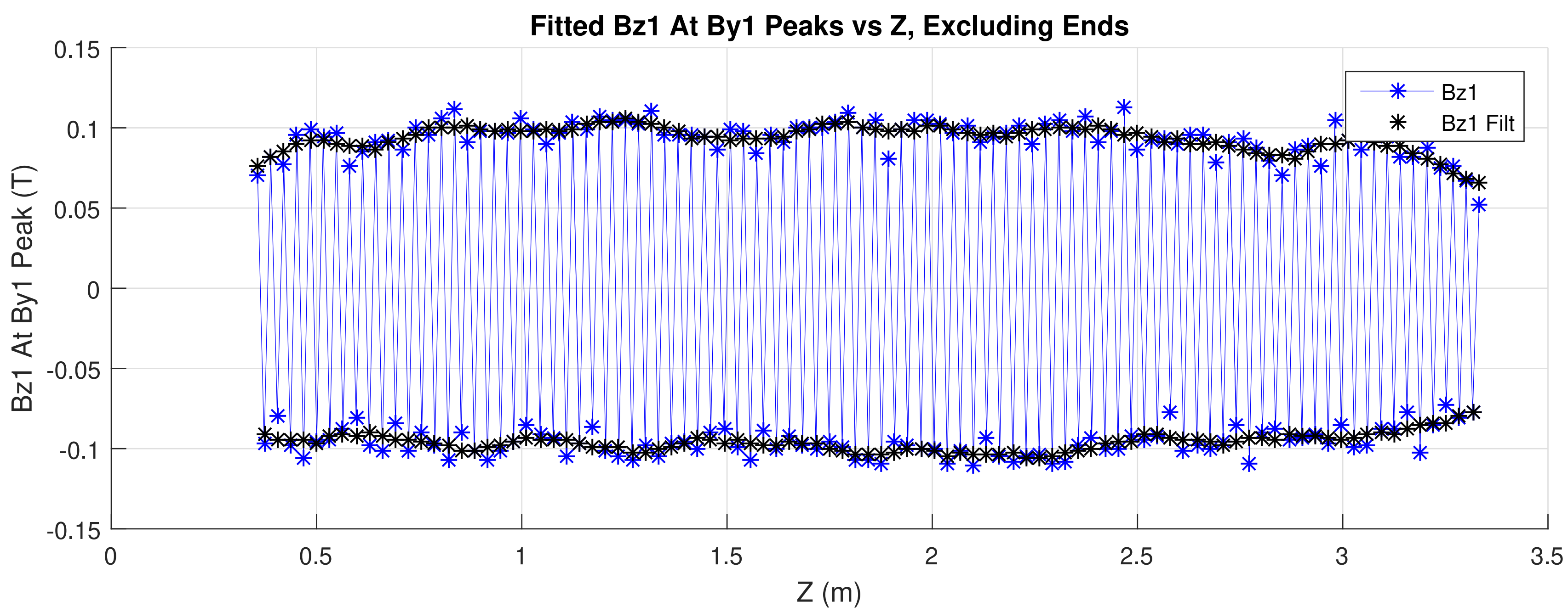

Abs(Fitted Peak Bx2) vs Z, Excluding Ends
Abs(Peak Bx2) (T)
0.86
0.85
0.84
0.83
0.82
0.81
0
0.5
1
1.5
2
2.5
3
3.5
Z (m)
Peak Fields: Ave = 0.834558 T, RMS = 0.007805 T

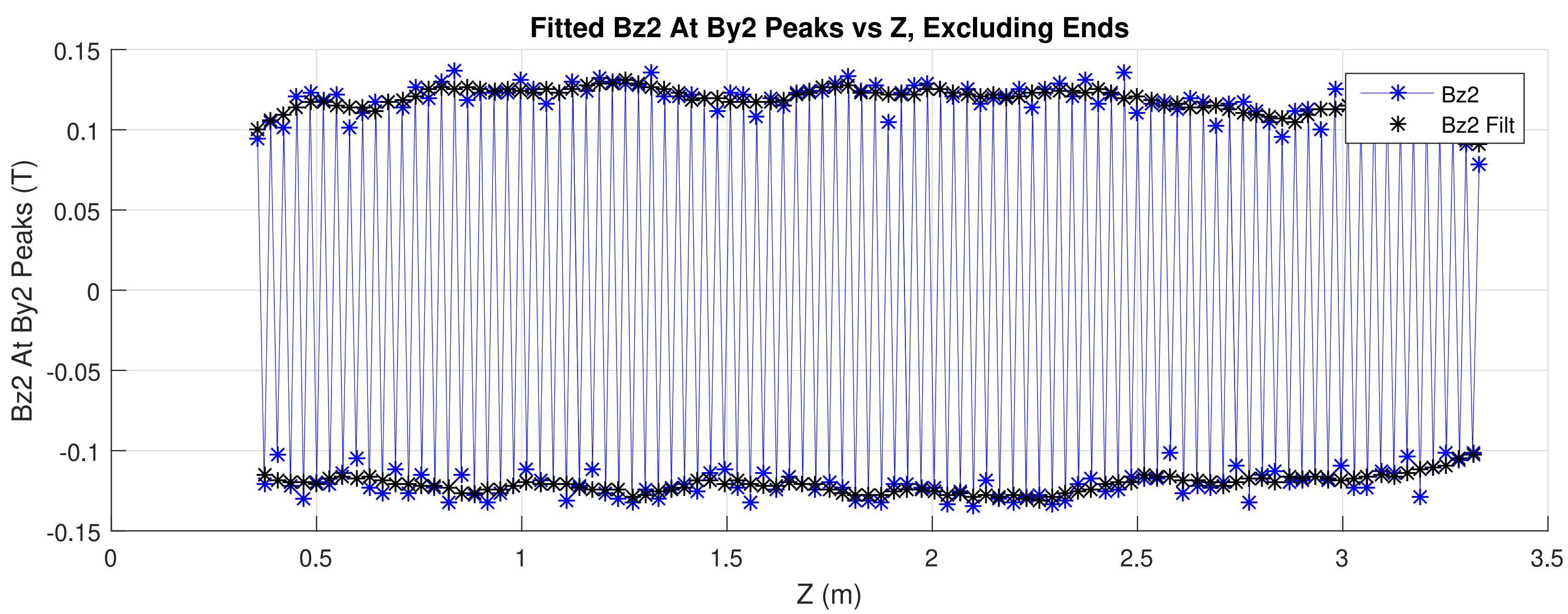

Abs(Fitted Peak By1) vs Z, Excluding Ends
Abs(Peak By1) (T)
Z (m)
Peak Fields: Ave = 0.844291 T, RMS = 0.007532 T
0.87
0.86
0.85
0.84
0.83
0.82
0
0.5
1
1.5
2
2.5
3
3.5

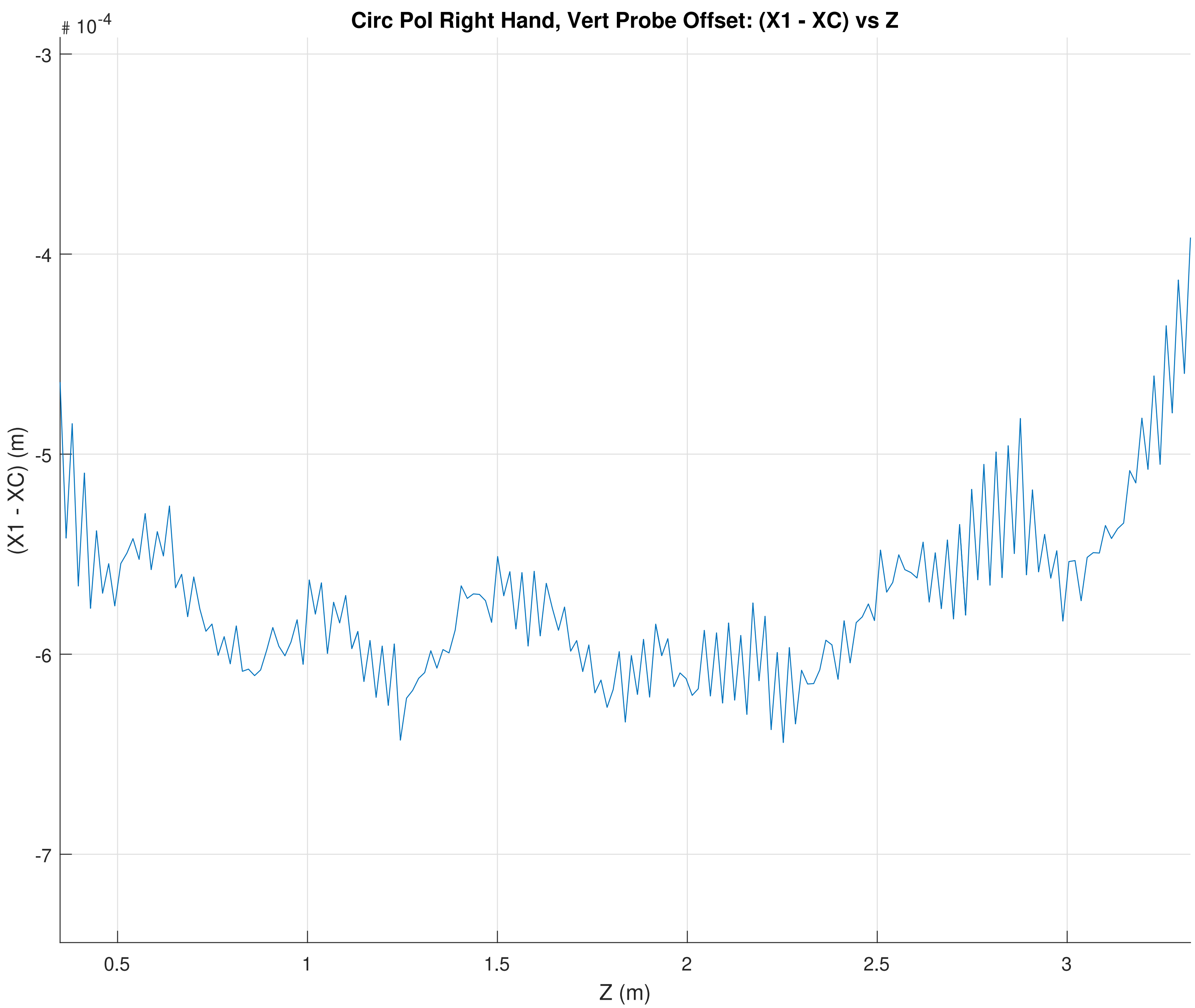

Abs(Fitted Peak By2) vs Z, Excluding Ends
Abs(Peak By2) (T)
Z (m)
Peak Fields: Ave = 0.843173 T, RMS = 0.007529 T
0.87
0.86
0.85
0.84
0.83
0.82
0
0.5
1
1.5
2
2.5
3
3.5

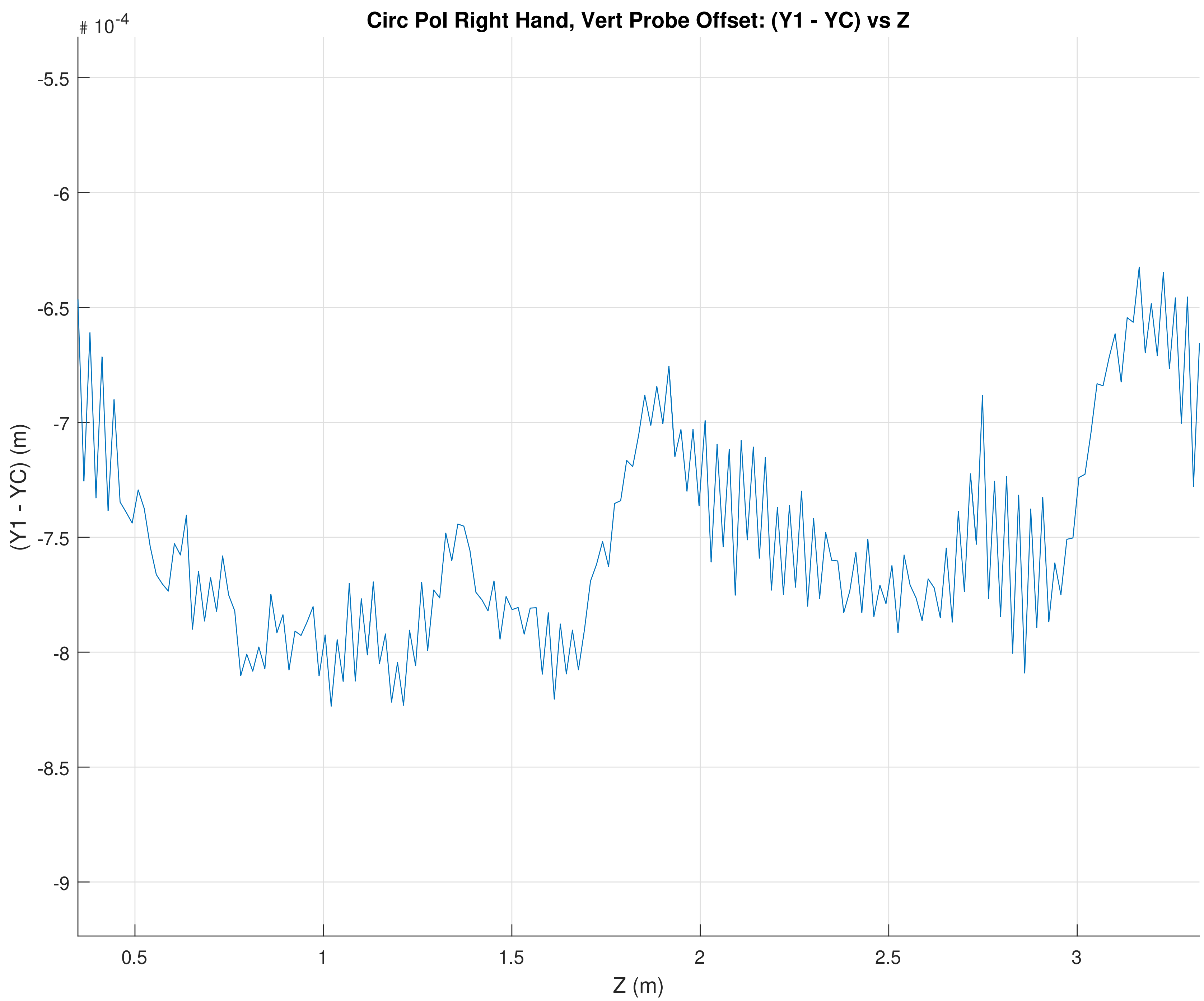

Fitted Bz1 At Bx1 Peaks vs Z, Excluding Ends
Bz1 At Bx1 Peak (T)
0.15
0.1
0.05
0
-0.05
-0.1
-0.15
0
0.5
1
1.5
2
2.5
3
3.5
Z (m)
Bz1
Bz1 Filt

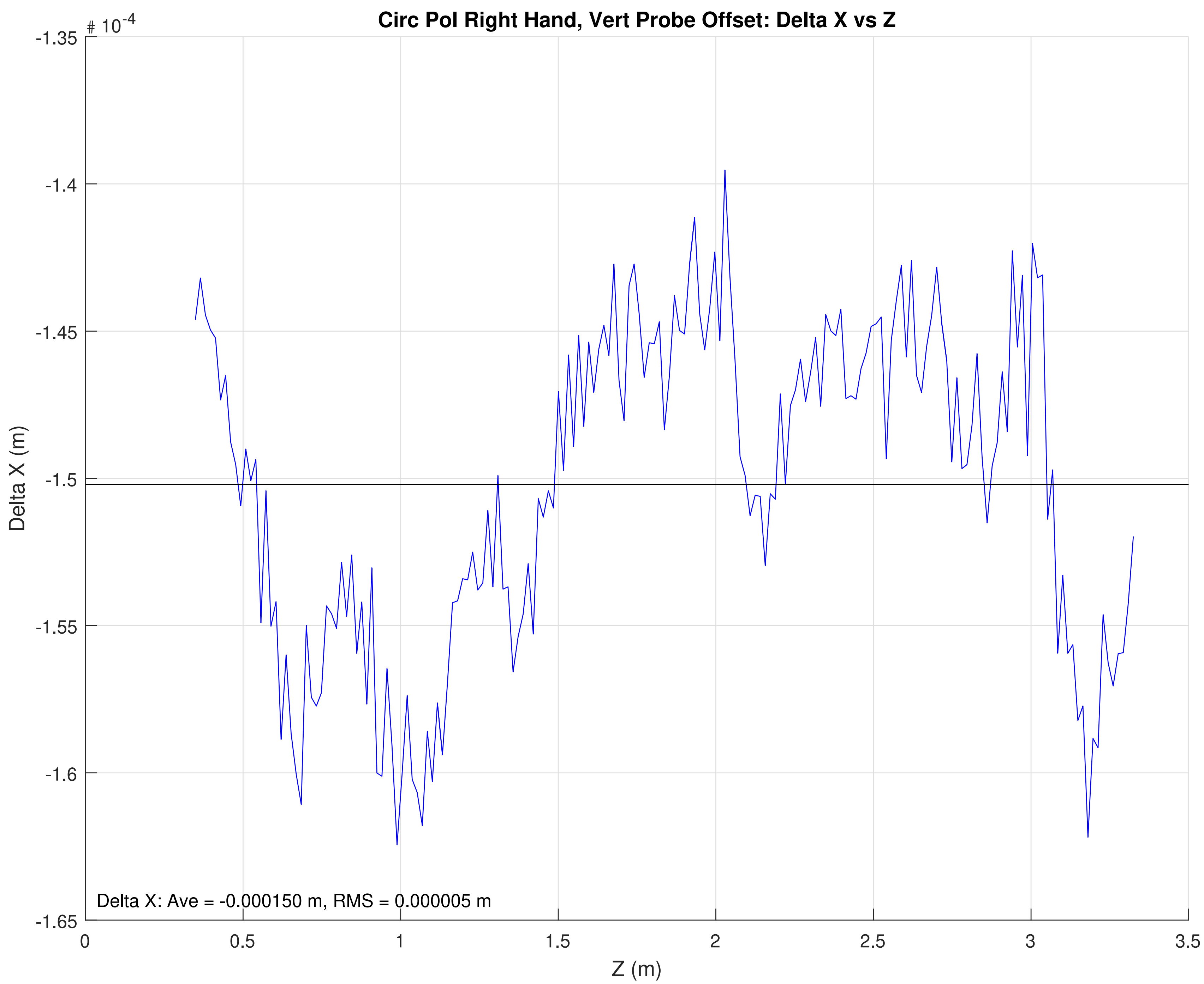

Fitted Bz2 At Bx2 Peaks vs Z, Excluding Ends
Bz2 At Bx2 Peaks (T)
0.2
0.15
0.1
0.05
0
-0.05
-0.1
-0.15
-0.2
0
0.5
1
1.5
2
2.5
3
3.5
Z (m)
Bz2
Bz2 Filt

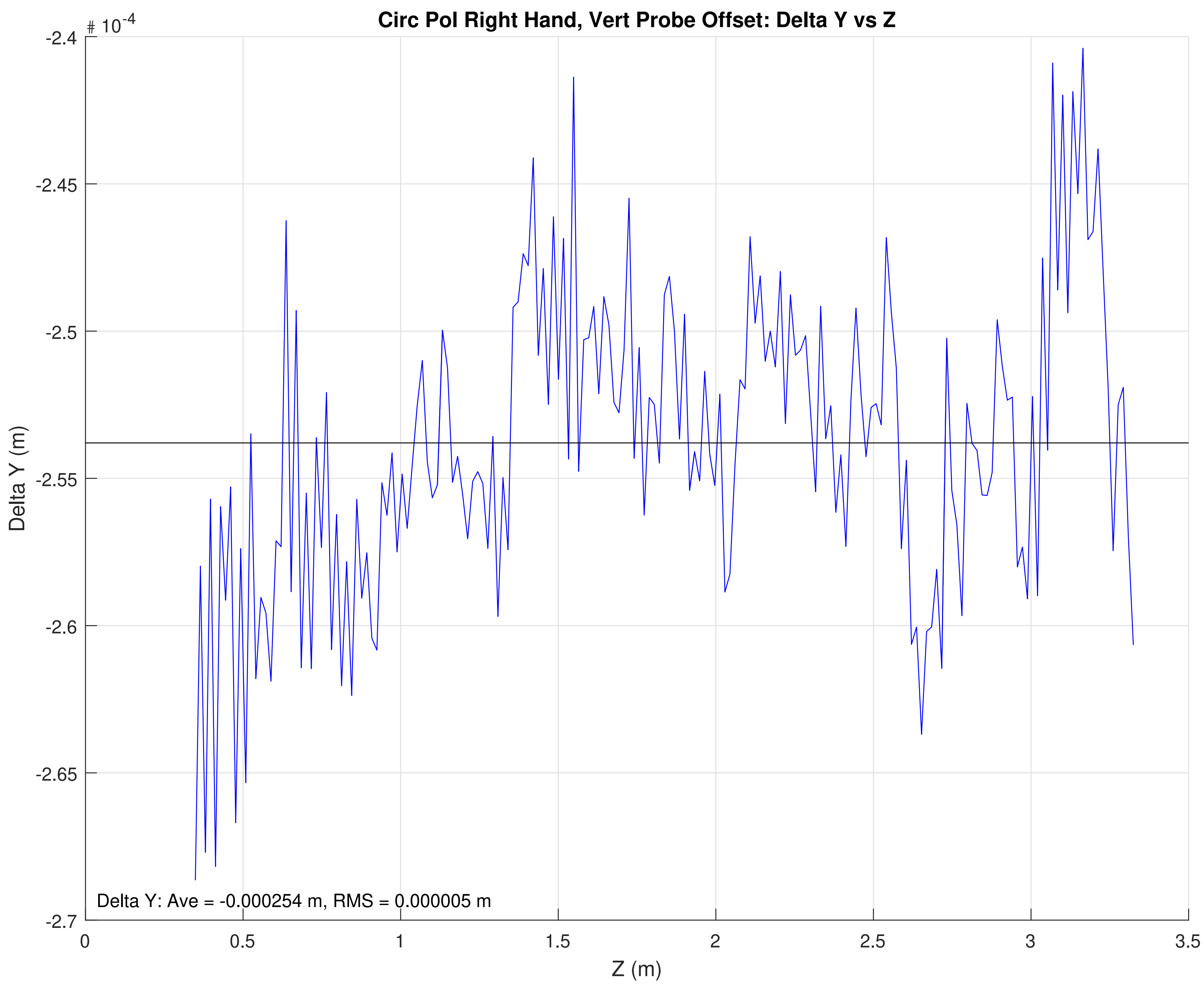

Fitted Bz1 At By1 Peaks vs Z, Excluding Ends
Bz1 At By1 Peak (T)
Z (m)
Bz1
Bz1 Filt


Fitted Bz2 At By2 Peaks vs Z, Excluding Ends
Bz2 At By2 Peaks (T)
Z (m)
Bz2
Bz2 Filt

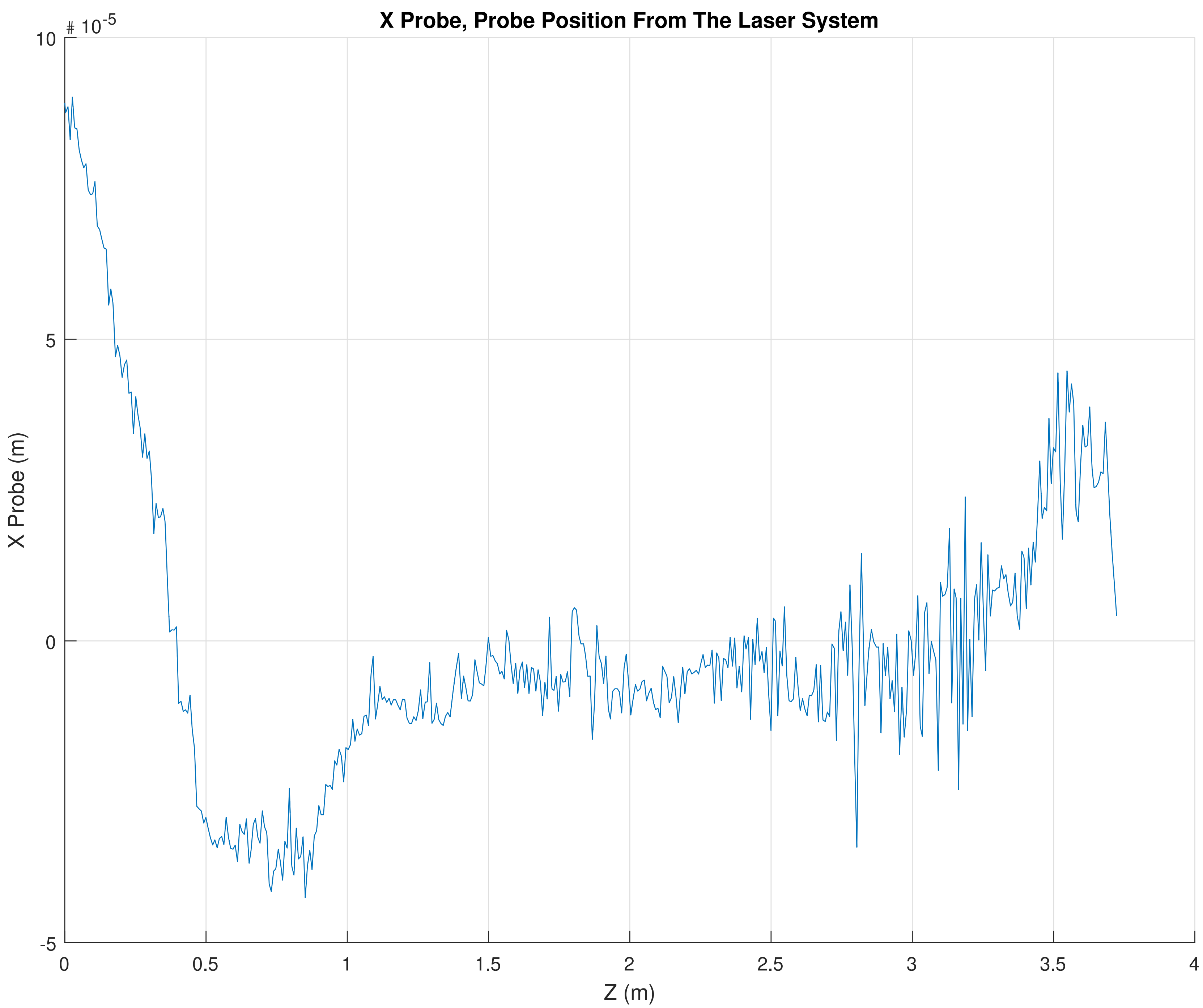

Circ Pol Right Hand, Vert Probe Offset: (X1 - XC) vs Z
10-4
-3
-4
-5
-6
-7
(X1 - XC) (m)
0.5
1
1.5
2
2.5
3
Z (m)


Circ Pol Right Hand, Vert Probe Offset: (Y1 - YC) vs Z
10-4
-5.5
-6
-6.5
-7
-7.5
-8
-8.5
-9
(Y1 - YC) (m)
0.5
1
1.5
2
2.5
3
Z (m)

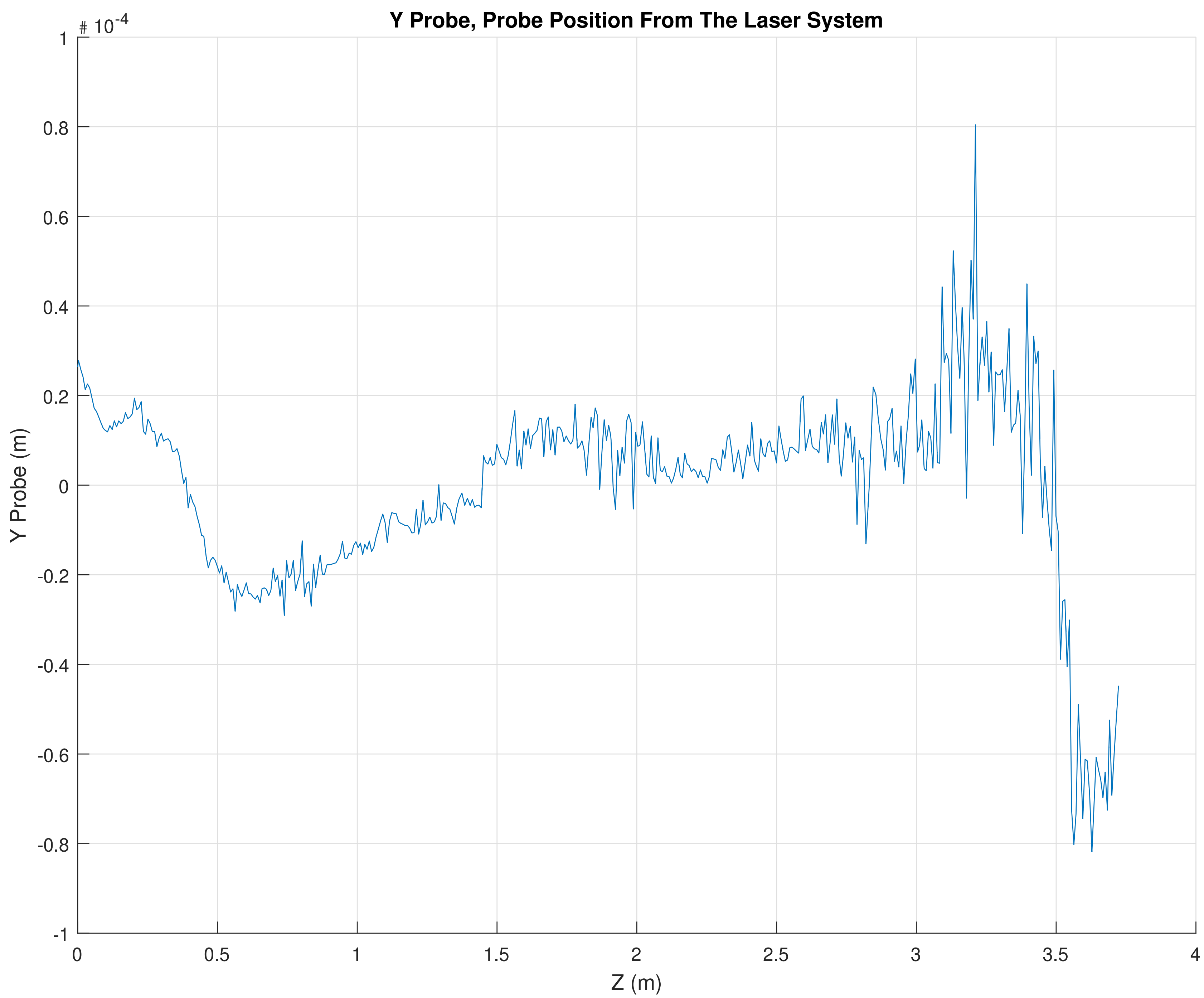

Circ Pol Right Hand, Vert Probe Offset: Delta X vs Z
10^-4
-1.35
-1.4
-1.45
-1.5
-1.55
-1.6
-1.65
Delta X (m)
0
0.5
1
1.5
2
2.5
3
3.5
Z (m)
Delta X: Ave = -0.000150 m, RMS = 0.000005 m

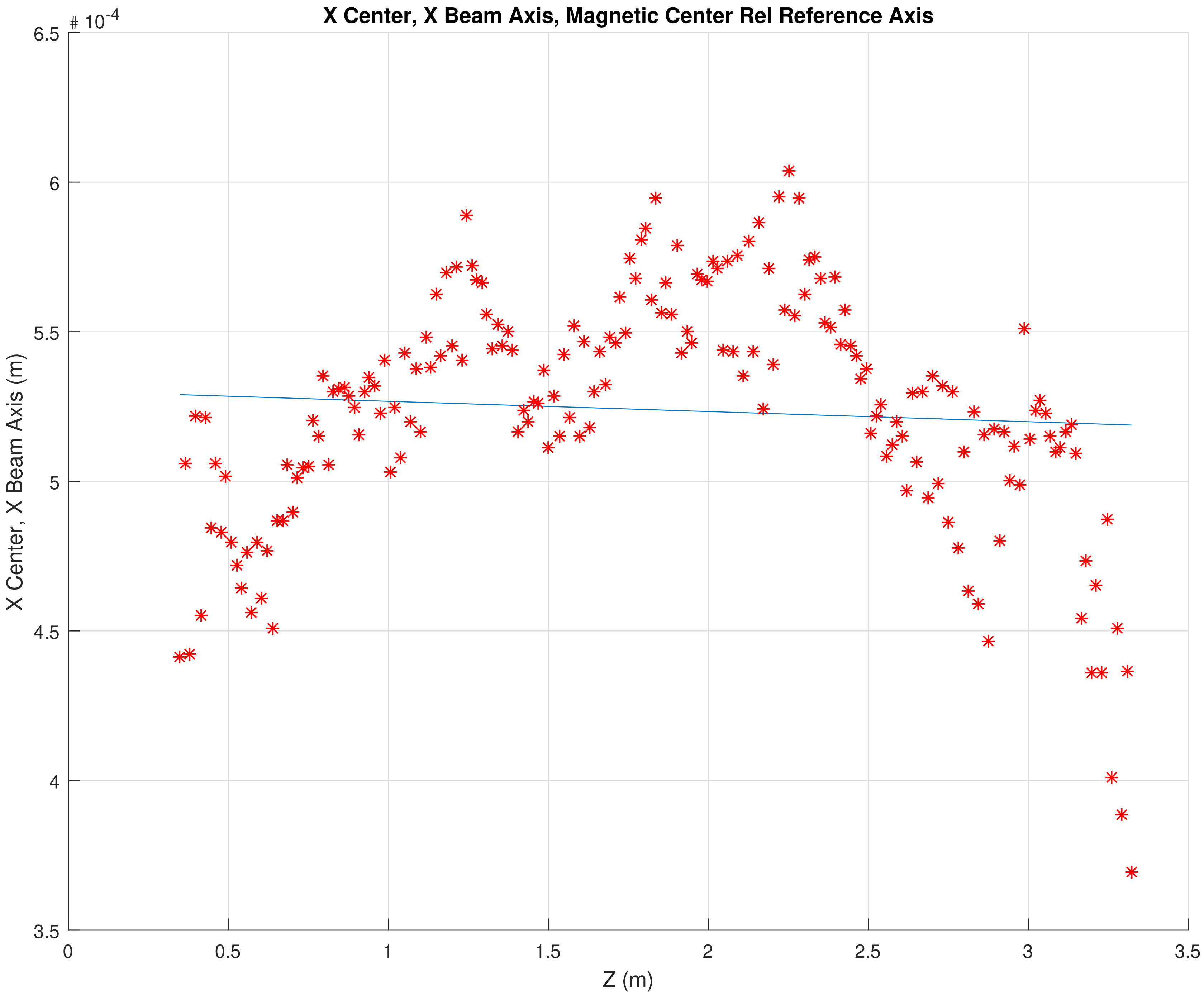


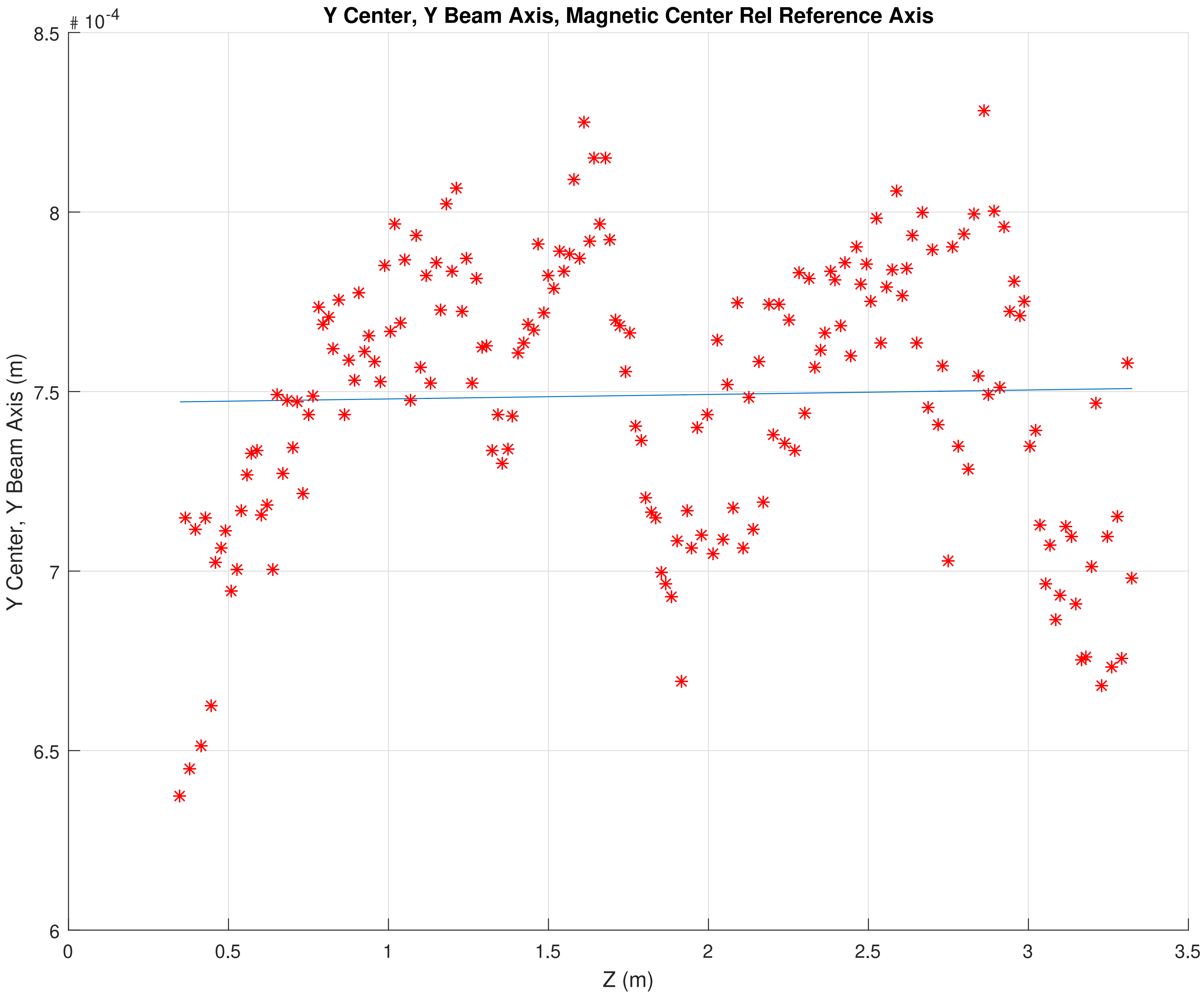
Circ Pol Right Hand, Vert Probe Offset: Delta Y vs Z
10-4
-2.4
-2.45
-2.5
-2.55
-2.6
-2.65
-2.7
Delta Y (m)
0
0.5
1
1.5
2
2.5
3
3.5
Z (m)
Delta Y: Ave = -0.000254 m, RMS = 0.000005 m



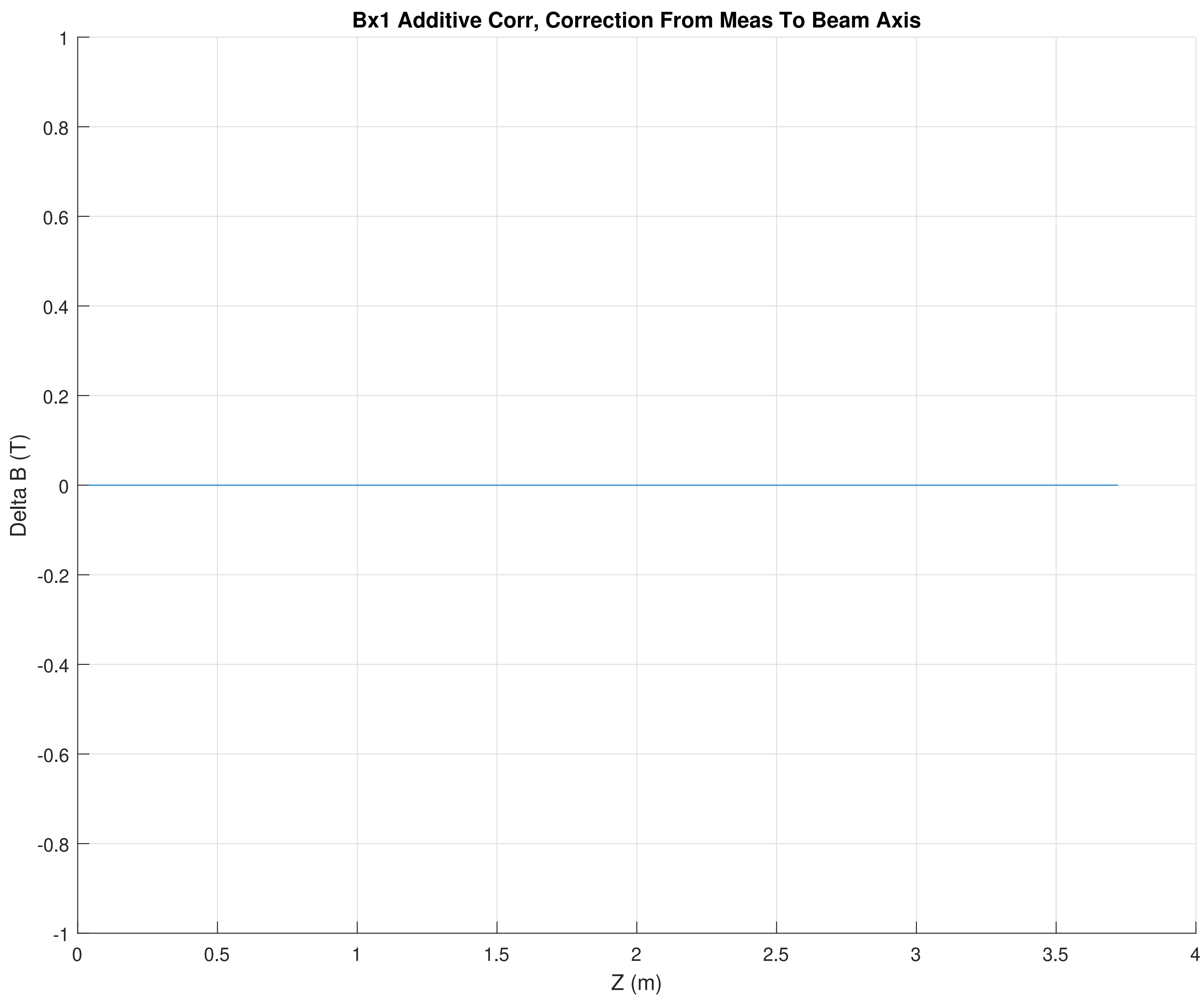
X Probe, Probe Position From The Laser System
10^-5
10
5
0
-5
0
0.5
1
1.5
2
2.5
3
3.5
4
Z (m)
X Probe (m)

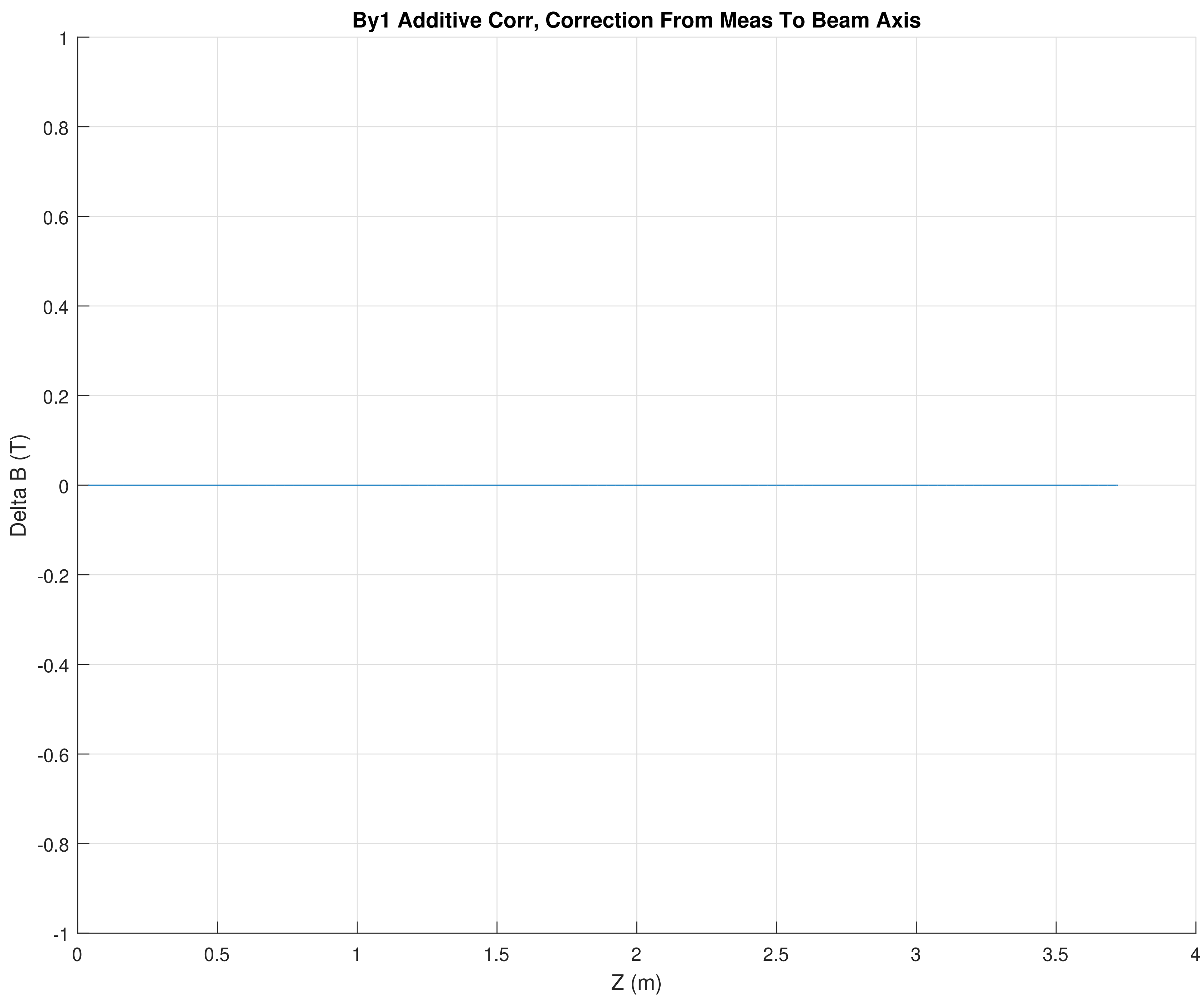

Y Probe, Probe Position From The Laser System
10^-4
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
Y Probe (m)
0
0.5
1
1.5
2
2.5
3
3.5
4
Z (m)

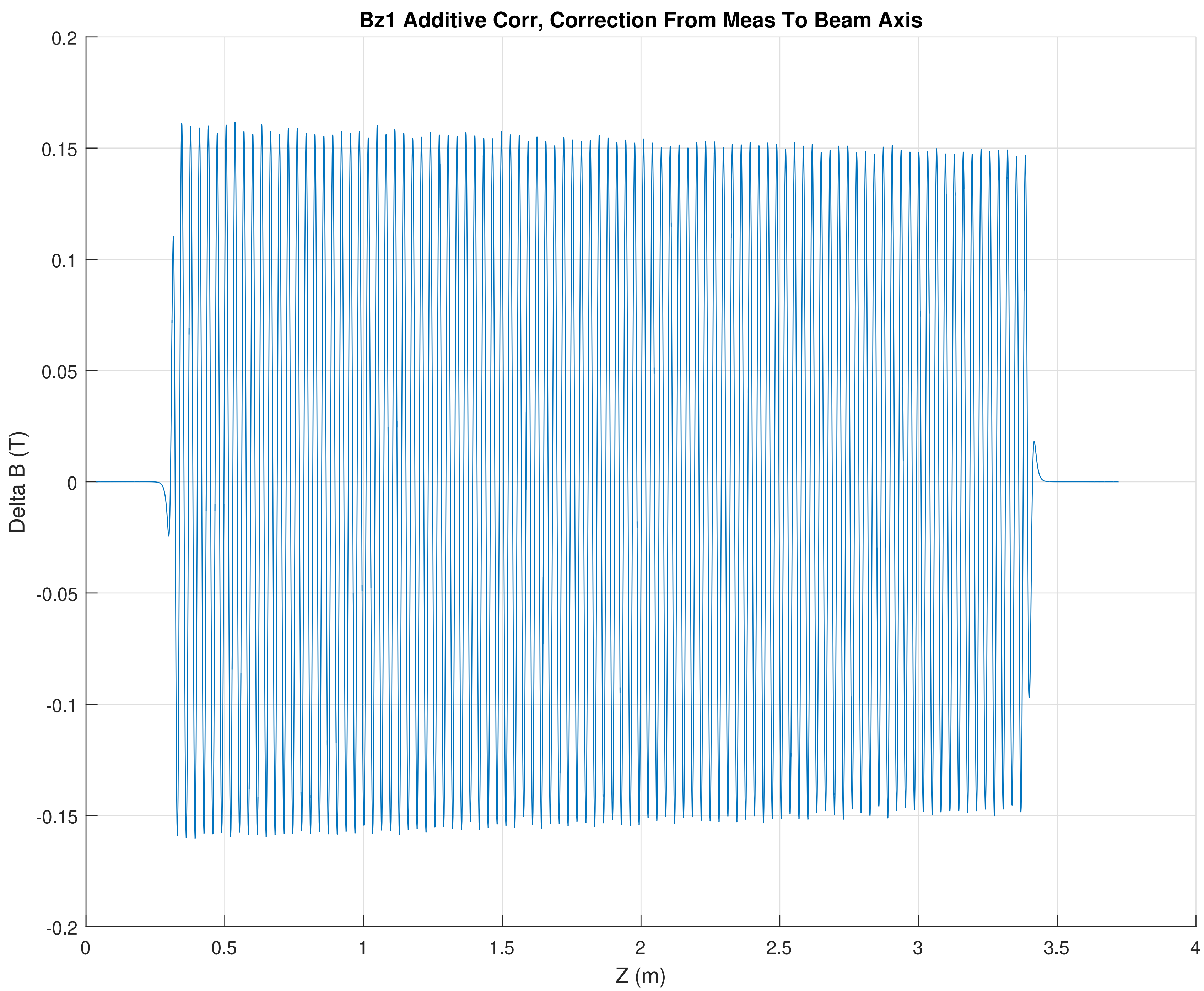

X Center, X Beam Axis, Magnetic Center Rel Reference Axis
10^-4
6.5
6
5.5
5
4.5
4
3.5
X Center, X Beam Axis (m)
0
0.5
1
1.5
2
2.5
3
3.5
Z (m)

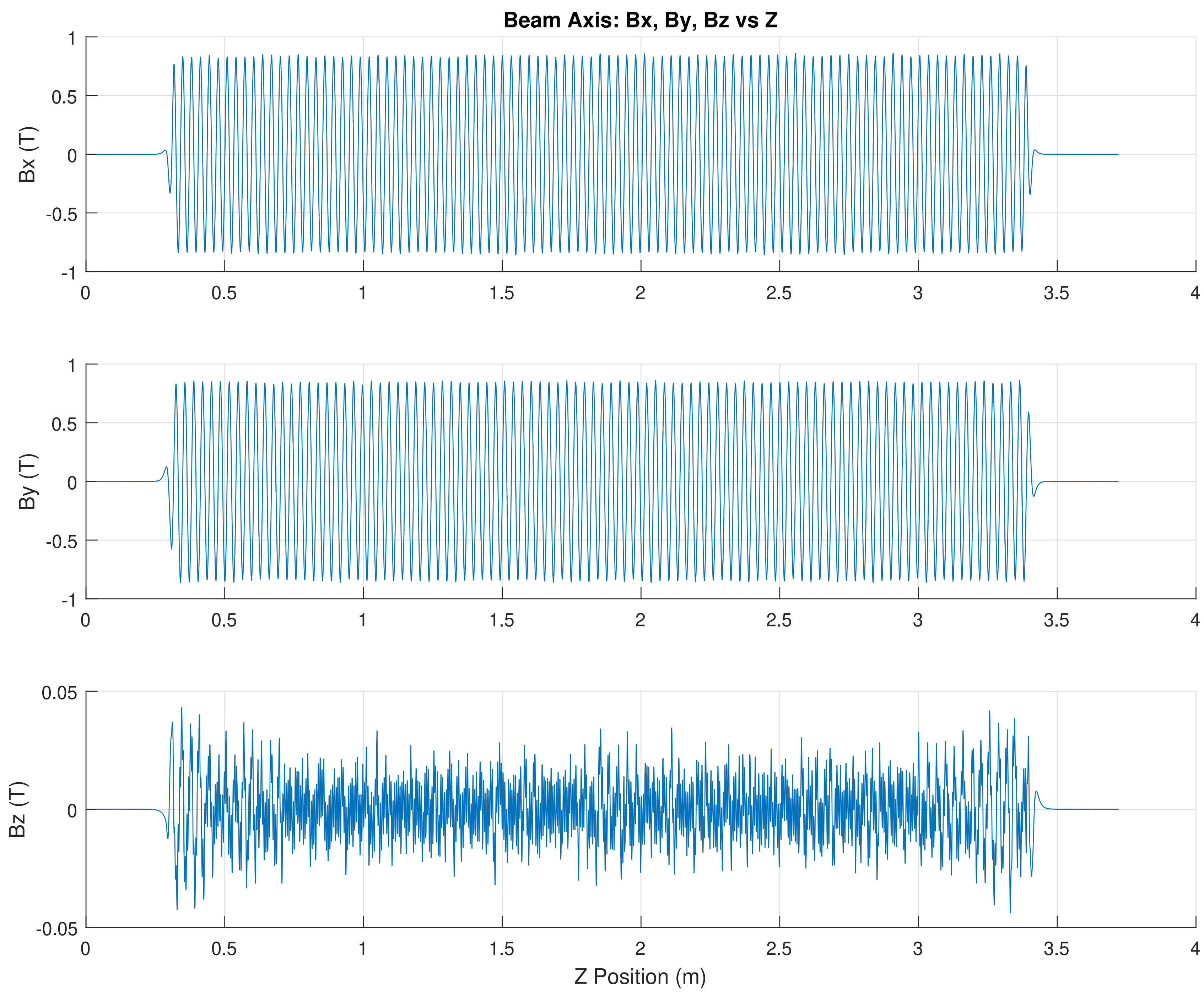


Y Center, Y Beam Axis, Magnetic Center Rel Reference Axis
10^-4
8.5
8
7.5
7
6.5
6
0
0.5
1
1.5
2
2.5
3
3.5
Z (m)
Y Center, Y Beam Axis (m)


Bx1 Additive Corr, Correction From Meas To Beam Axis
Delta 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
4


By1 Additive Corr, Correction From Meas To Beam Axis
Delta B (T)
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
4
Z (m)


Bz1 Additive Corr, Correction From Meas To Beam Axis
Delta B (T)
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
4
Z (m)



Beam Axis: Bx, By, Bz vs Z
Bx (T)
By (T)
Bz (T)
1
0.5
0
-0.5
-1
0.05
-0.05
0
0.5
1
1.5
2
2.5
3
3.5
4
Z Position (m)