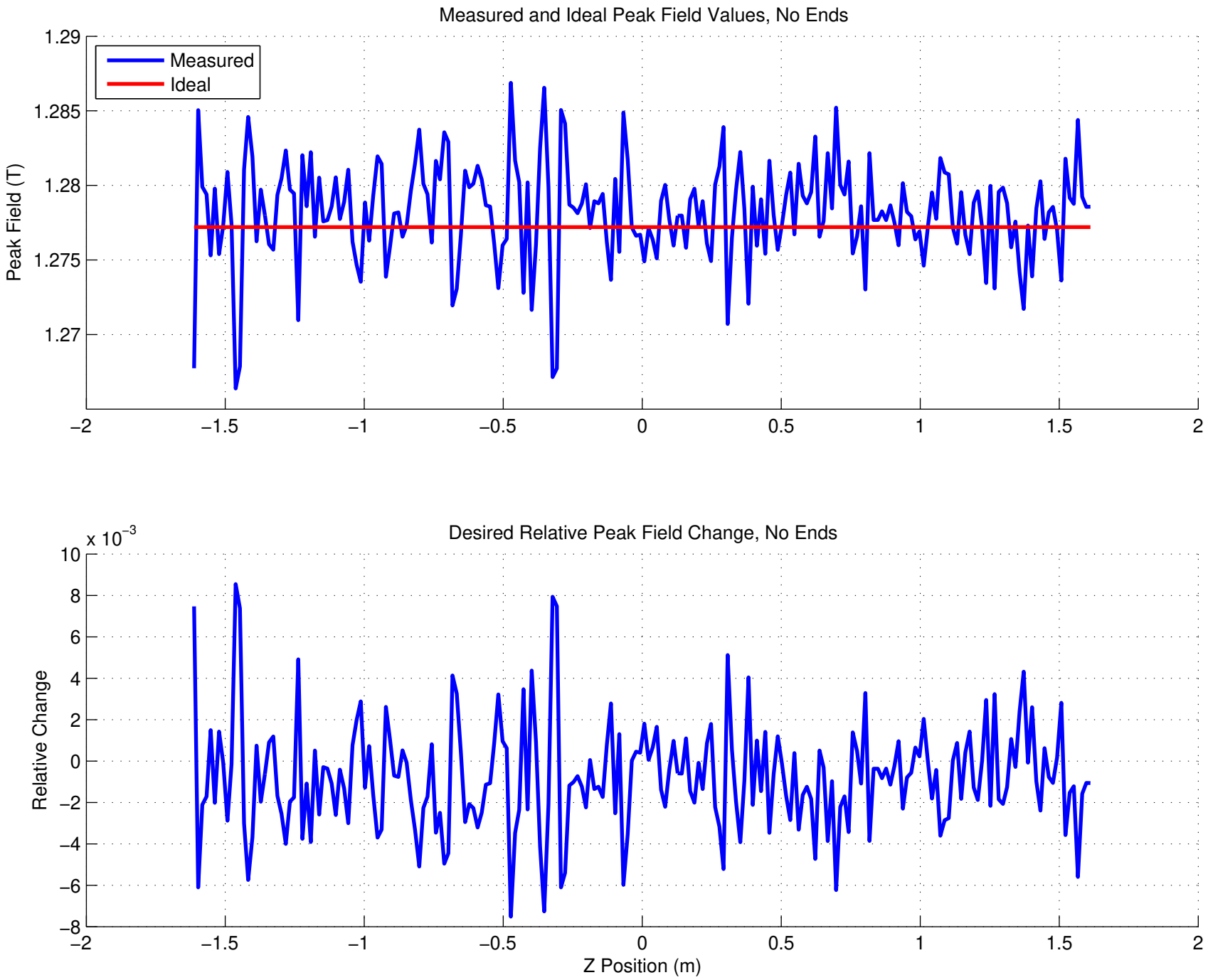
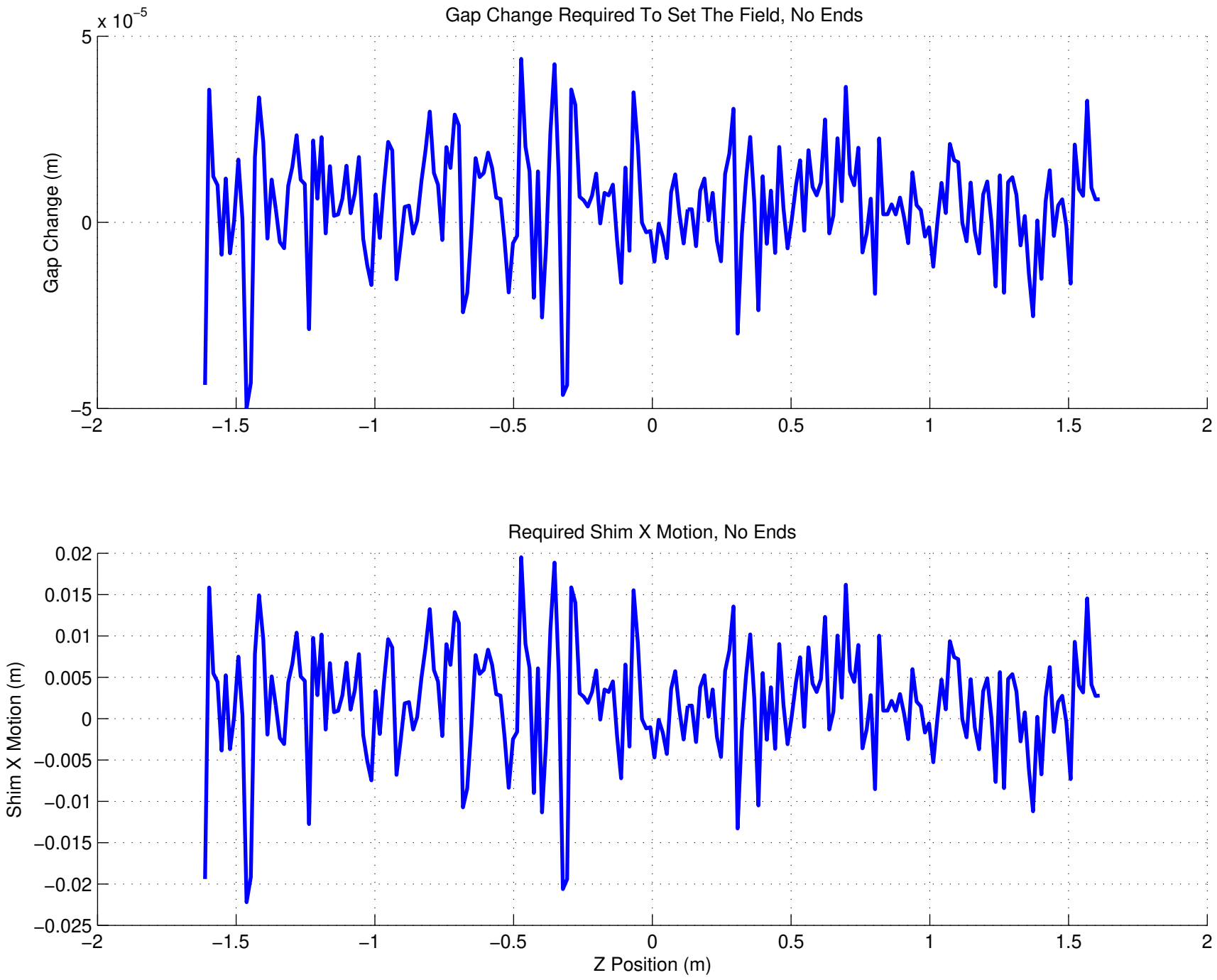
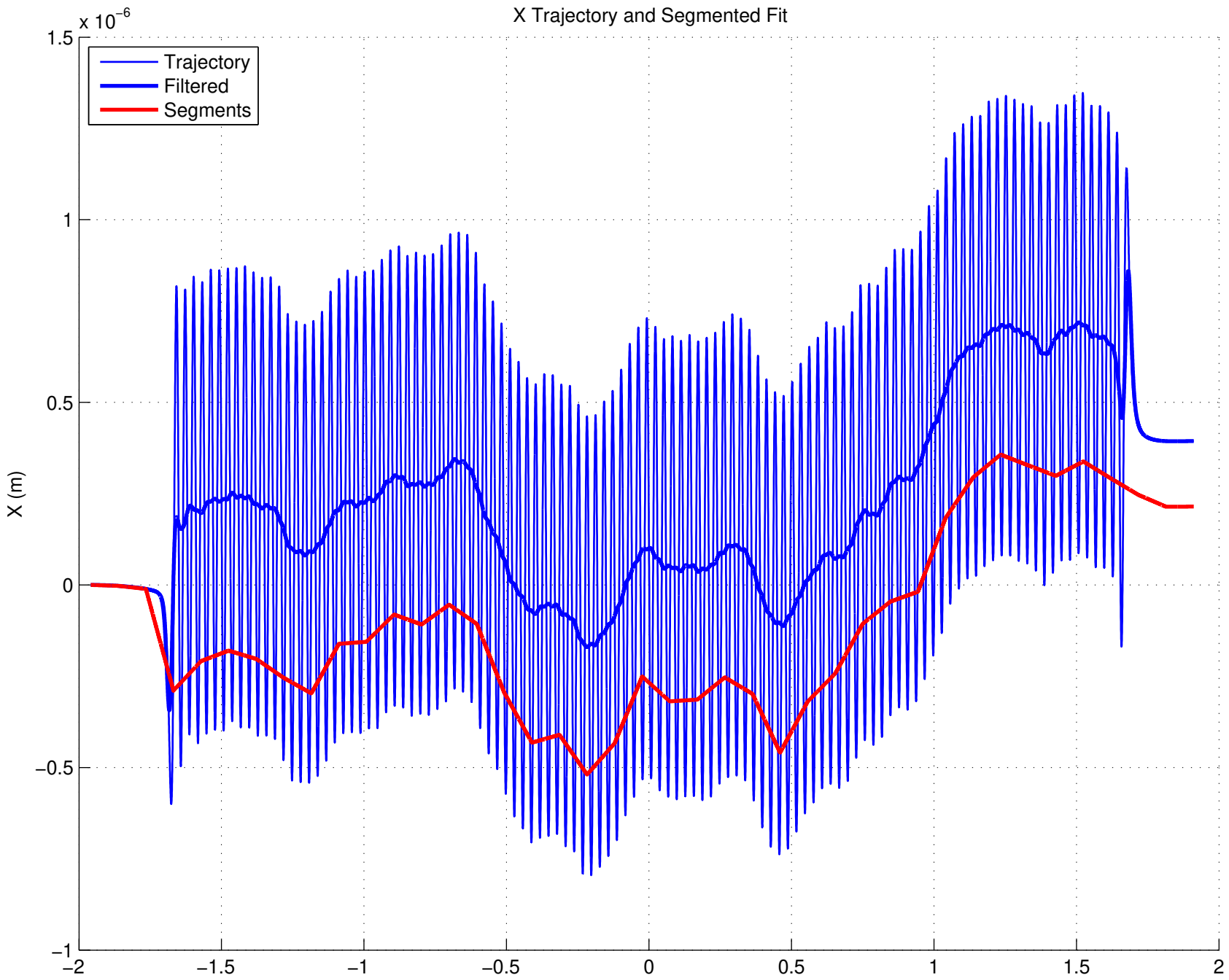
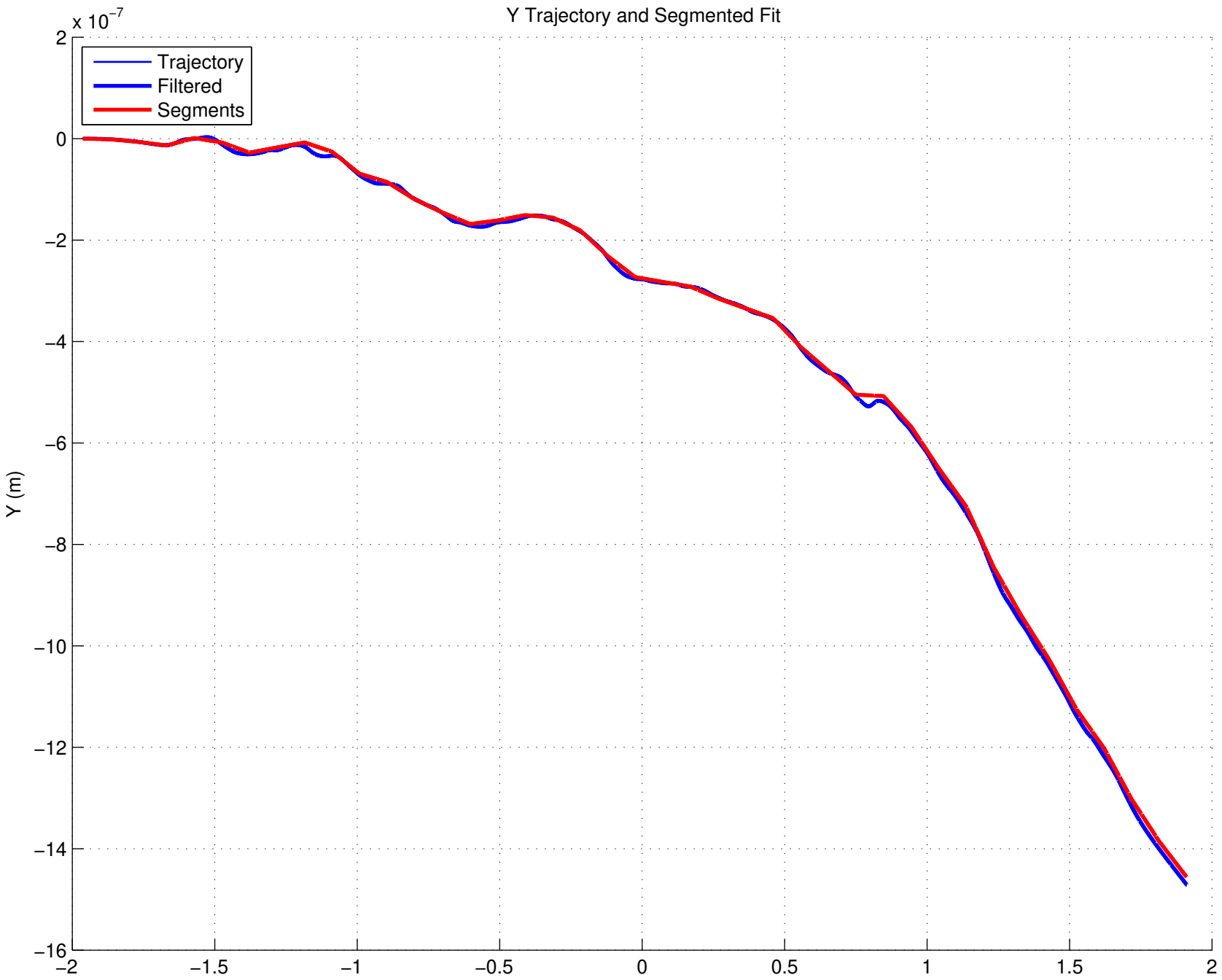
Planar Insertion Device Shim Analysis

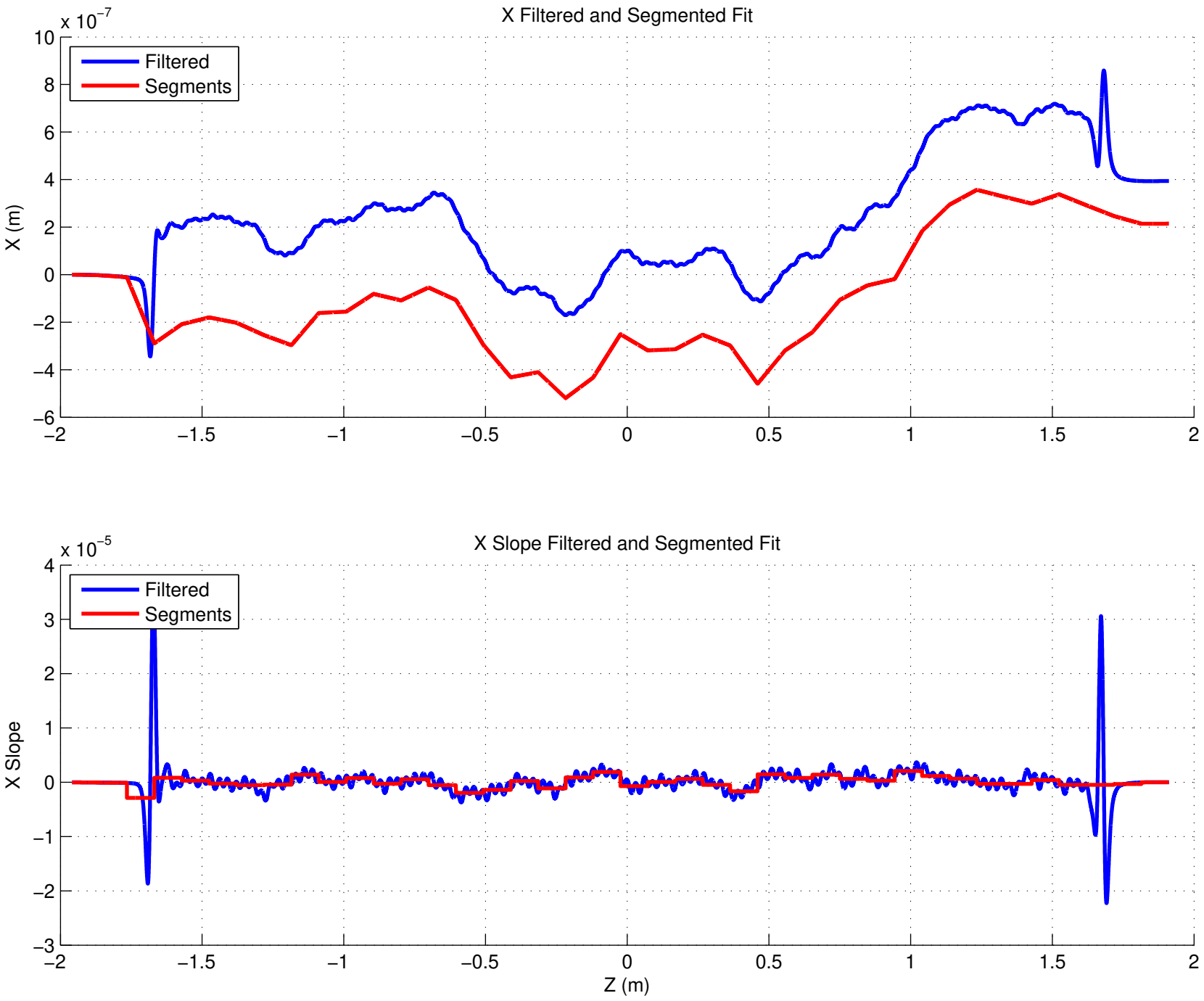
Parameters:
INPUT−FILE−DIR =C:\magdata\Lcls\Undulator\L143−112000−17\RMA0001\Rough Tuning\Z Scans\Run 031\
INPUT−FILE−NAME =bscanz−dat.002
INPUT−FILE−TYPE =SLAC−BXBYVSZ
GAMMA =26690.65
LAMBDA−U =0.03
IDEAL−K−VALUE =3.4996
NUM−POLES =226
NUM−END−POLES =5
CELL−LENGTH =3.656

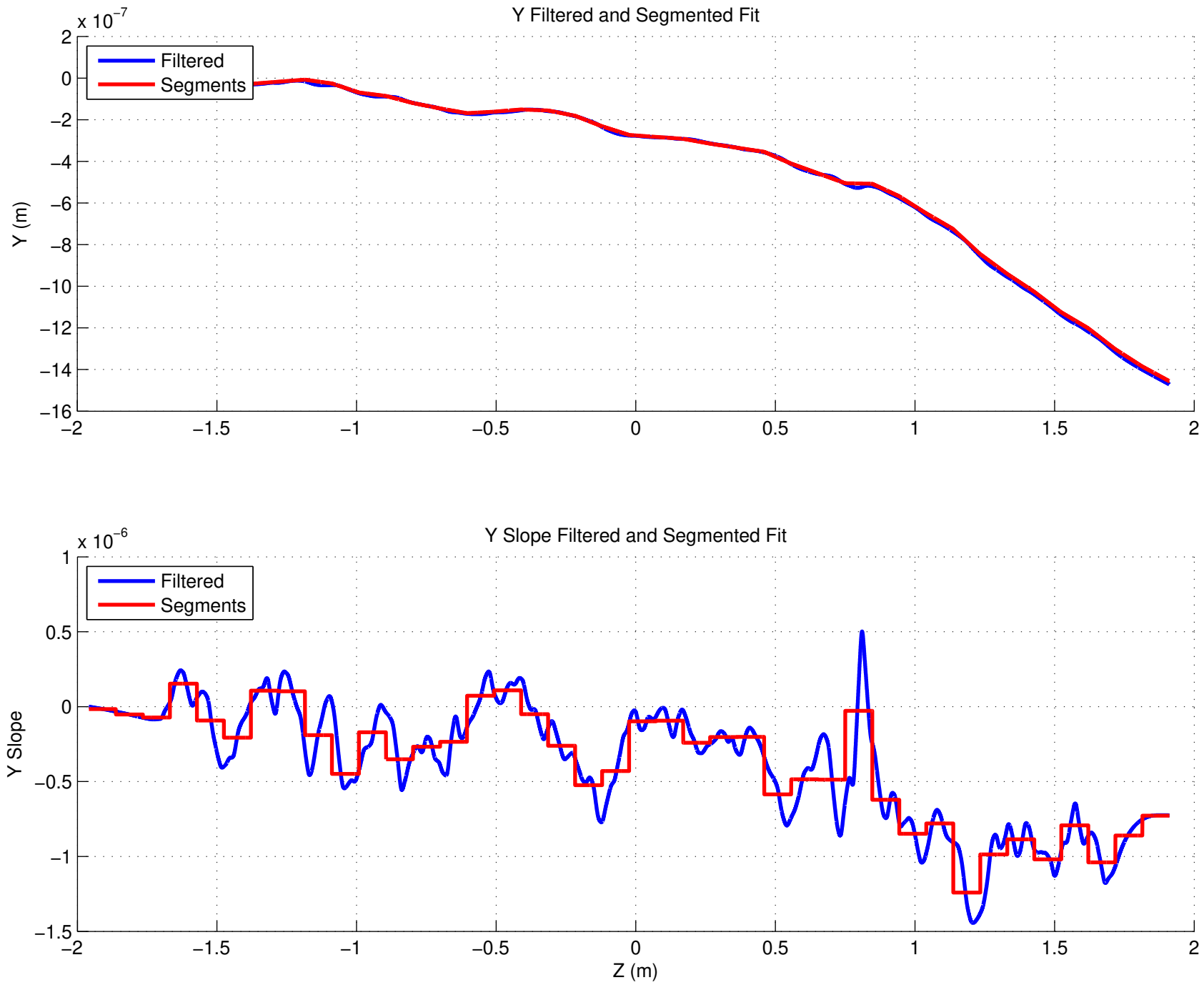

Measured and Ideal Peak Field Values, No Ends
Measured
Ideal
Peak Field (T)
1.29
1.285
1.28
1.275
1.27
−2
−1.5
−1
−0.5
0
0.5
1
1.5
2
Desired Relative Peak Field Change, No Ends
x 10^−3
Relative Change
10
8
6
4
2
0
−2
−4
−6
−8
Z Position (m)

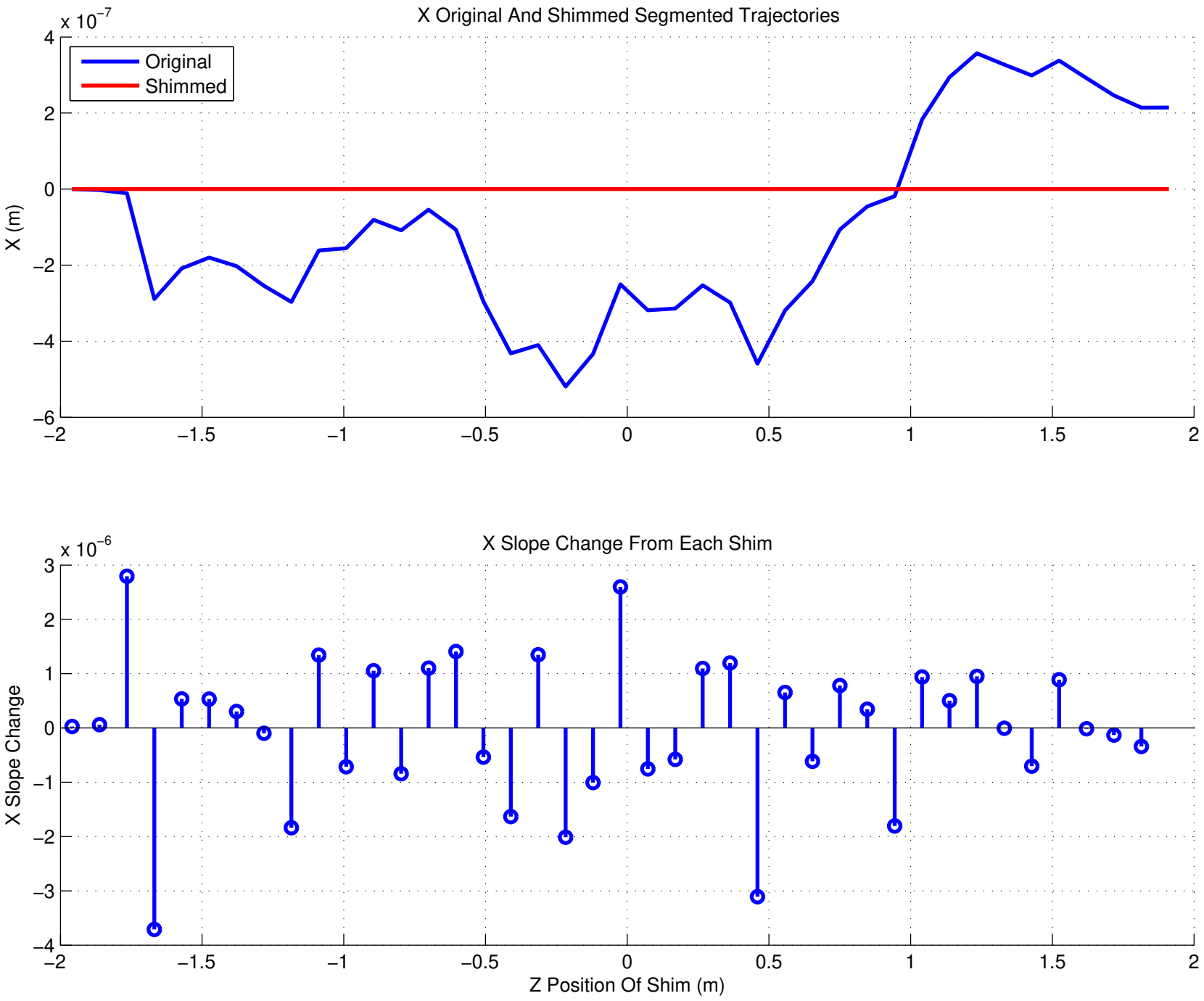

Gap Change Required To Set The Field, No Ends
x 10^-5
Gap Change (m)
5
0
−5
−2
−1.5
−1
−0.5
0
0.5
1
1.5
2
Required Shim X Motion, No Ends
Shim X Motion (m)
0.02
0.015
0.01
0.005
0
−0.005
−0.01
−0.015
−0.02
−0.025
Z Position (m)

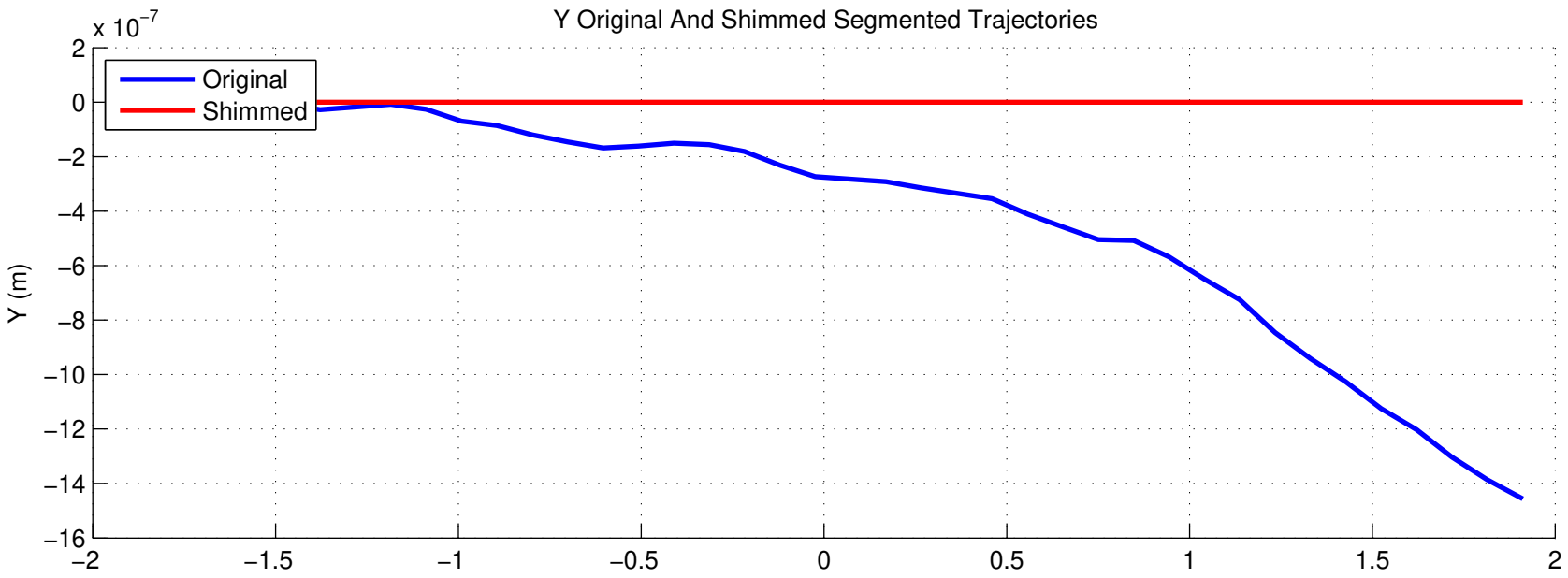

X Trajectory and Segmented Fit
x 10^-6
Trajectory
Filtered
Segments
X (m)
1.5
1
0.5
0
−0.5
−1
−2
−1.5
−1
−0.5
0
0.5
1
1.5
2

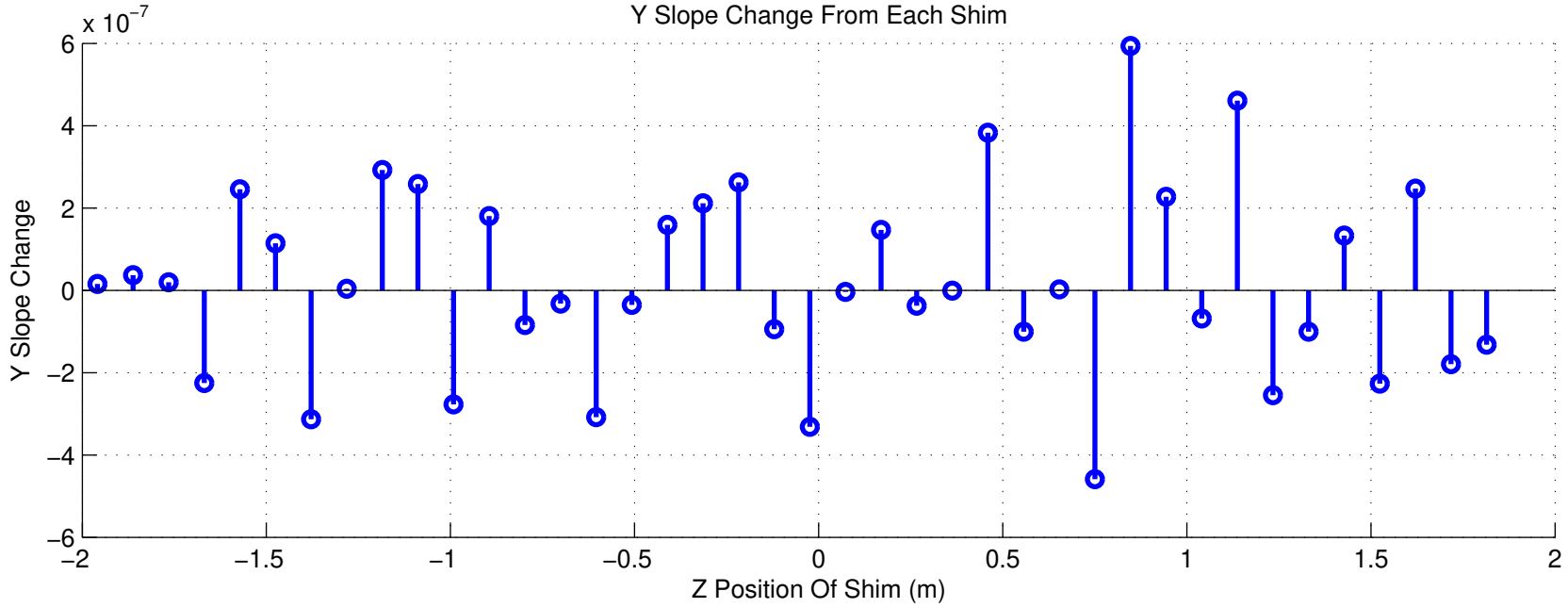

Y Trajectory and Segmented Fit
x 10^-7
Trajectory
Filtered
Segments
Y (m)
2
0
−2
−4
−6
−8
−10
−12
−14
−16
−2
−1.5
−1
−0.5
0
0.5
1
1.5
2

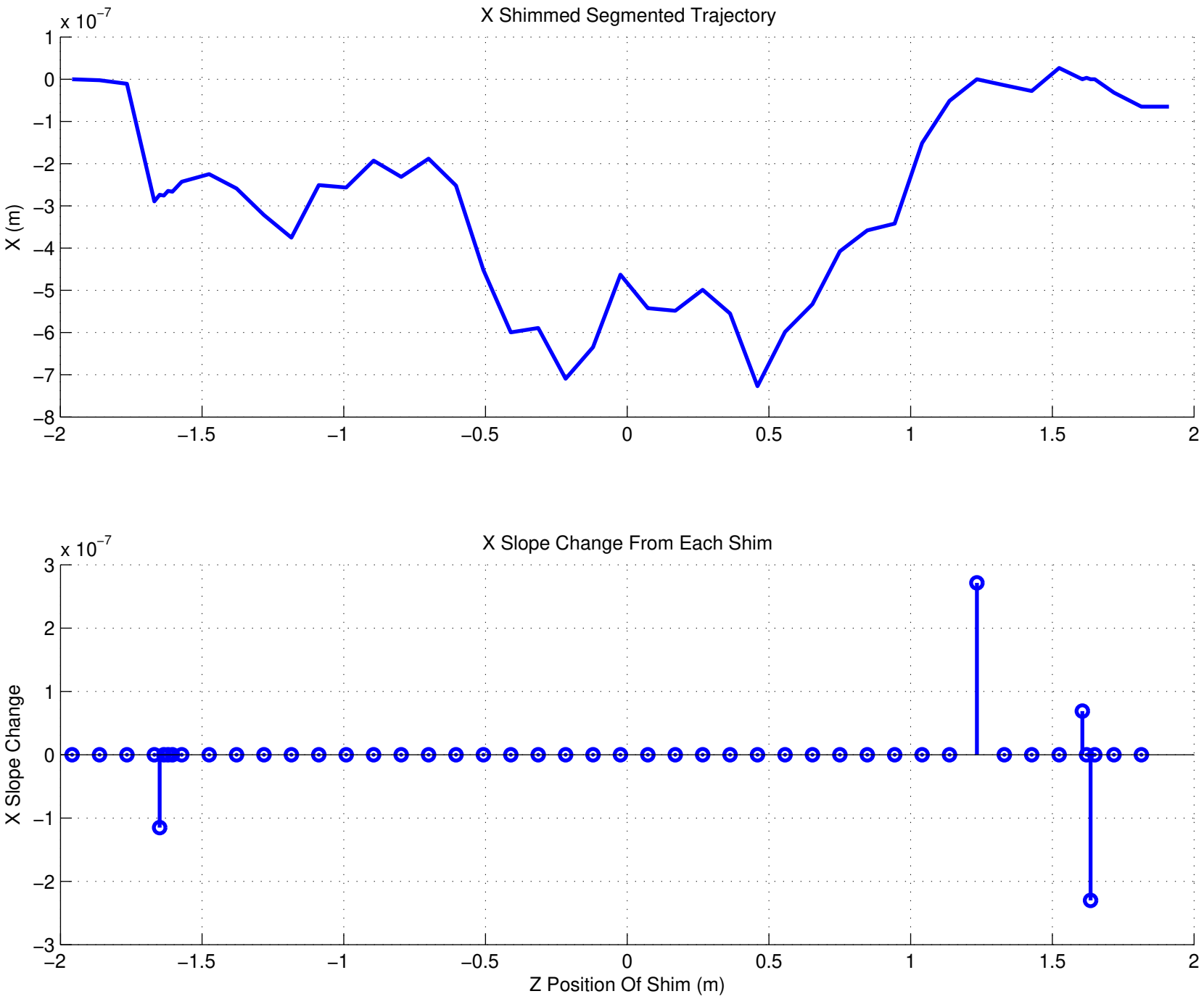

X Filtered and Segmented Fit
x 10^-7
Filtered
Segments
X (m)
10
8
6
4
2
0
−2
−4
−6
−2
−1.5
−1
−0.5
0
0.5
1
1.5
2
X Slope Filtered and Segmented Fit
x 10^-5
Filtered
Segments
X Slope
4
3
2
1
0
−1
−2
−3
−2
−1.5
−1
−0.5
0
0.5
1
1.5
2
Z (m)

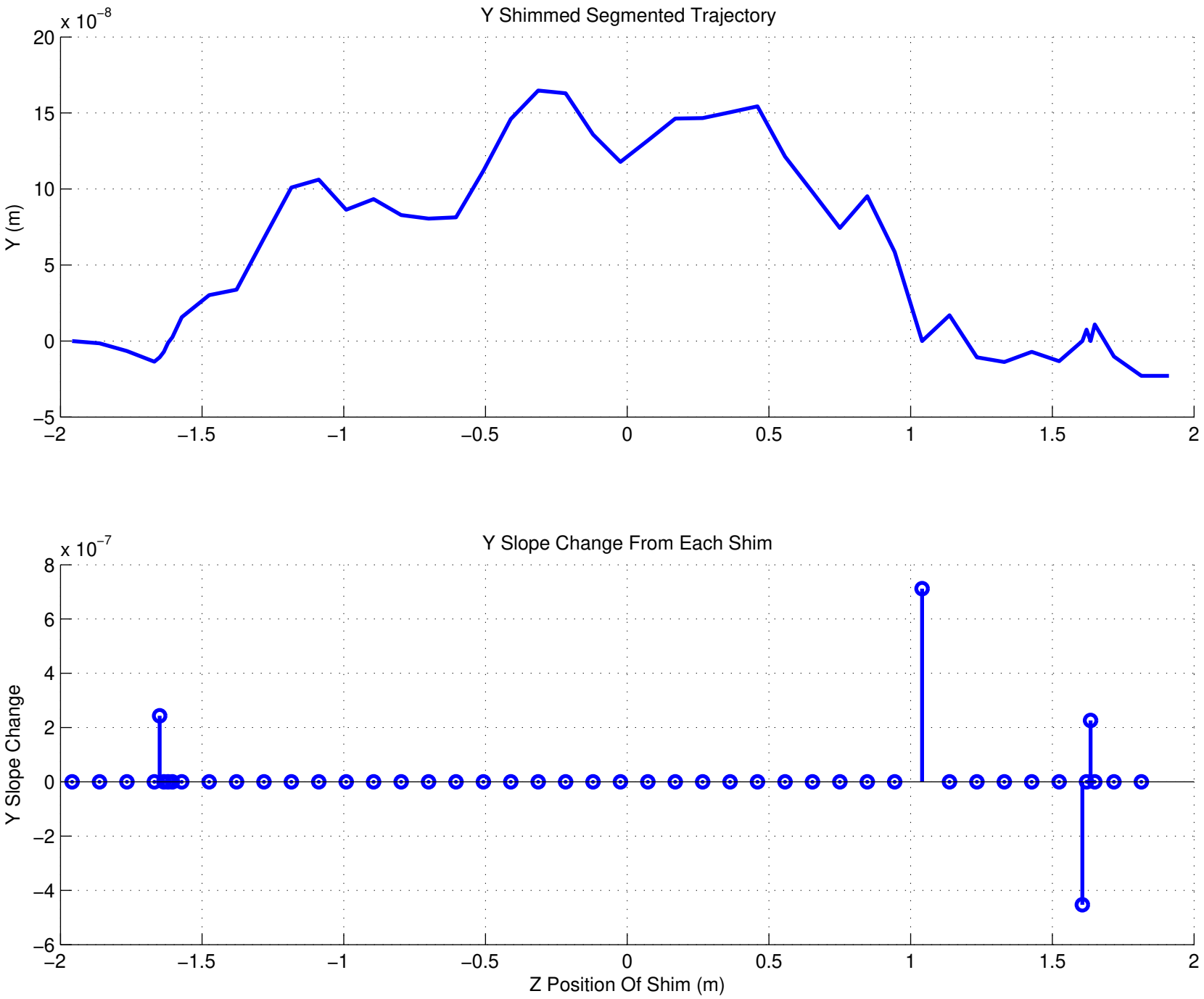

Y Filtered and Segmented Fit
x 10^-7
Filtered
Segments
Y (m)
2
0
−2
−4
−6
−8
−10
−12
−14
−16
−2
−1.5
−1
−0.5
0
0.5
1
1.5
2
Y Slope Filtered and Segmented Fit
x 10^-6
Filtered
Segments
Y Slope
1
0.5
0
−0.5
−1
−1.5
Z (m)

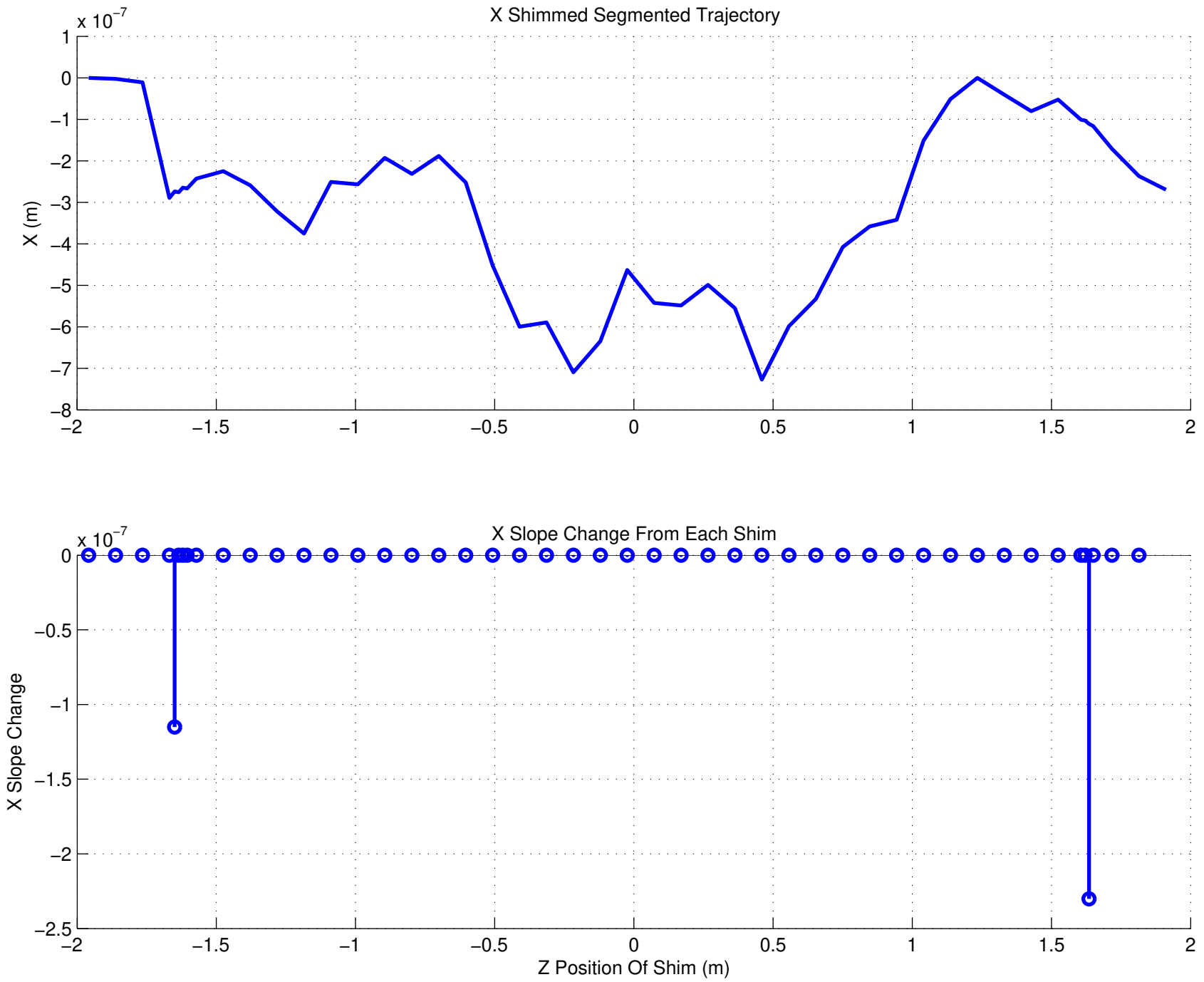

X Original And Shimmed Segmented Trajectories
x 10^-7
Original
Shimmed
X (m)
4
2
0
−2
−4
−6
−2
−1.5
−1
−0.5
0
0.5
1
1.5
2
X Slope Change From Each Shim
x 10^-6
X Slope Change
3
2
1
0
−1
−2
−3
−4
Z Position Of Shim (m)

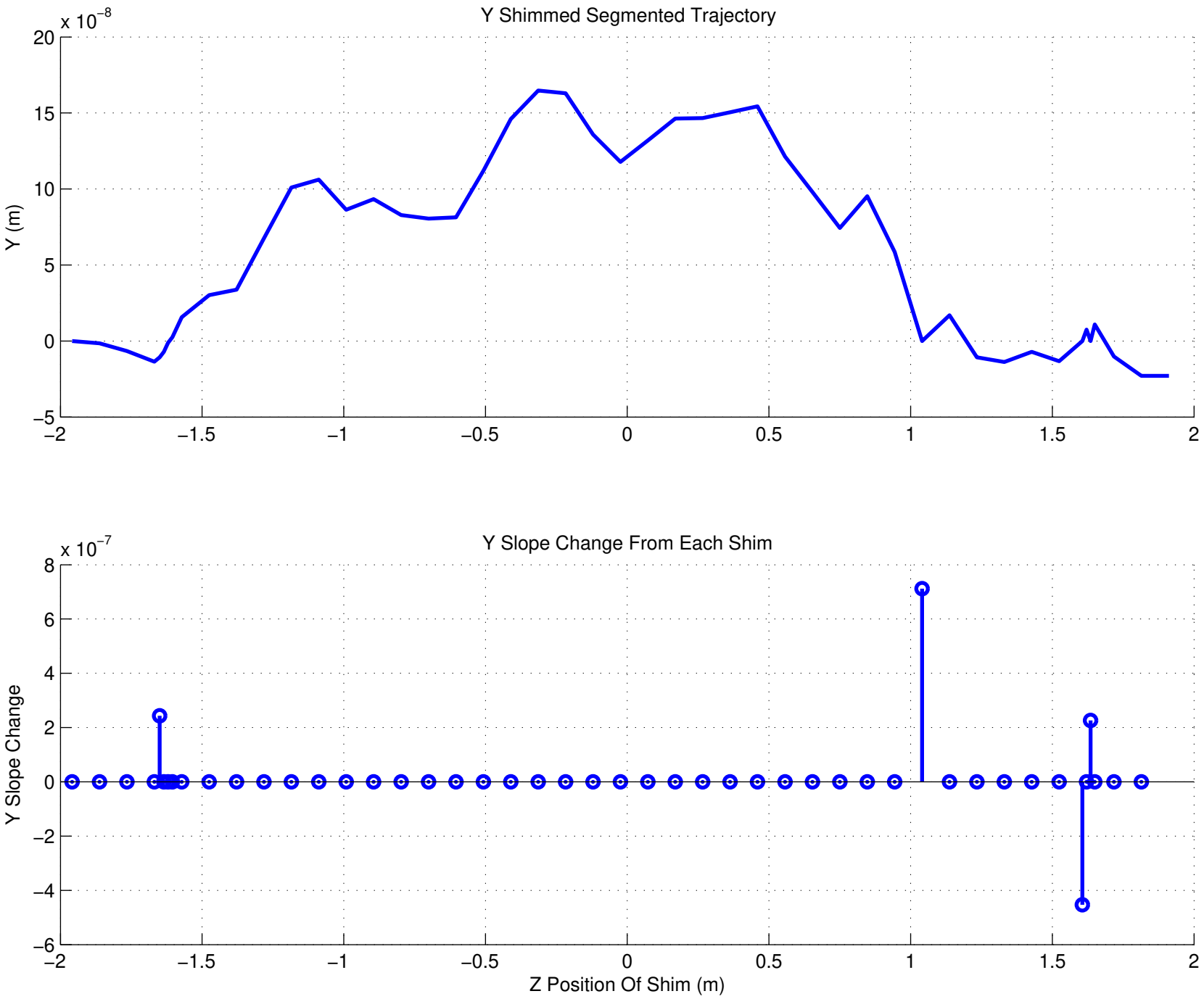

Y Original And Shimmed Segmented Trajectories
x 10^-7
Original
Shimmed
Y (m)
2
0
−2
−4
−6
−8
−10
−12
−14
−16
−2
−1.5
−1
−0.5
0
0.5
1
1.5
2

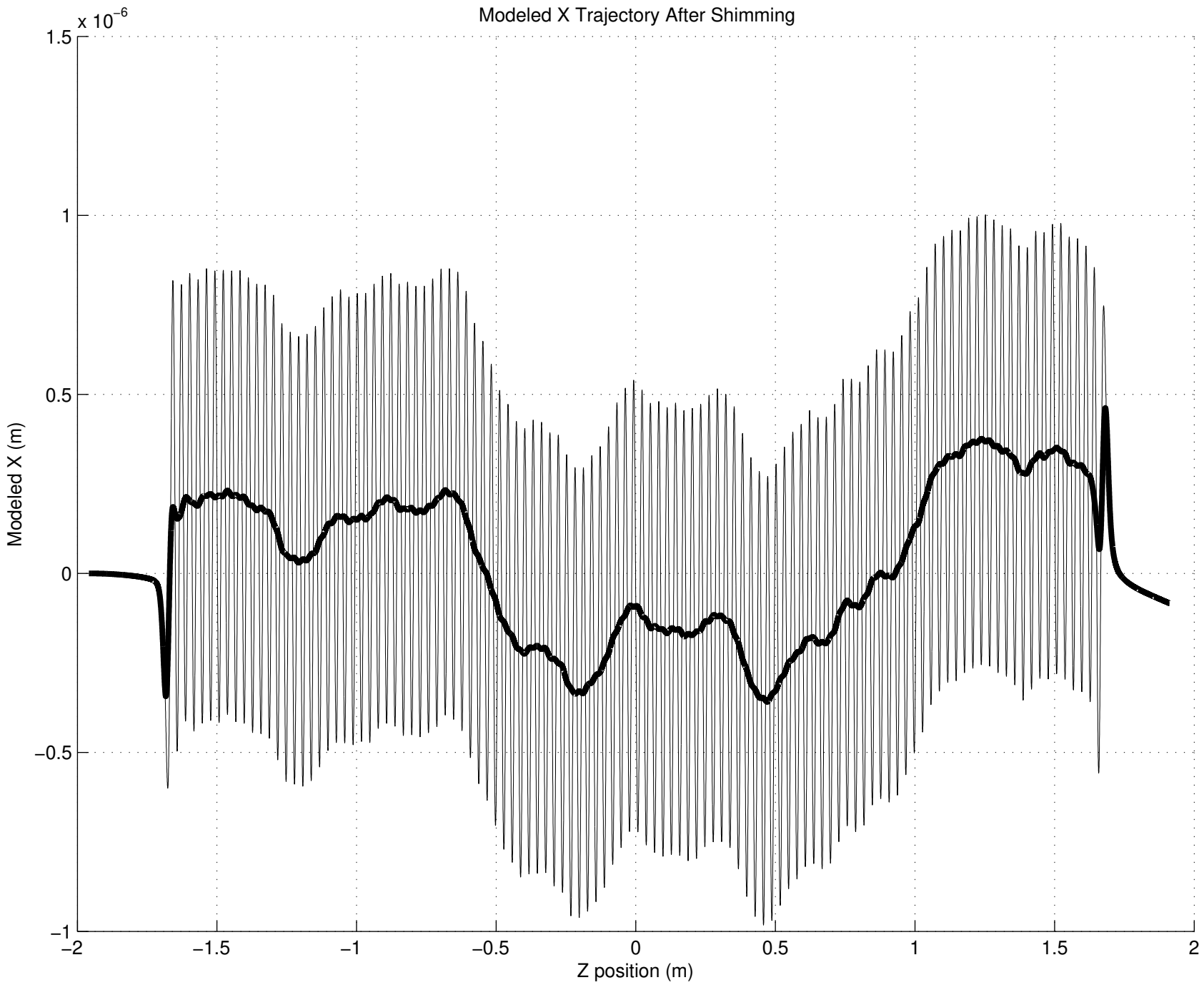

Y Slope Change From Each Shim
x 10^-7
Y Slope Change
6
4
2
0
−2
−4
−6
−2
−1.5
−1
−0.5
0
0.5
1
1.5
2
Z Position Of Shim (m)

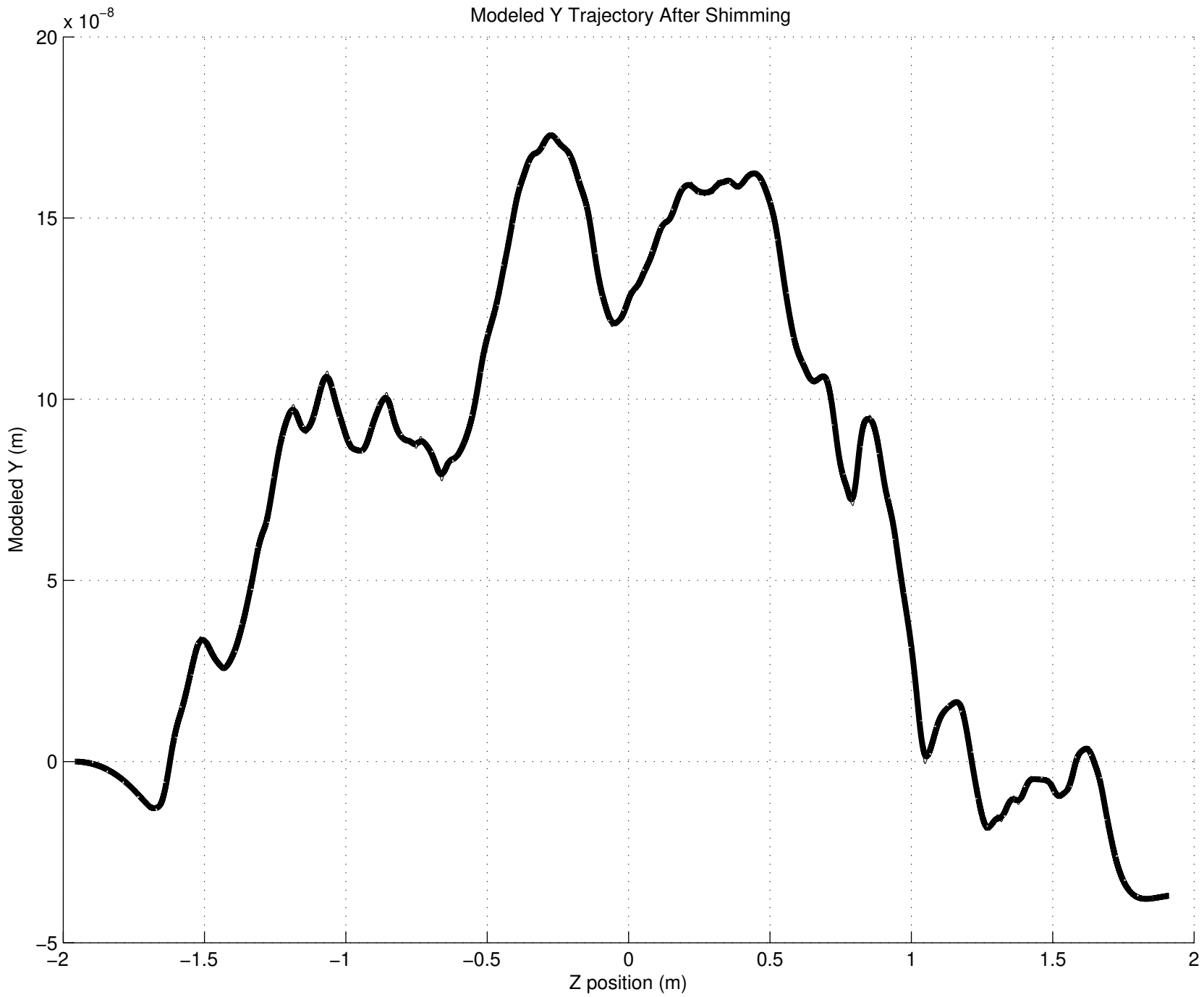

X Shimmed Segmented Trajectory
x 10^-7
X (m)
1
0
−1
−2
−3
−4
−5
−6
−7
−8
−2
−1.5
−1
−0.5
0
0.5
1
1.5
2
X Slope Change From Each Shim
x 10^-7
X Slope Change
3
2
1
0
−1
−2
−3
Z Position Of Shim (m)

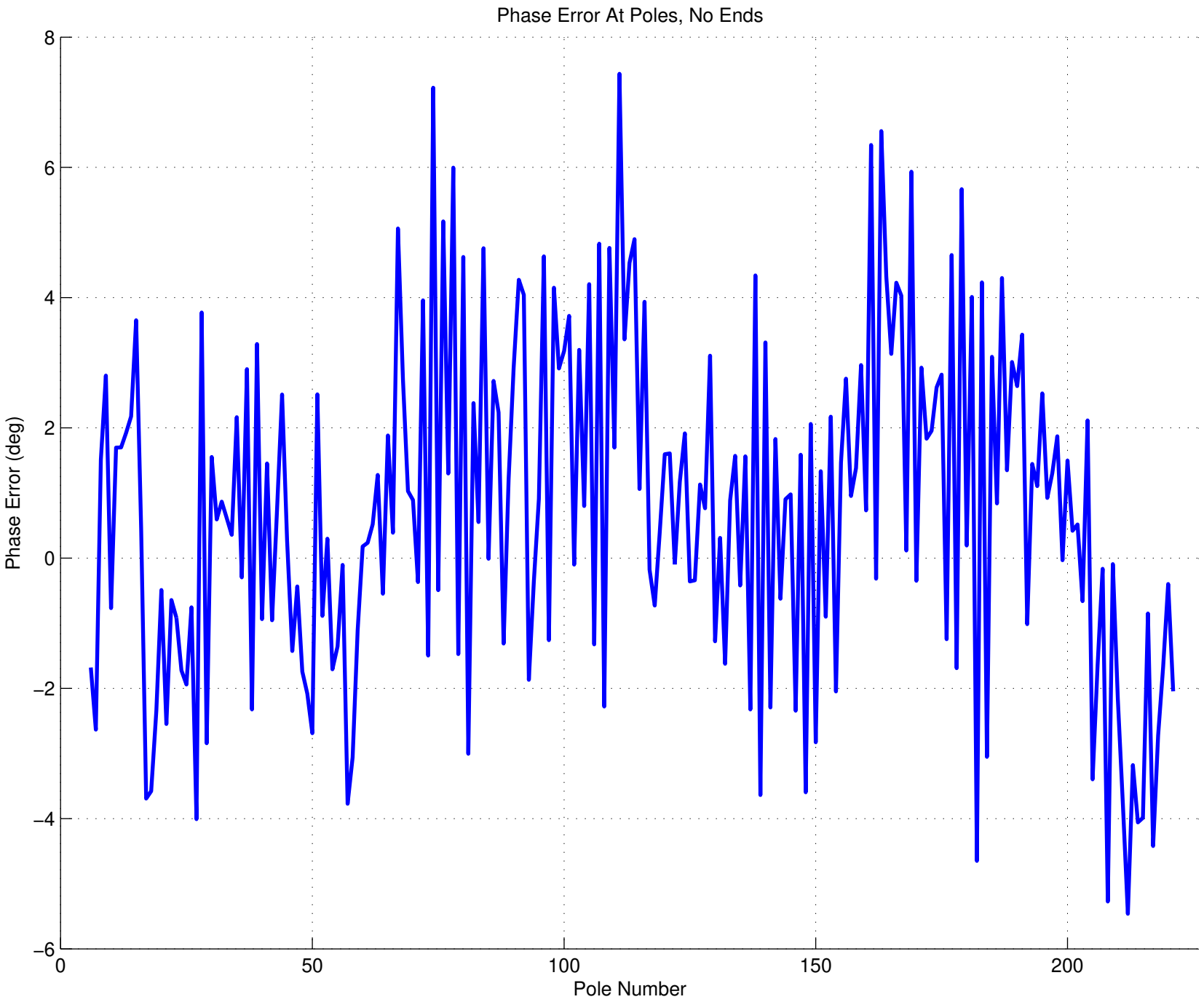

Y Shimmed Segmented Trajectory
x 10^-8
Y (m)
20
15
10
5
0
−5
−2
−1.5
−1
−0.5
0
0.5
1
1.5
2
Y Slope Change From Each Shim
x 10^-7
Y Slope Change
8
6
4
2
0
−2
−4
−6
Z Position Of Shim (m)

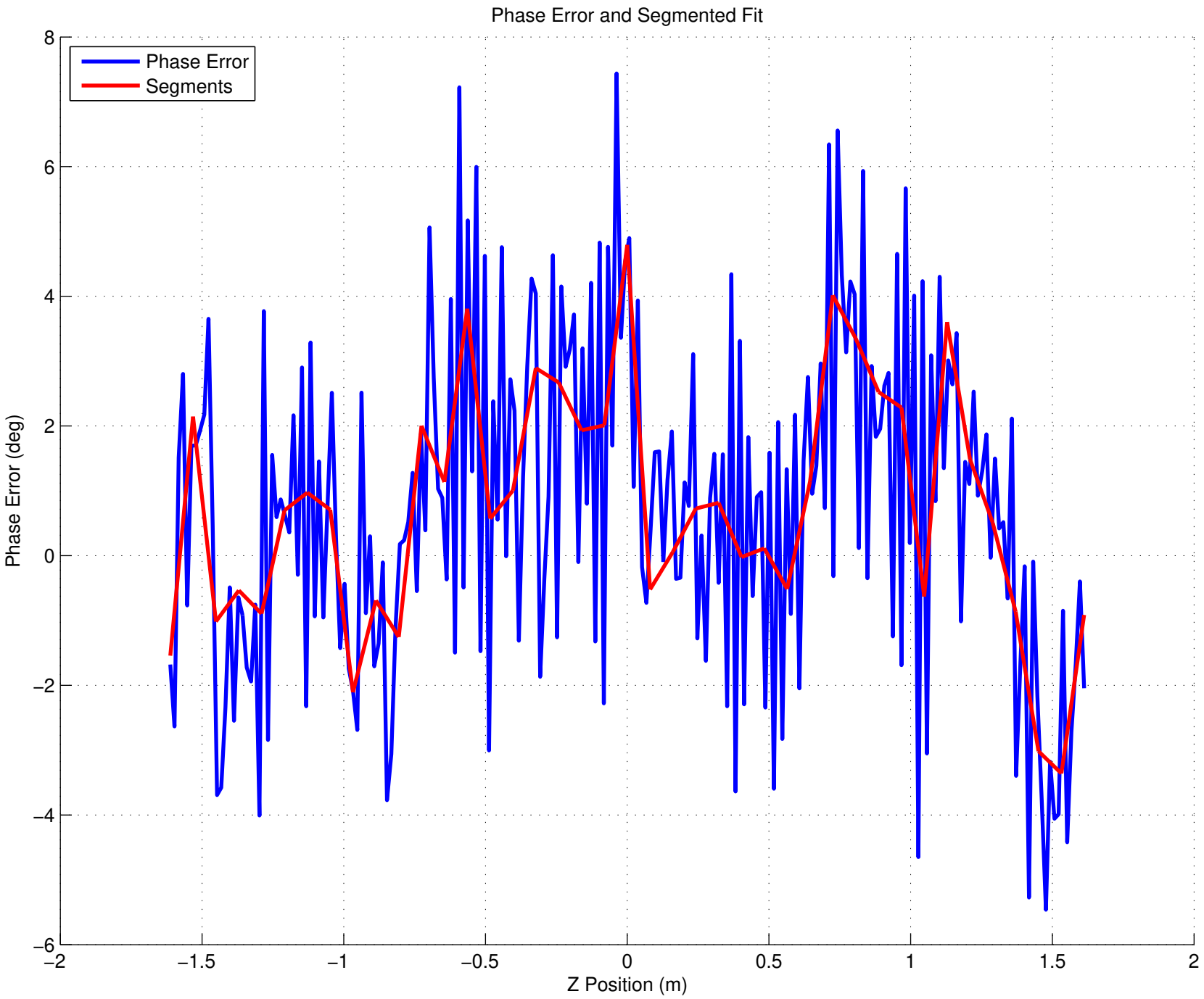

X Shimmed Segmented Trajectory
x 10^-7
X (m)
1
0
−1
−2
−3
−4
−5
−6
−7
−8
−2
−1.5
−1
−0.5
0
0.5
1
1.5
2
X Slope Change From Each Shim
x 10^-7
X Slope Change
0
−0.5
−1
−1.5
−2
−2.5
Z Position Of Shim (m)

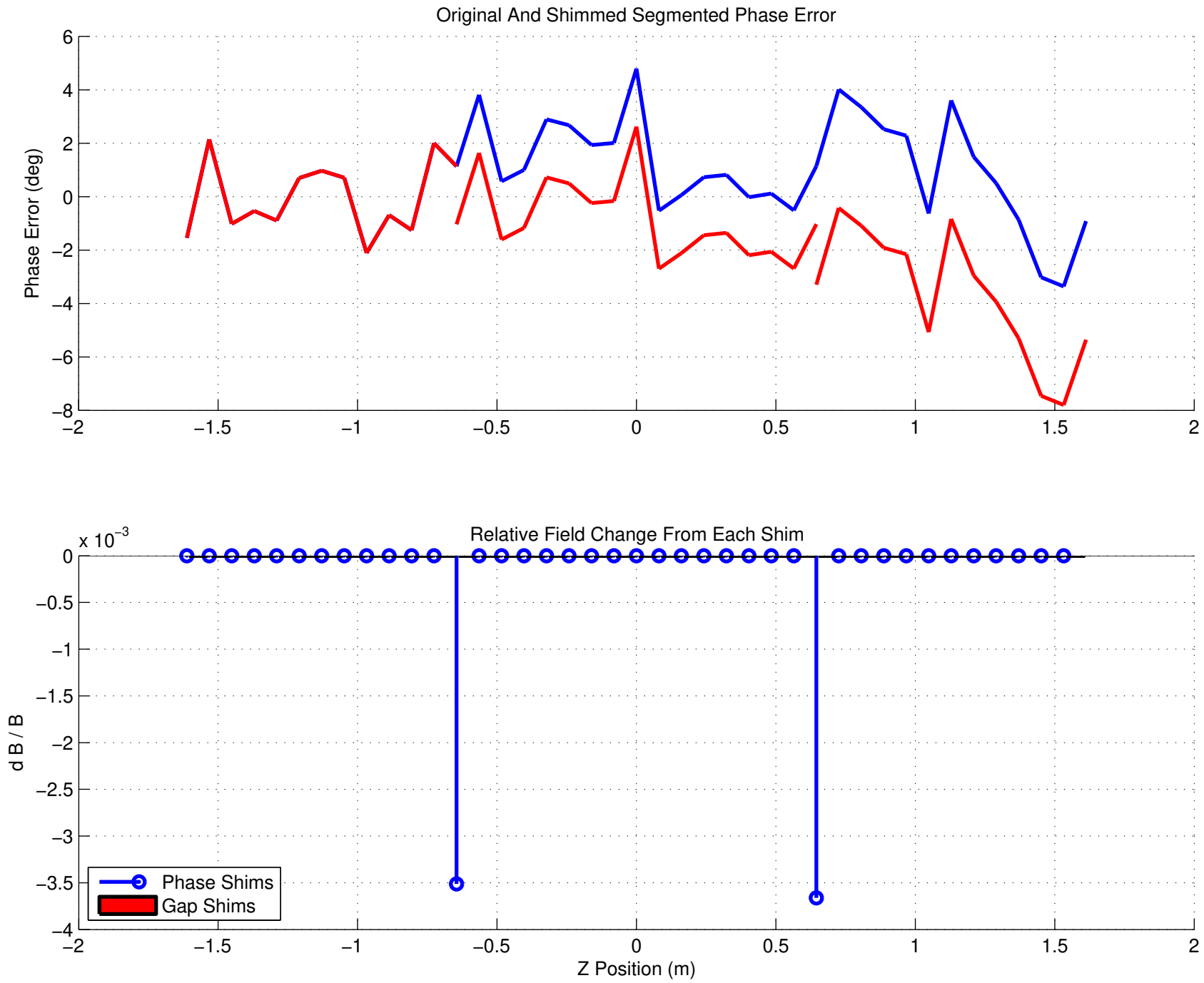

Y Shimmed Segmented Trajectory
x 10^-8
Y (m)
20
15
10
5
0
−5
−2
−1.5
−1
−0.5
0
0.5
1
1.5
2
Y Slope Change From Each Shim
x 10^-7
Y Slope Change
8
6
4
2
0
−2
−4
−6
Z Position Of Shim (m)

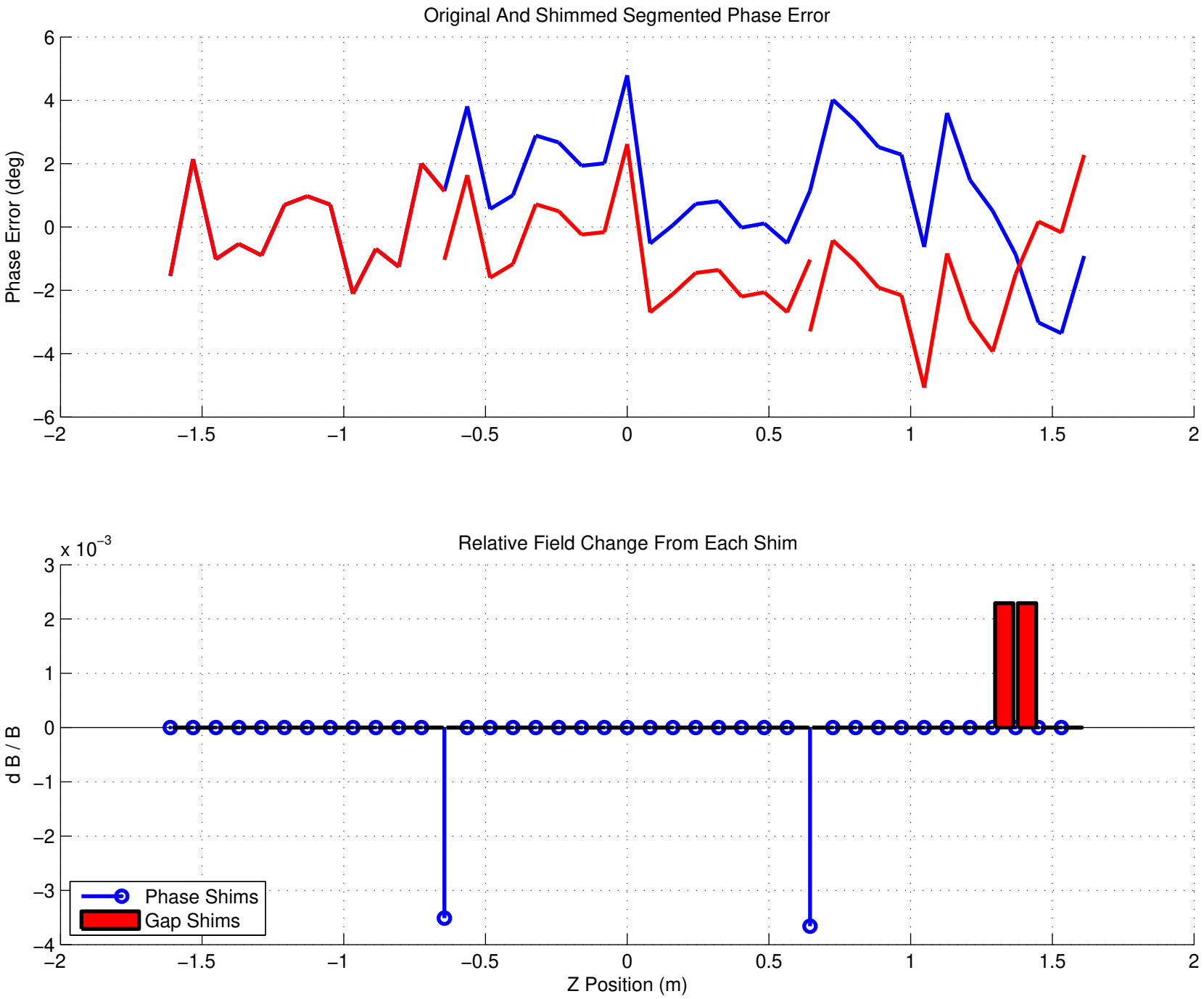

Modeled X Trajectory After Shimming
x 10^-6
1.5
1
0.5
0
−0.5
−1
Modeled X (m)
−2
−1.5
−1
−0.5
0
0.5
1
1.5
2
Z position (m)

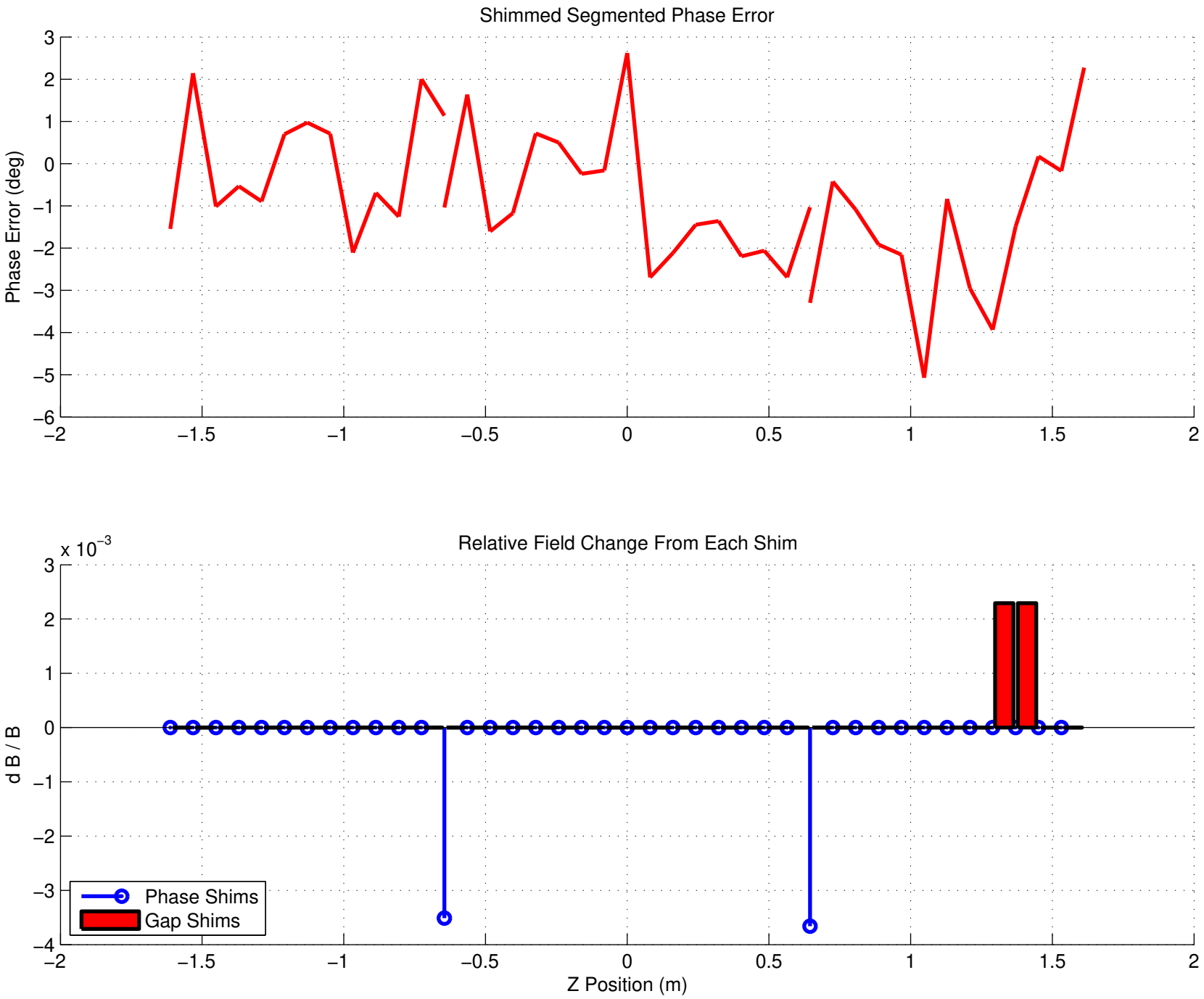

Modeled Y Trajectory After Shimming
x 10^-8
20
15
10
5
0
−5
Modeled Y (m)
−2
−1.5
−1
−0.5
0
0.5
1
1.5
2
Z position (m)

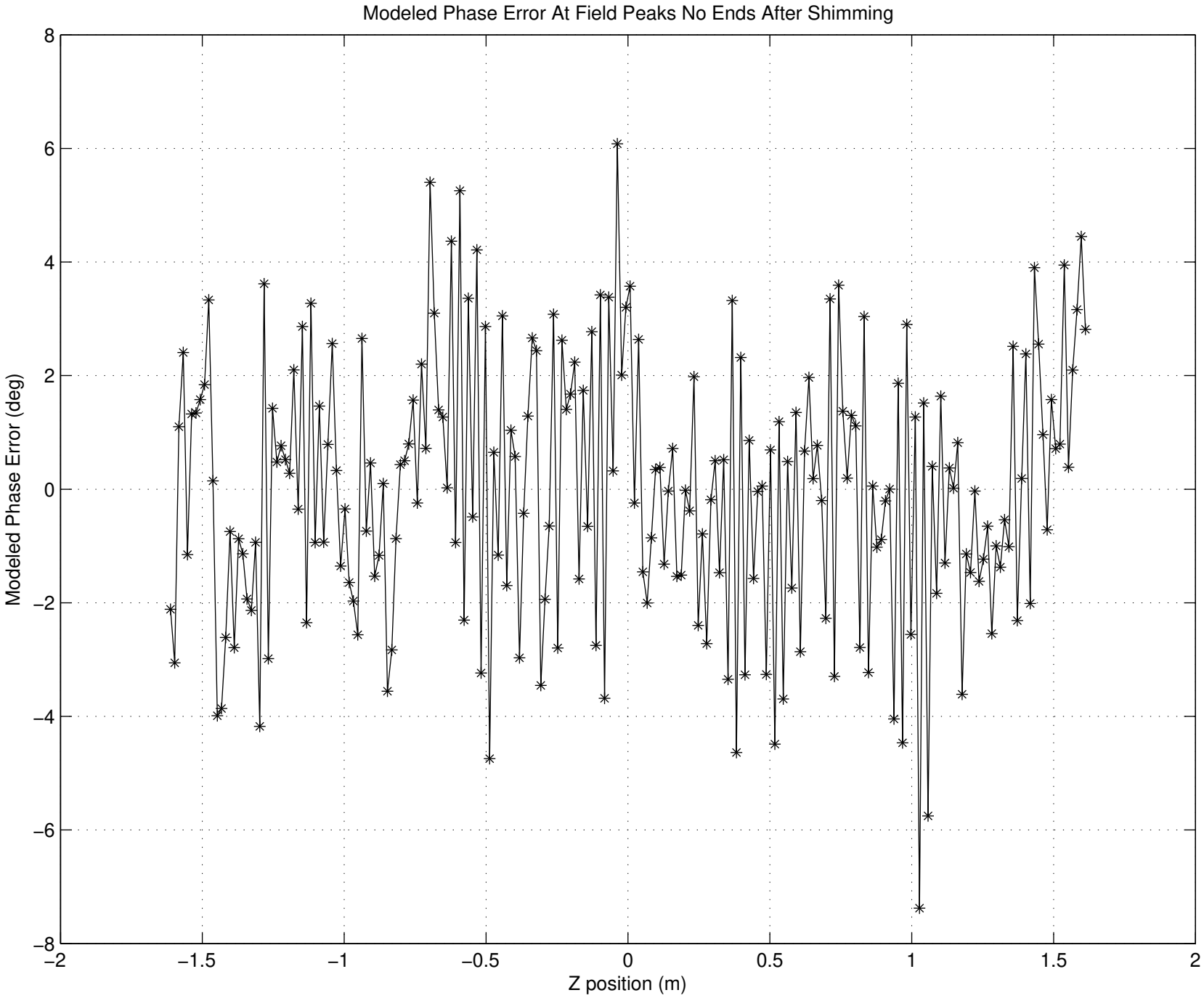

Phase Error At Poles, No Ends
Phase Error (deg)
Pole Number
8
6
4
2
0
−2
−4
−6
0
50
100
150
200


Phase Error and Segmented Fit
Phase Error
Segments
Phase Error (deg)
Z Position (m)
8
6
4
2
0
−2
−4
−6
−2
−1.5
−1
−0.5
0
0.5
1
1.5
2


Original And Shimmed Segmented Phase Error
Phase Error (deg)
6
4
2
0
−2
−4
−6
−8
−2
−1.5
−1
−0.5
0
0.5
1
1.5
2
Relative Field Change From Each Shim
x 10^−3
d B / B
0
−0.5
−1
−1.5
−2
−2.5
−3
−3.5
−4
Phase Shims
Gap Shims
Z Position (m)


Original And Shimmed Segmented Phase Error
Phase Error (deg)
6
4
2
0
−2
−4
−6
−2
−1.5
−1
−0.5
0
0.5
1
1.5
2
Relative Field Change From Each Shim
x 10^−3
d B / B
3
2
1
0
−1
−2
−3
−4
Phase Shims
Gap Shims
Z Position (m)


Shimmed Segmented Phase Error
Phase Error (deg)
3
2
1
0
−1
−2
−3
−4
−5
−6
−2
−1.5
−1
−0.5
0
0.5
1
1.5
2
Relative Field Change From Each Shim
x 10^−3
d B / B
3
2
1
0
−1
−2
−3
−4
Phase Shims
Gap Shims
Z Position (m)



Phase Error: Ave = −0.000000 deg, RMS = 2.315440 deg