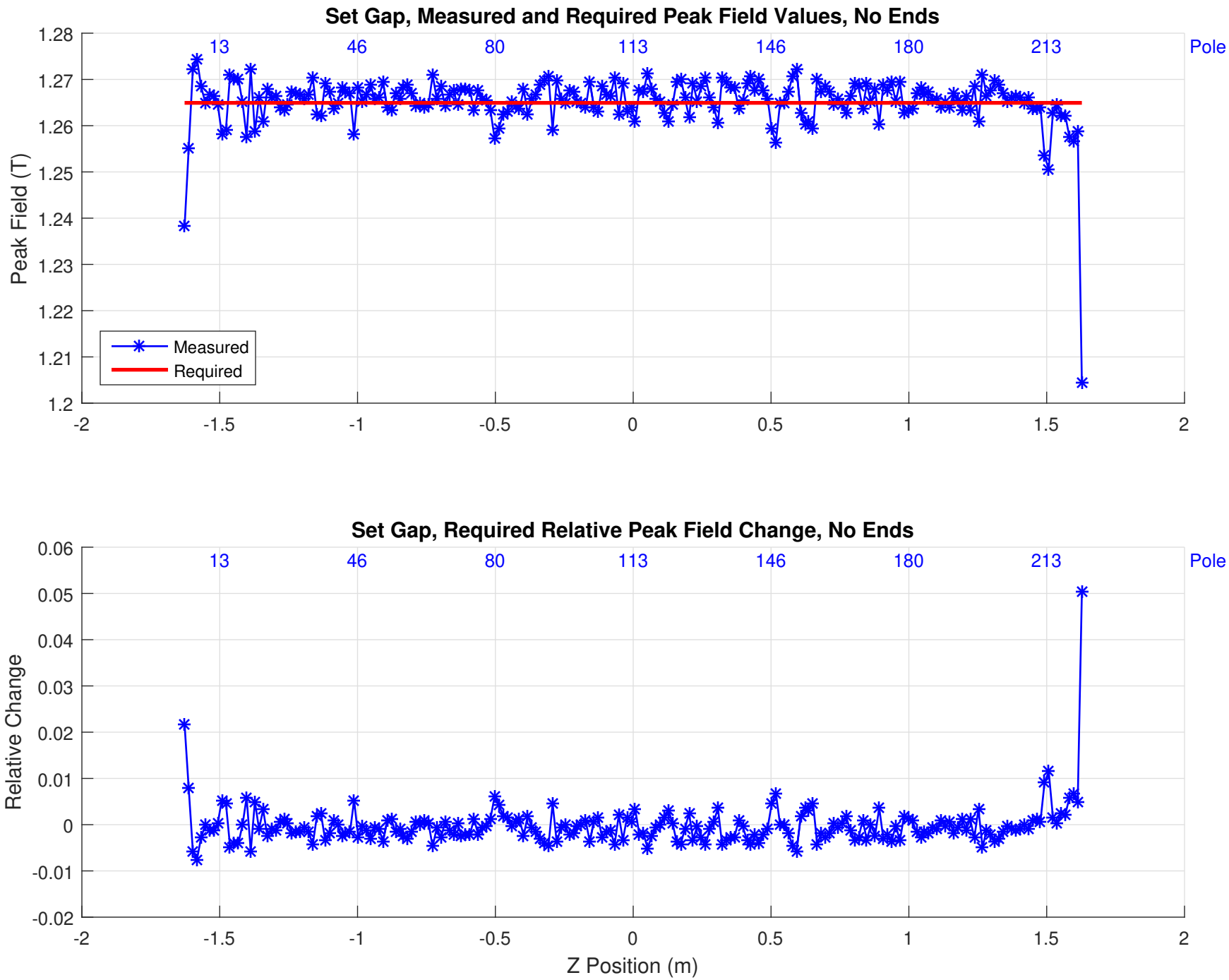
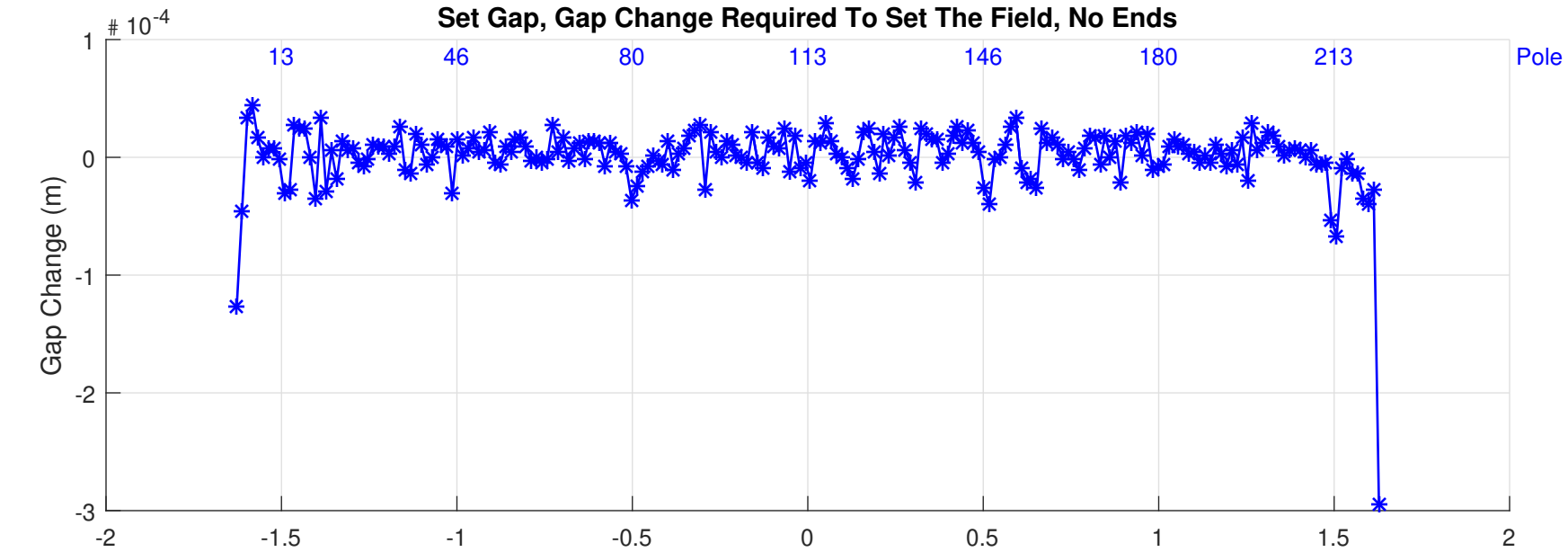
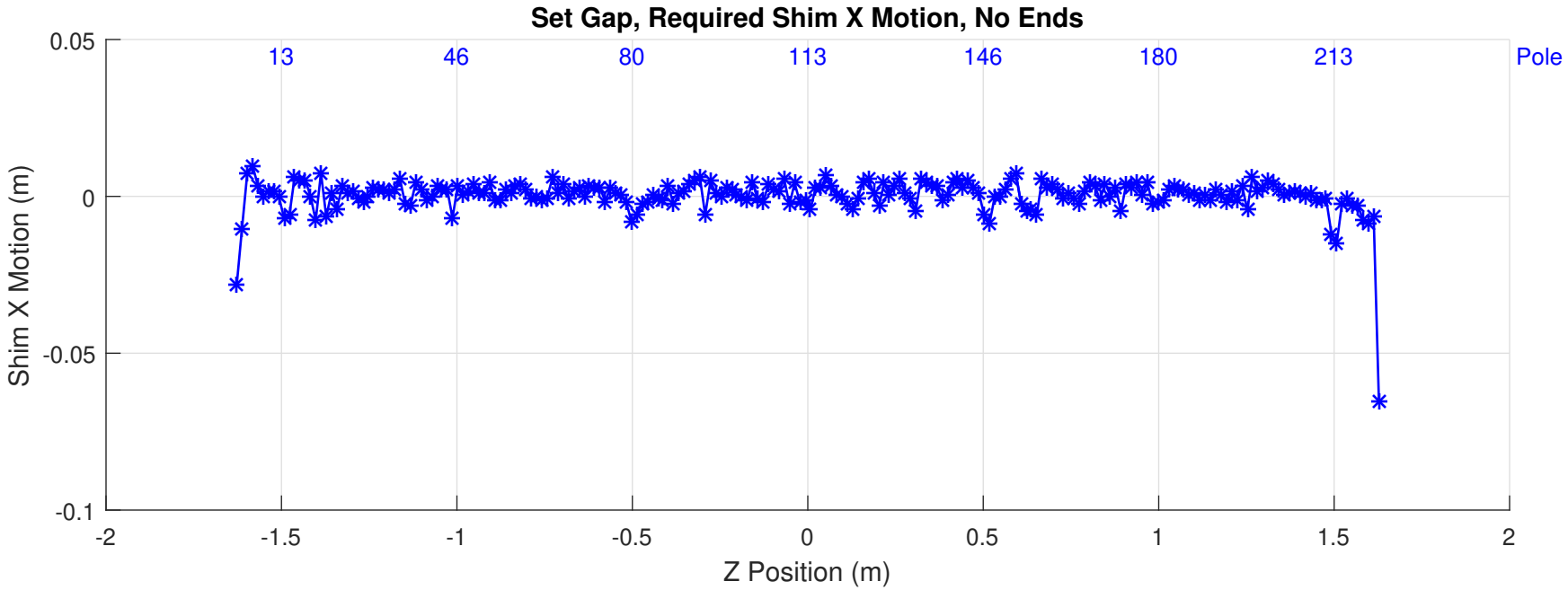
SLAC Magnetic Measurements

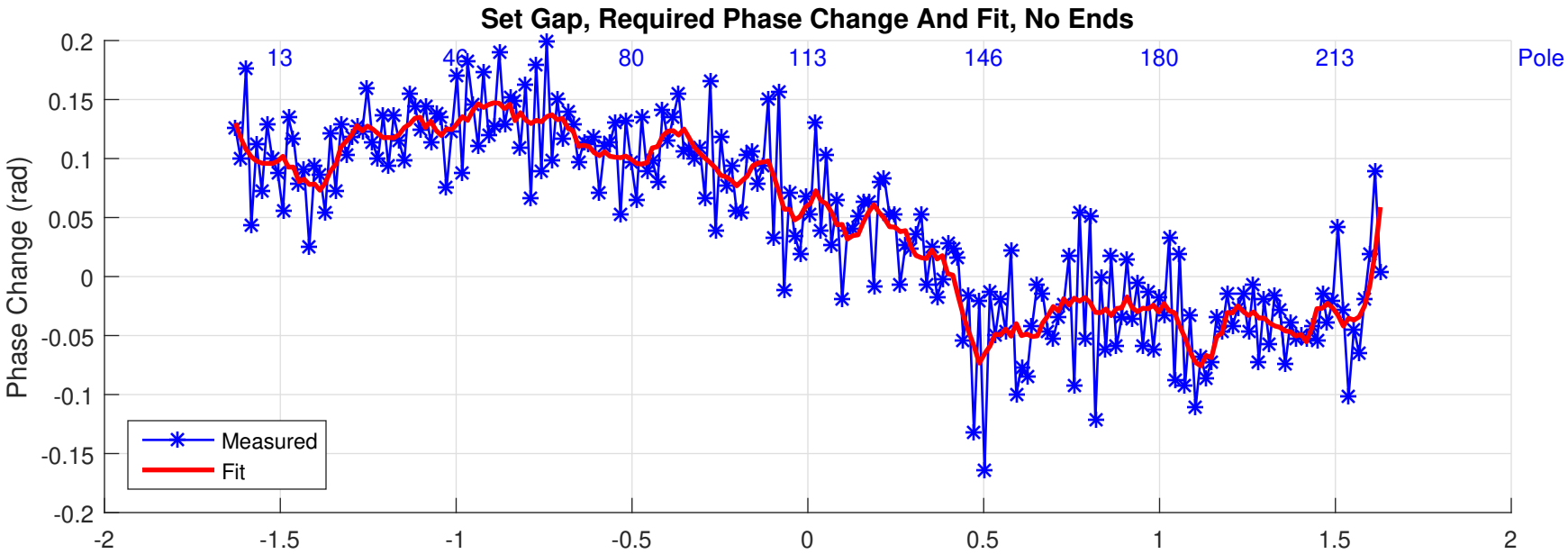
Planar Insertion Device Shim Analysis

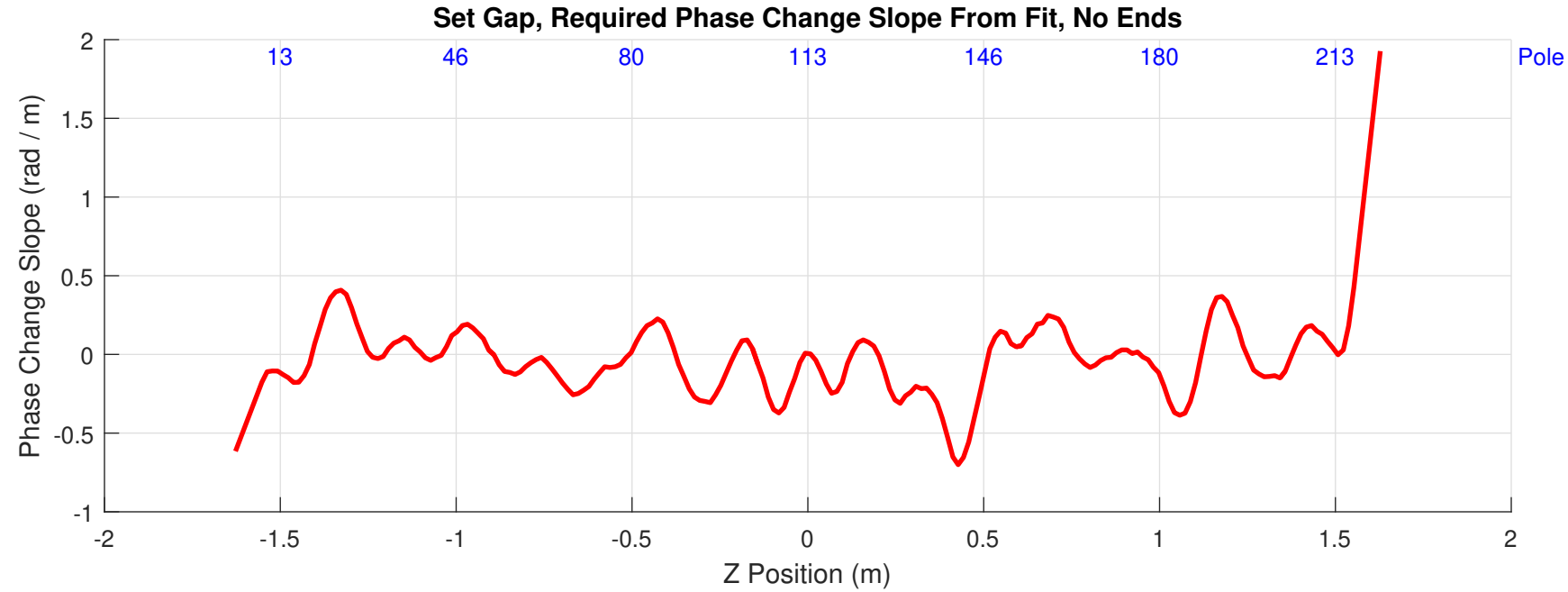
Parameters:
INPUT-FILE-DIR =s:\magdata\LCLS\Undulator\L143-112000-04\DATASET0005\Tuning\Z Scans\Run 010\
INPUT-FILE-NAME =x+00000-y+000-bscanz.dat
INPUT-FILE-TYPE =ZVXYBXYH
CORR-REQUIRED =0
GAMMA =26689
NOM-LAMBDA-U =0.03
NOM-K-VALUE =3.5
NOM-LAMBDA-R =1.5004e-10
NUM-POLES =226
NUM-END-POLES =4
CELL-LENGTH =3.656

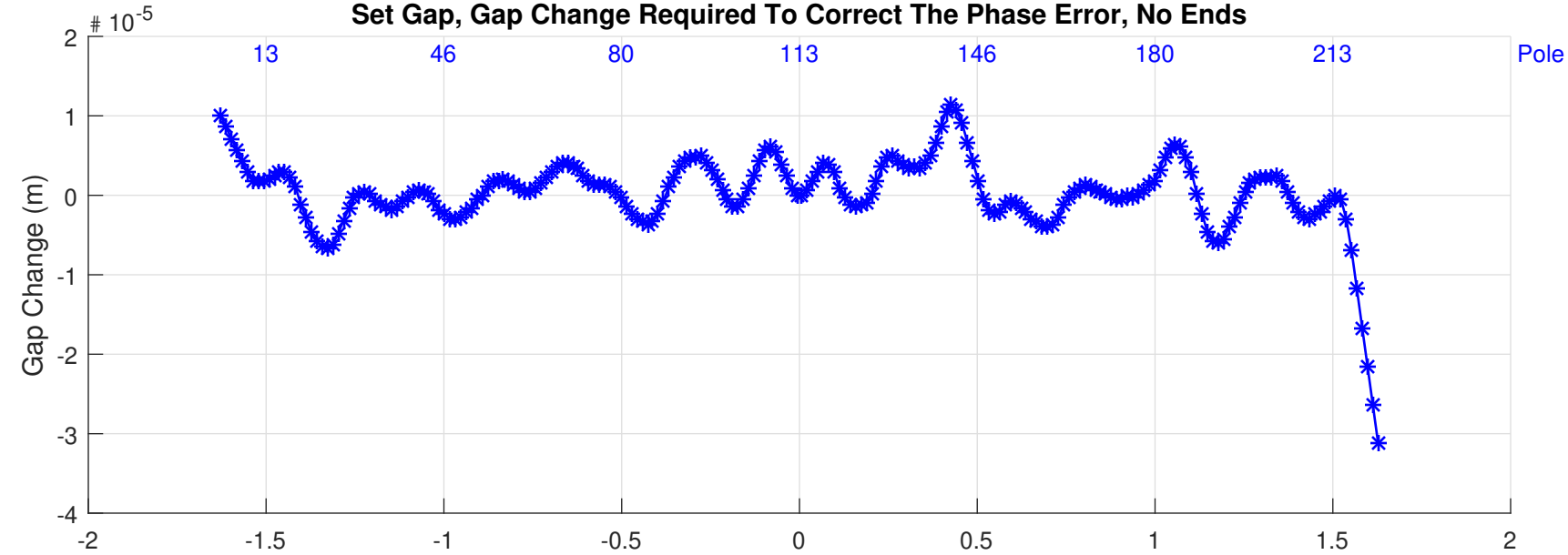

Set Gap, Measured and Required Peak Field Values, No Ends
Peak Field (T)
1.28
1.27
1.26
1.25
1.24
1.23
1.22
1.21
1.2
13
46
80
113
146
180
213
Pole
Measured
Required
-2
-1.5
-1
-0.5
0
0.5
1
1.5
2
Set Gap, Required Relative Peak Field Change, No Ends
Relative Change
0.06
0.05
0.04
0.03
0.02
0.01
0
-0.01
-0.02
13
46
80
113
146
180
213
Pole
-2
-1.5
-1
-0.5
0
0.5
1
1.5
2
Z Position (m)

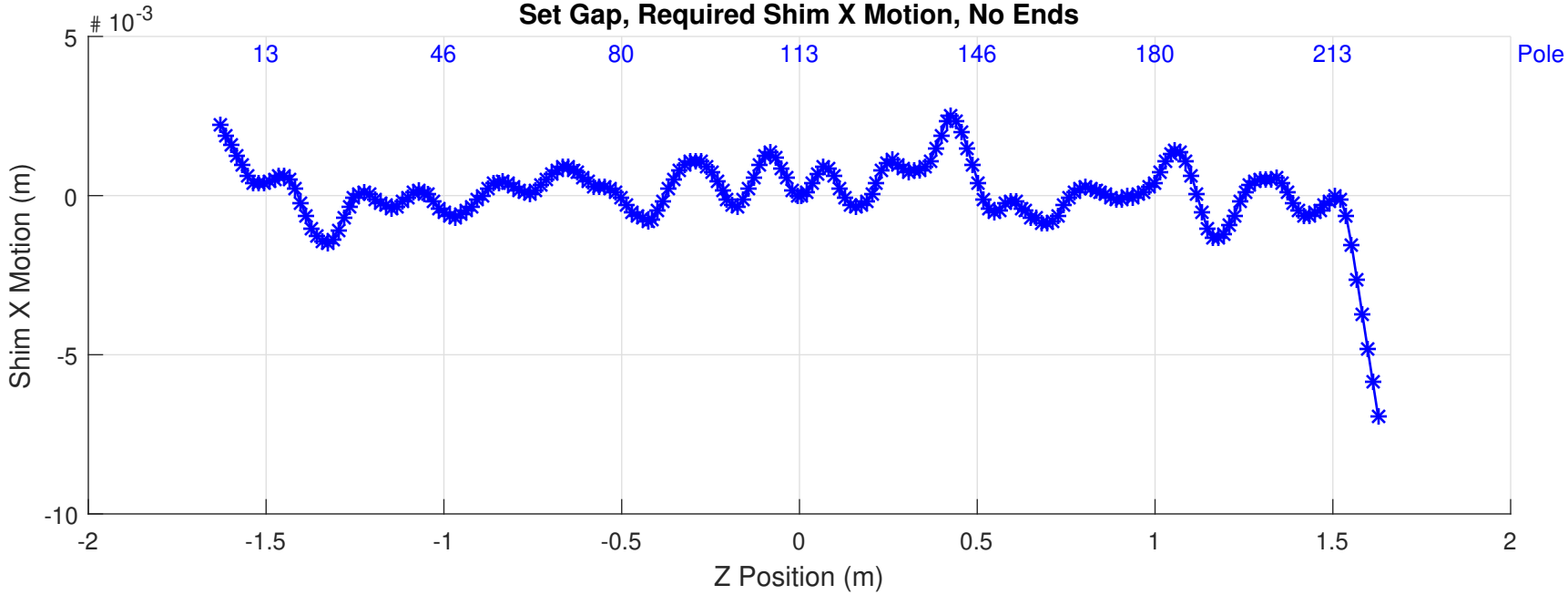

Set Gap, Gap Change Required To Set The Field, No Ends
10^-4
Gap Change (m)
1
0
-1
-2
-3
13
46
80
113
146
180
213
Pole
-2
-1.5
-1
-0.5
0
0.5
1
1.5
2

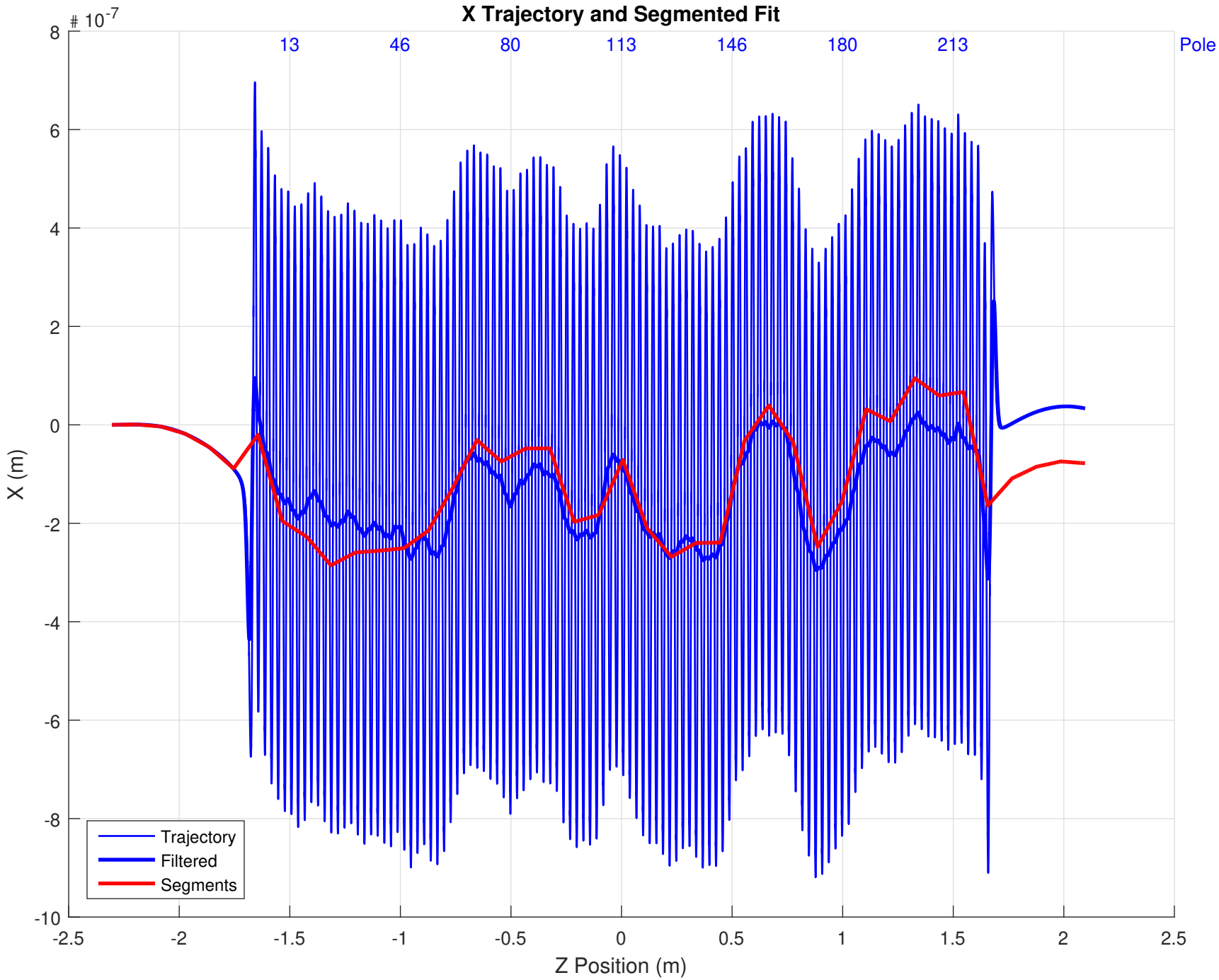

Set Gap, Required Shim X Motion, No Ends
Shim X Motion (m)
0.05
0
-0.05
-0.1
13
46
80
113
146
180
213
Pole
-2
-1.5
-1
-0.5
0
0.5
1
1.5
2
Z Position (m)

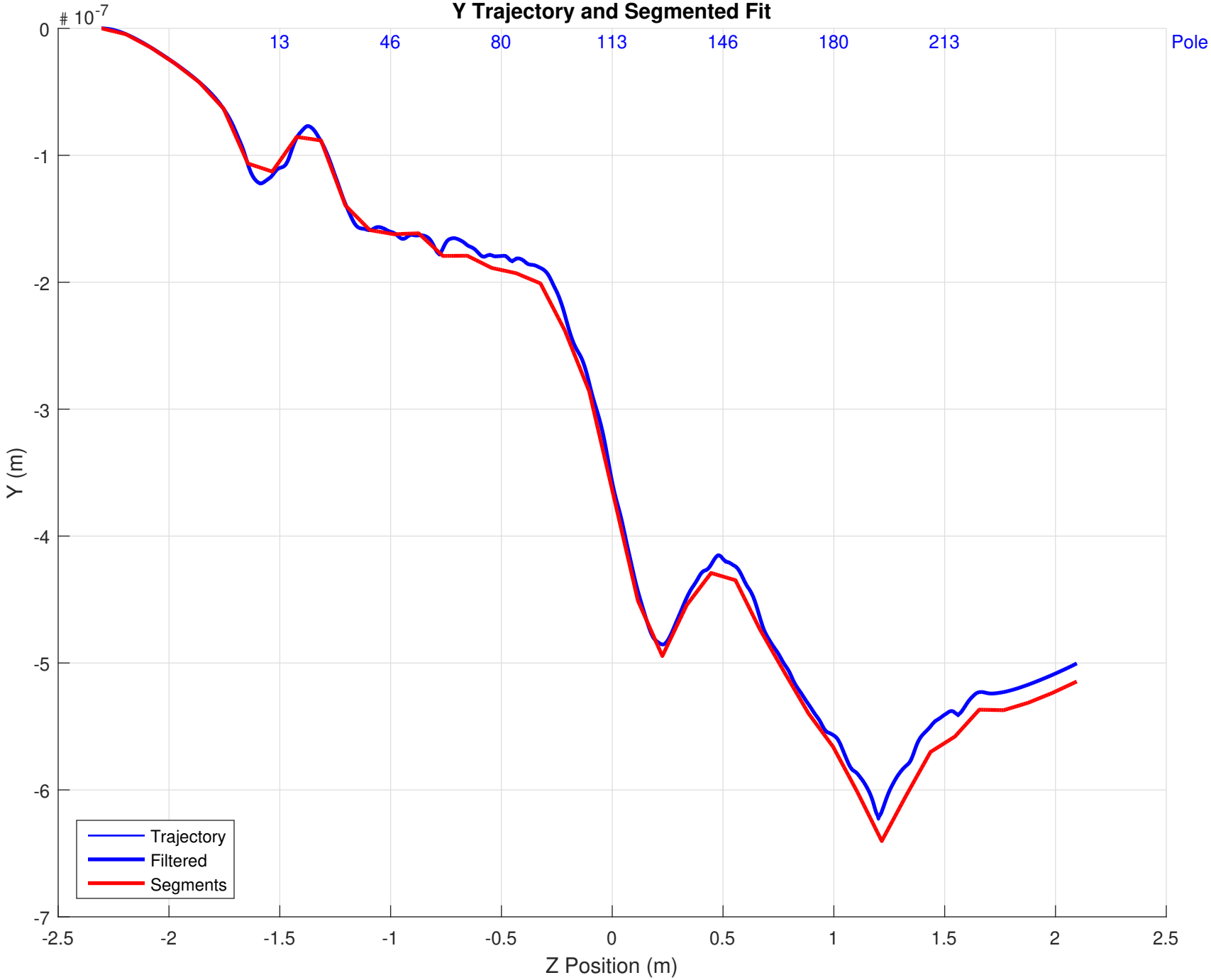

Set Gap, Required Phase Change And Fit, No Ends
Phase Change (rad)
13
46
80
113
146
180
213
Pole
Measured
Fit
0.2
0.15
0.1
0.05
0
-0.05
-0.1
-0.15
-0.2
-2
-1.5
-1
-0.5
0
0.5
1
1.5
2

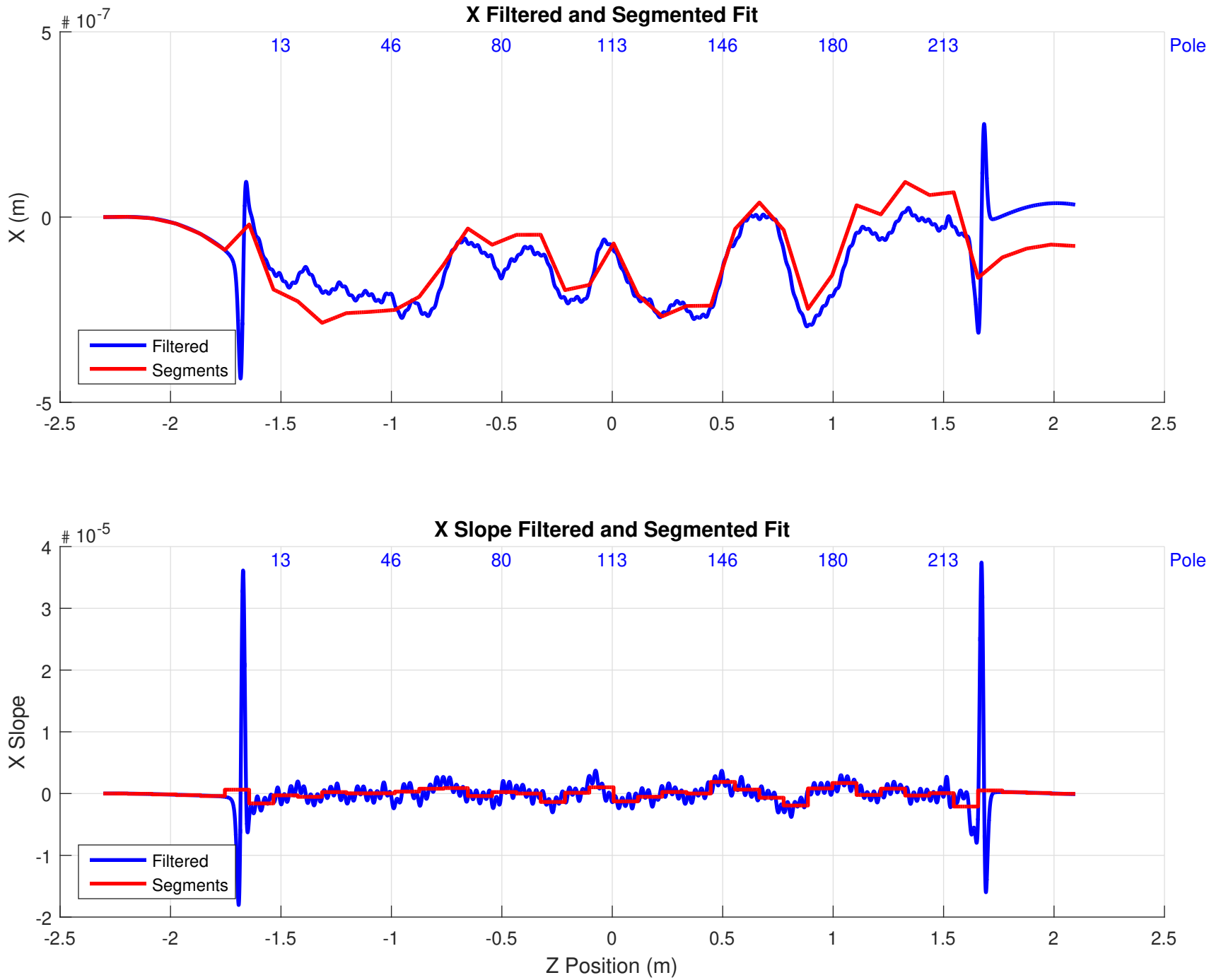

Set Gap, Required Phase Change Slope From Fit, No Ends
Phase Change Slope (rad / m)
13
46
80
113
146
180
213
Pole
2
1.5
1
0.5
0
-0.5
-1
-2
-1.5
-1
-0.5
0
0.5
1
1.5
2
Z Position (m)

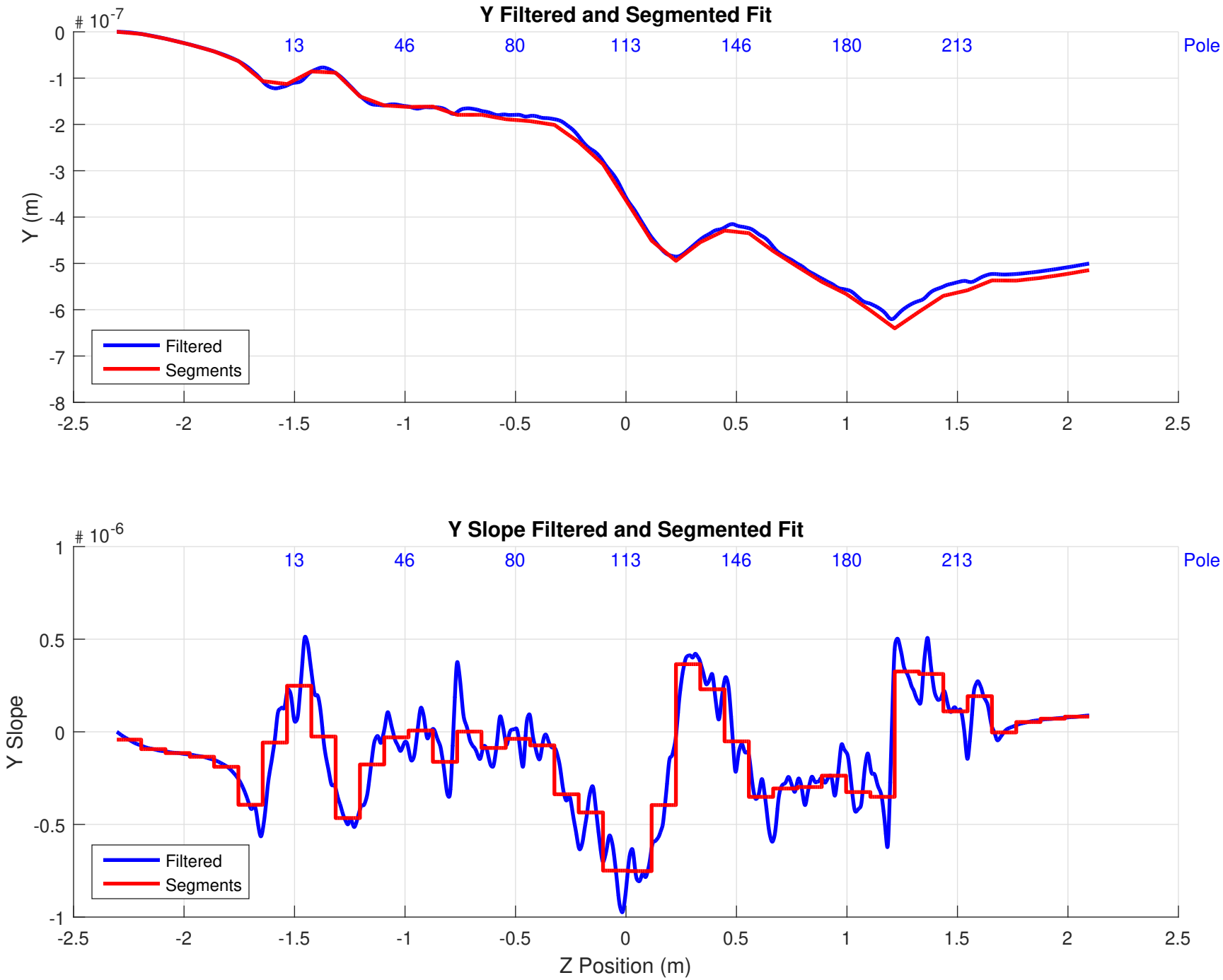

Set Gap, Gap Change Required To Correct The Phase Error, No Ends
10-5
Gap Change (m)
Pole
13
46
80
113
146
180
213
2
1
0
-1
-2
-3
-4
-2
-1.5
-1
-0.5
0
0.5
1
1.5
2

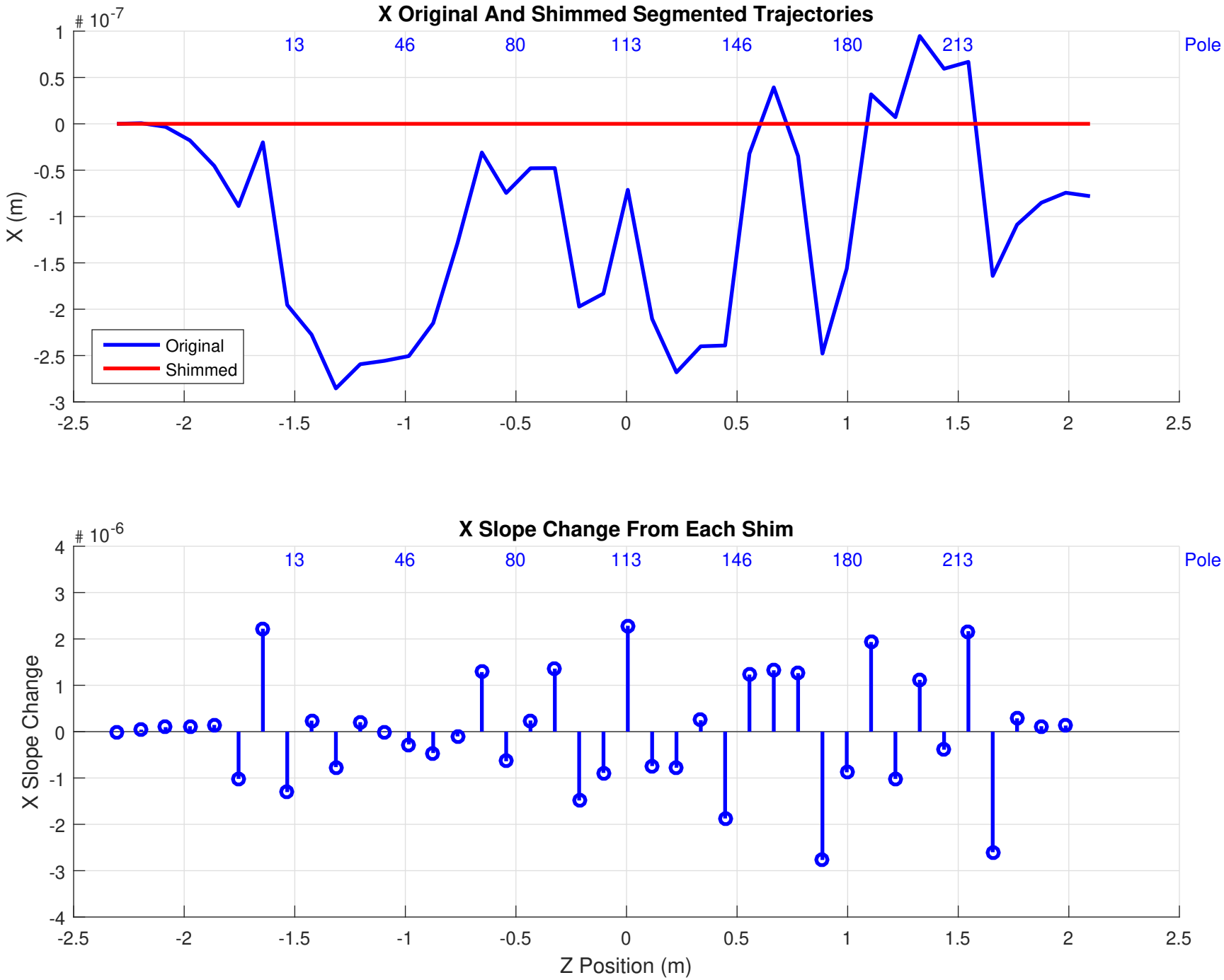

Set Gap, Required Shim X Motion, No Ends
10-3
Shim X Motion (m)
Pole
13
46
80
113
146
180
213
5
0
-5
-10
-2
-1.5
-1
-0.5
0
0.5
1
1.5
2
Z Position (m)

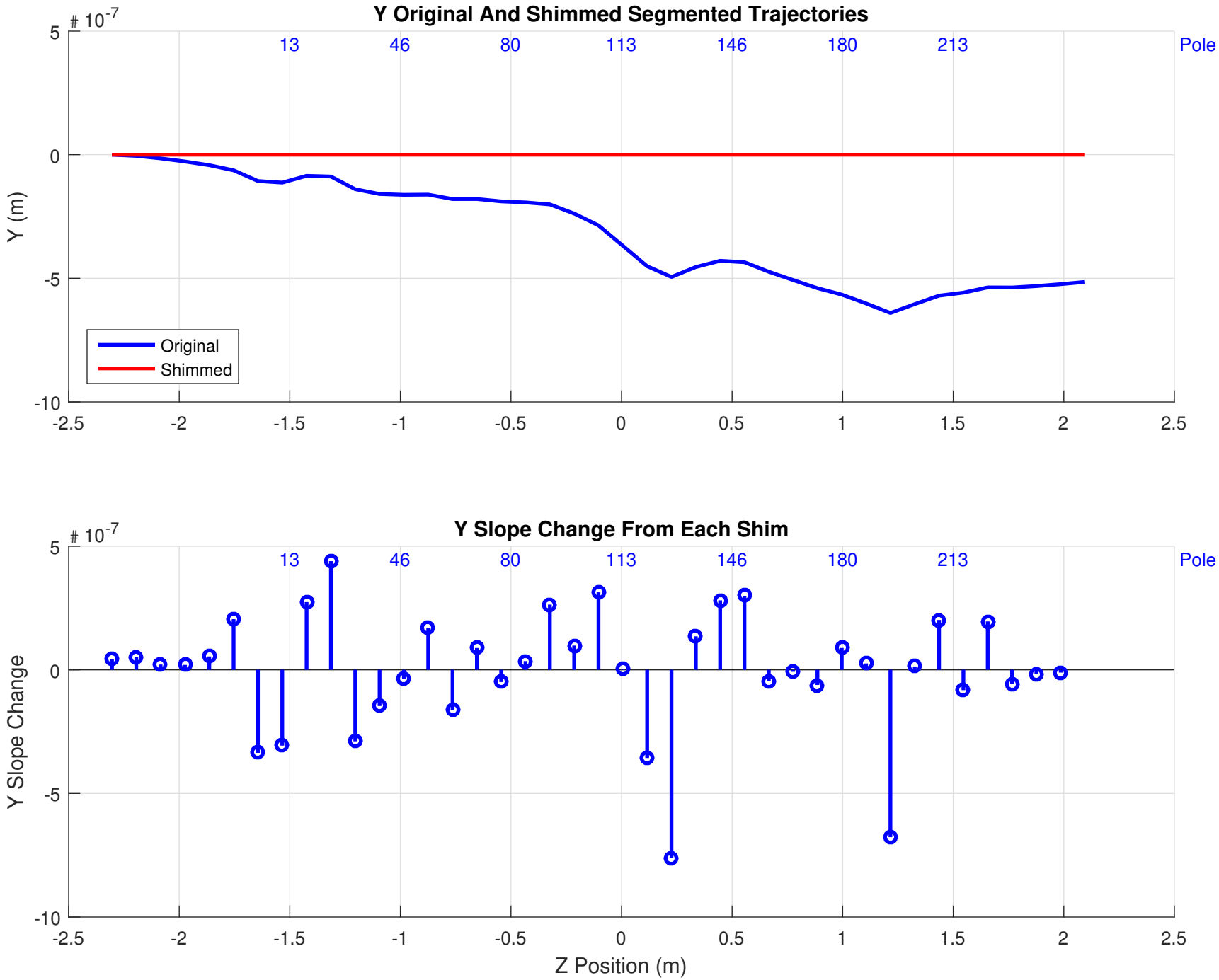

X Trajectory and Segmented Fit
10^-7
13
46
80
113
146
180
213
Pole
8
6
4
2
0
-2
-4
-6
-8
-10
X (m)
-2.5
-2
-1.5
-1
-0.5
0
0.5
1
1.5
2
2.5
Z Position (m)
Trajectory
Filtered
Segments

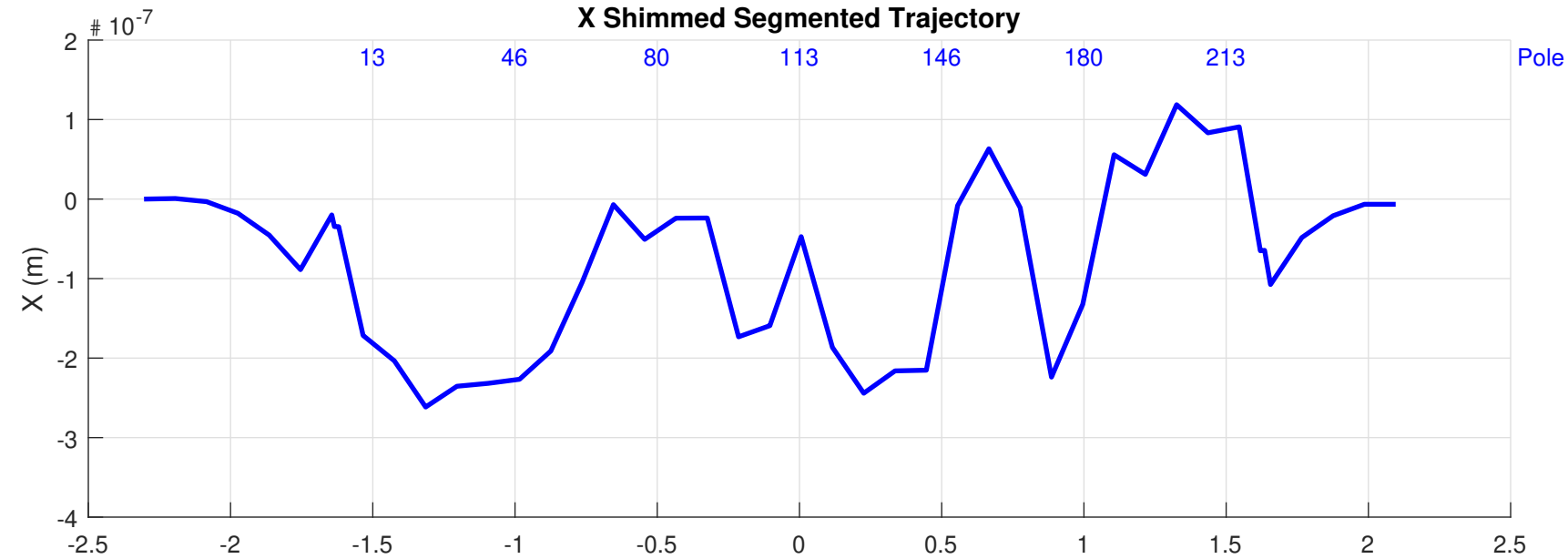

Y Trajectory and Segmented Fit
10^-7
0
-1
-2
-3
-4
-5
-6
-7
13
46
80
113
146
180
213
Pole
Y (m)
-2.5
-2
-1.5
-1
-0.5
0
0.5
1
1.5
2
2.5
Z Position (m)
Trajectory
Filtered
Segments

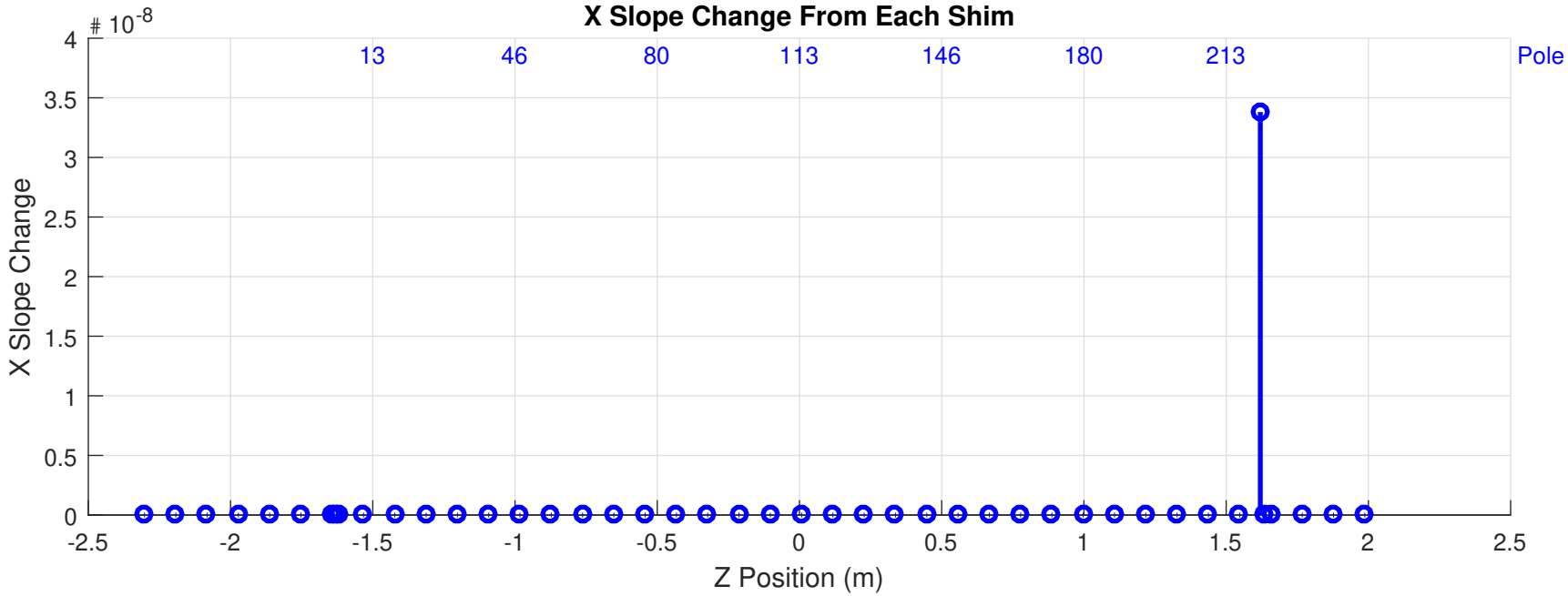

X Filtered and Segmented Fit
10^-7
5
0
-5
X (m)
13
46
80
113
146
180
213
Pole
Filtered
Segments
-2.5
-2
-1.5
-1
-0.5
0
0.5
1
1.5
2
2.5
X Slope Filtered and Segmented Fit
10^-5
4
3
2
1
0
-1
-2
X Slope
Z Position (m)

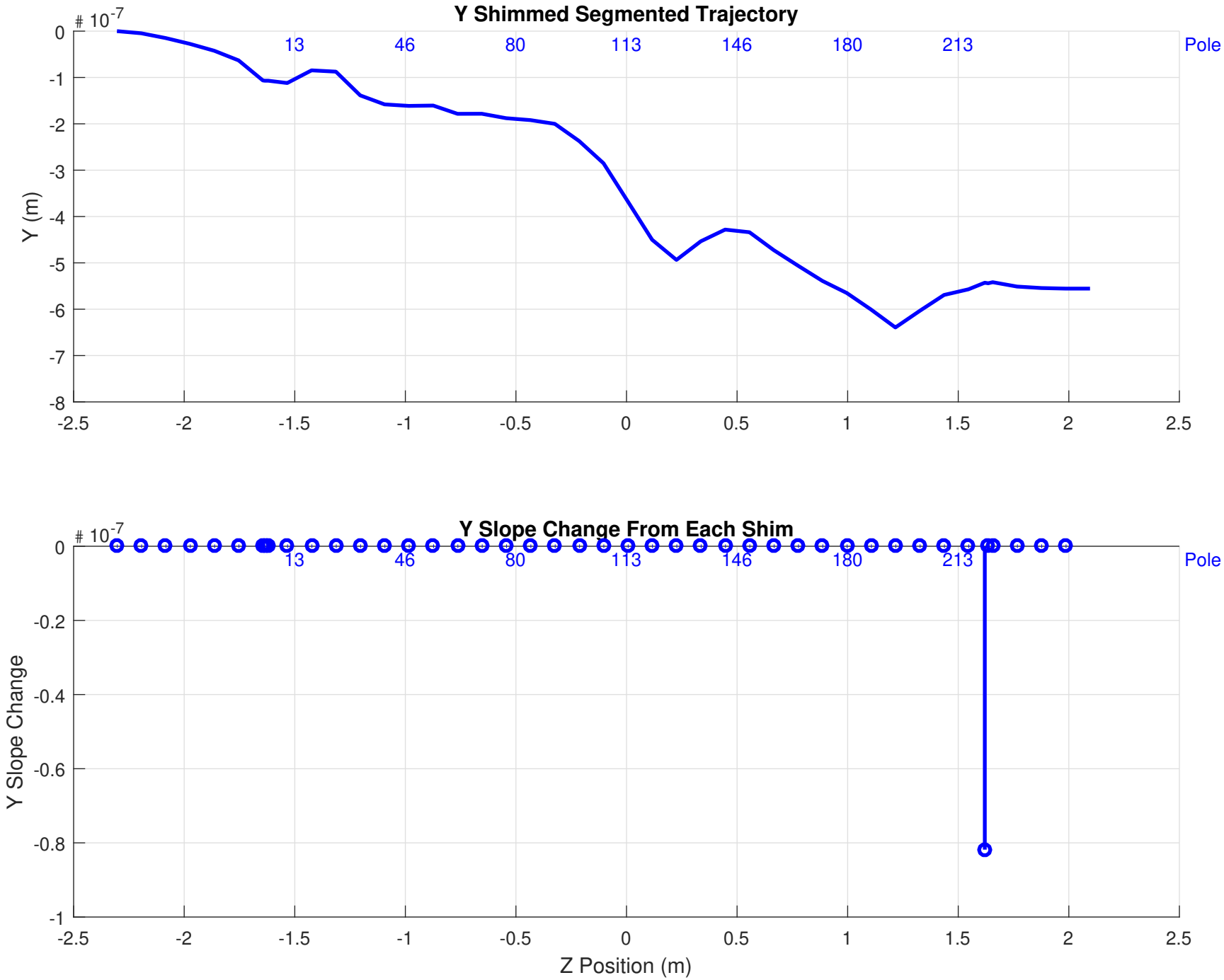

Y Filtered and Segmented Fit
10^-7
Y (m)
13
46
80
113
146
180
213
Pole
Filtered
Segments
Y Slope Filtered and Segmented Fit
10^-6
Y Slope
Z Position (m)

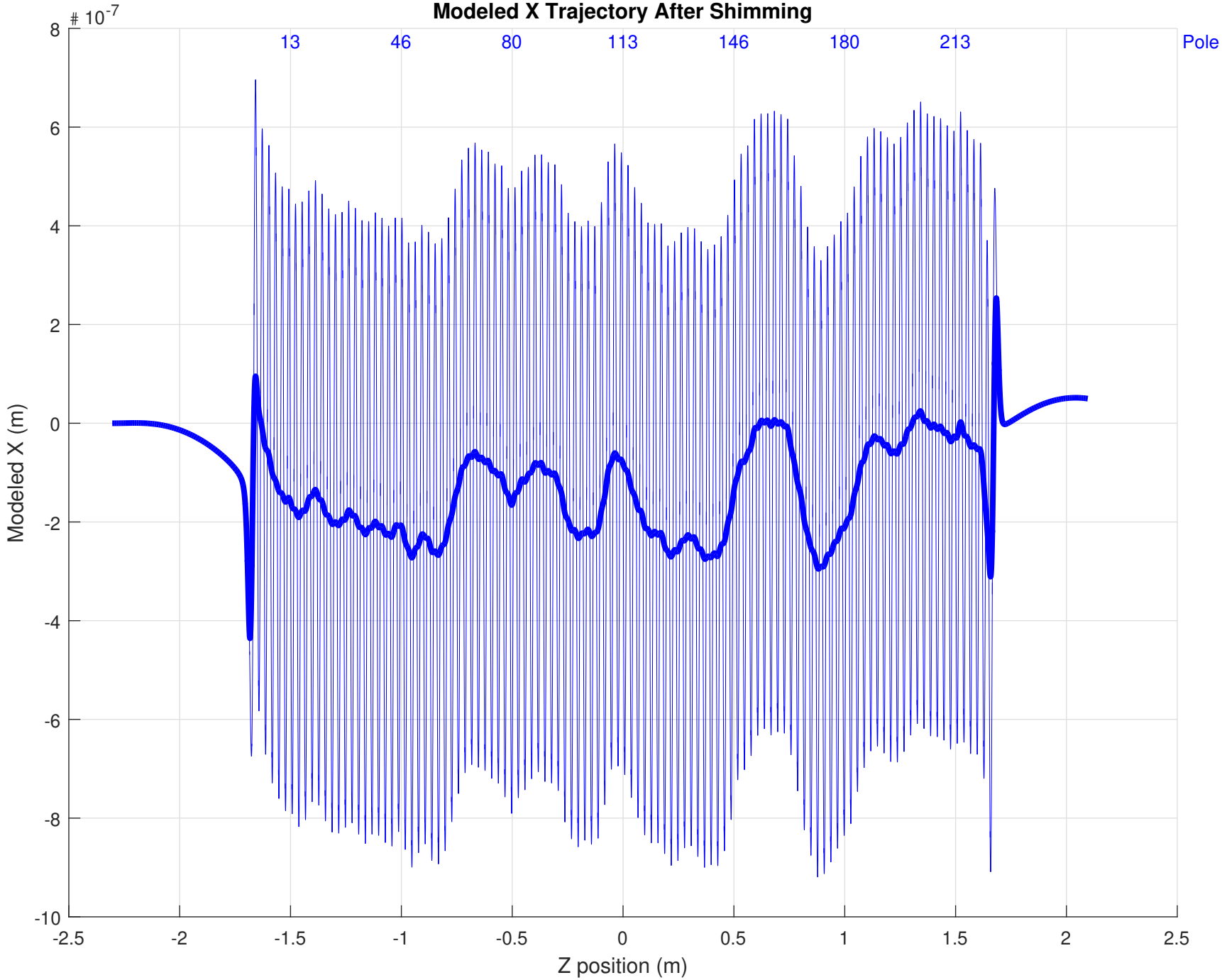

X Original And Shimmed Segmented Trajectories
10^-7
X (m)
13
46
80
113
146
180
213
Pole
Original
Shimmed
X Slope Change From Each Shim
10^-6
X Slope Change
Z Position (m)

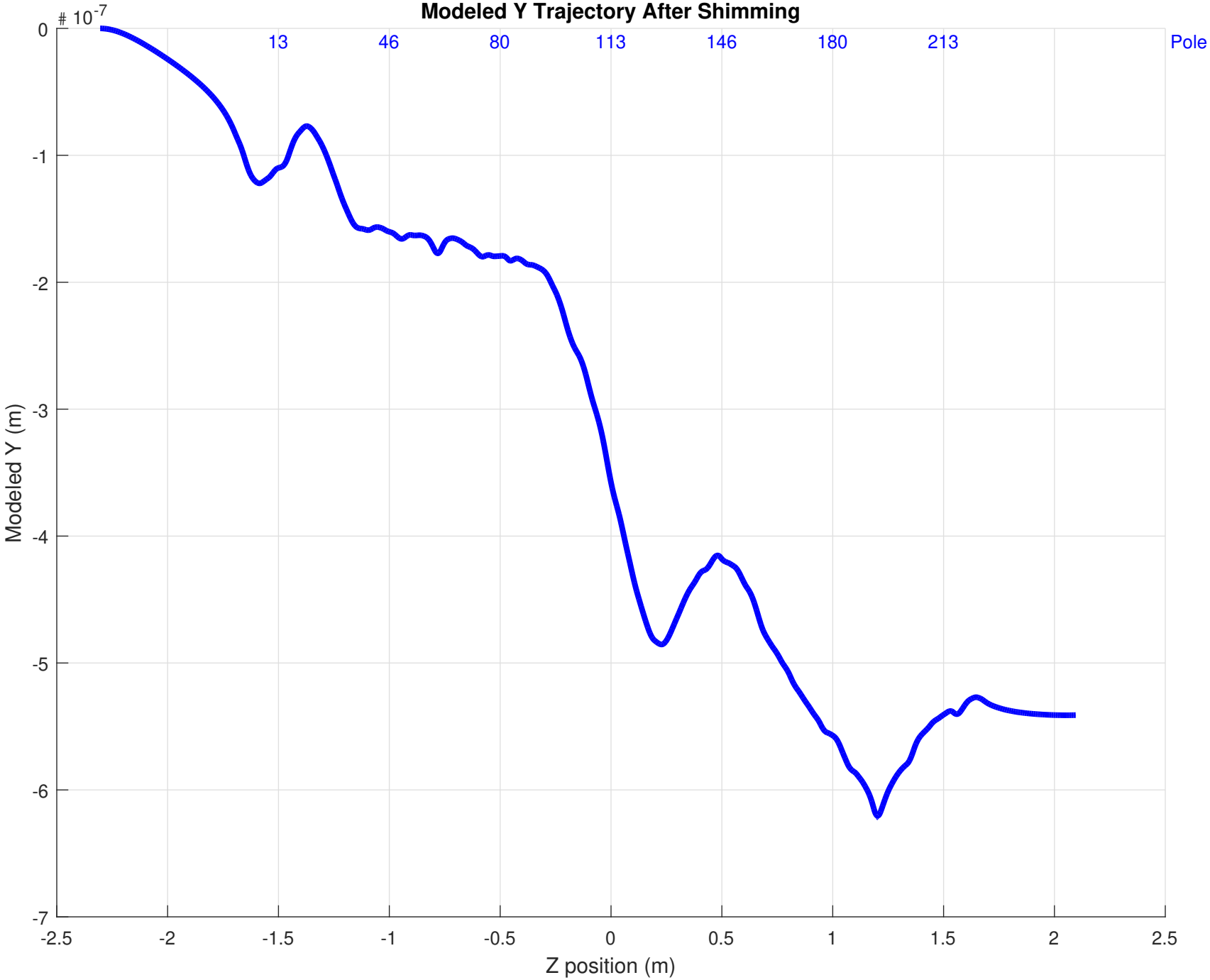

Y Original And Shimmed Segmented Trajectories
10^-7
13
46
80
113
146
180
213
Pole
Y (m)
Original
Shimmed
Y Slope Change From Each Shim
Y Slope Change
Z Position (m)

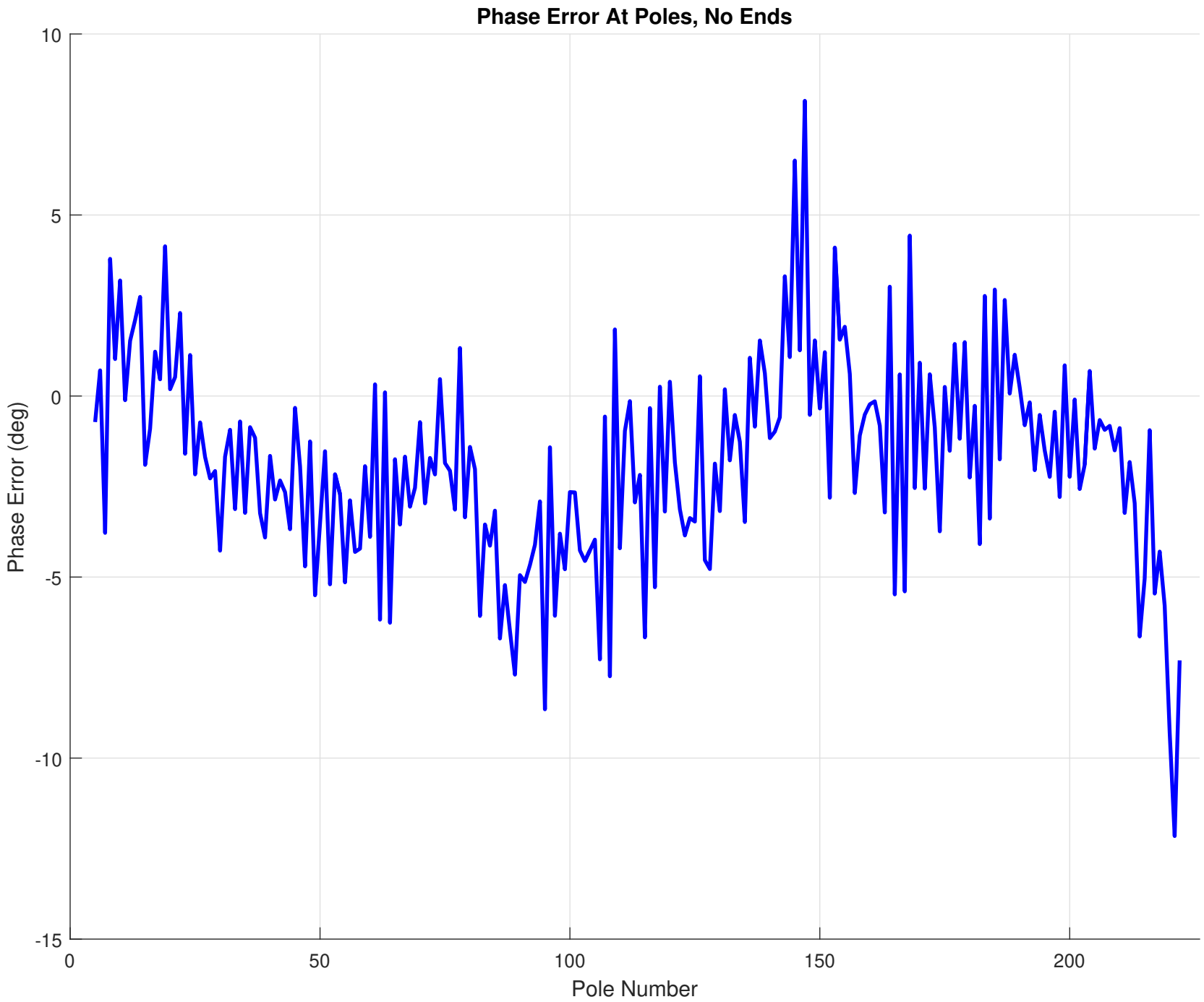

X Shimmed Segmented Trajectory
10^-7
13
46
80
113
146
180
213
Pole
X (m)
2
1
0
-1
-2
-3
-4
-2.5
-2
-1.5
-1
-0.5
0
0.5
1
1.5
2
2.5

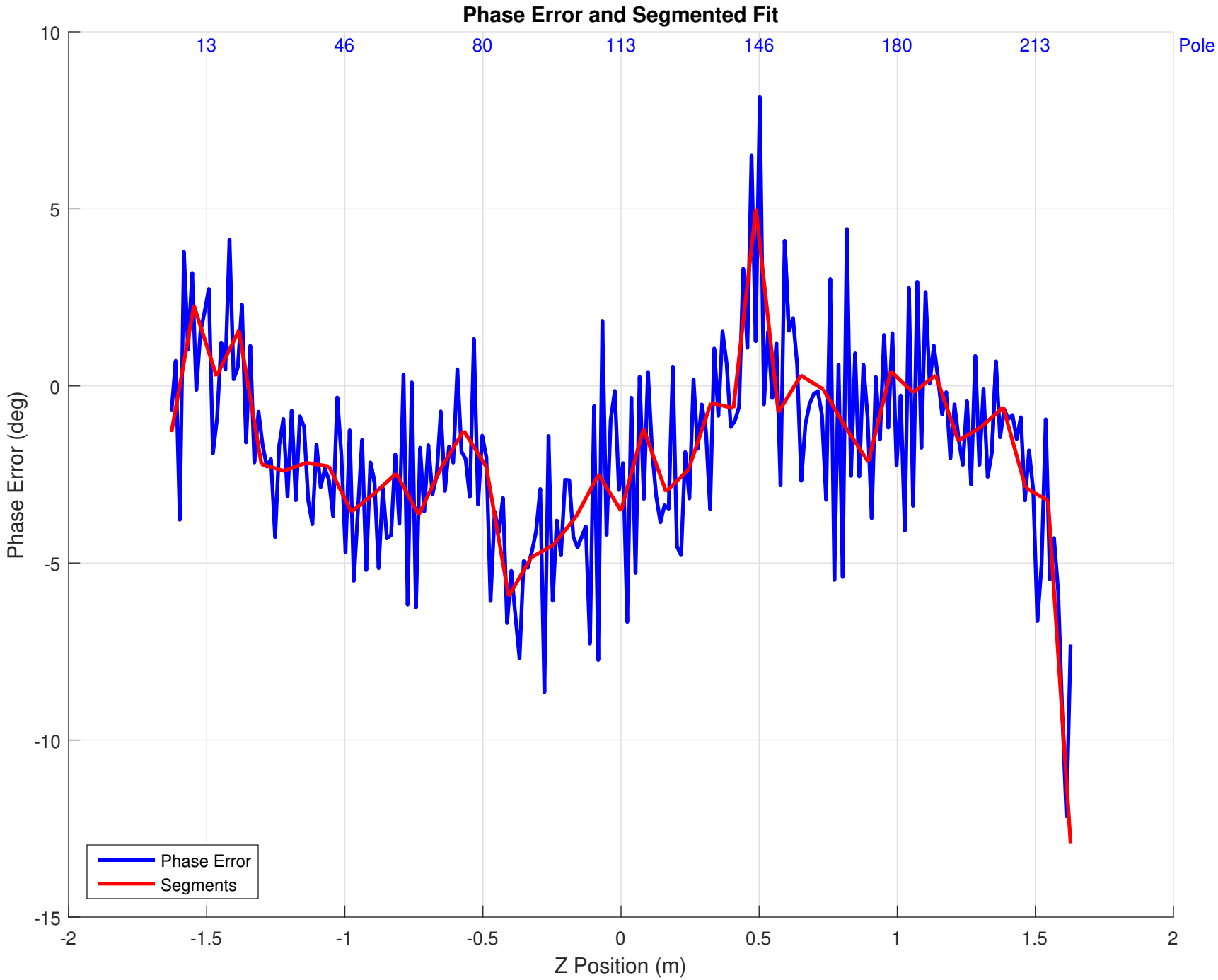

X Slope Change From Each Shim
10^-8
13
46
80
113
146
180
213
Pole
X Slope Change
4
3.5
3
2.5
2
1.5
1
0.5
0
-2.5
-2
-1.5
-1
-0.5
0
0.5
1
1.5
2
2.5
Z Position (m)

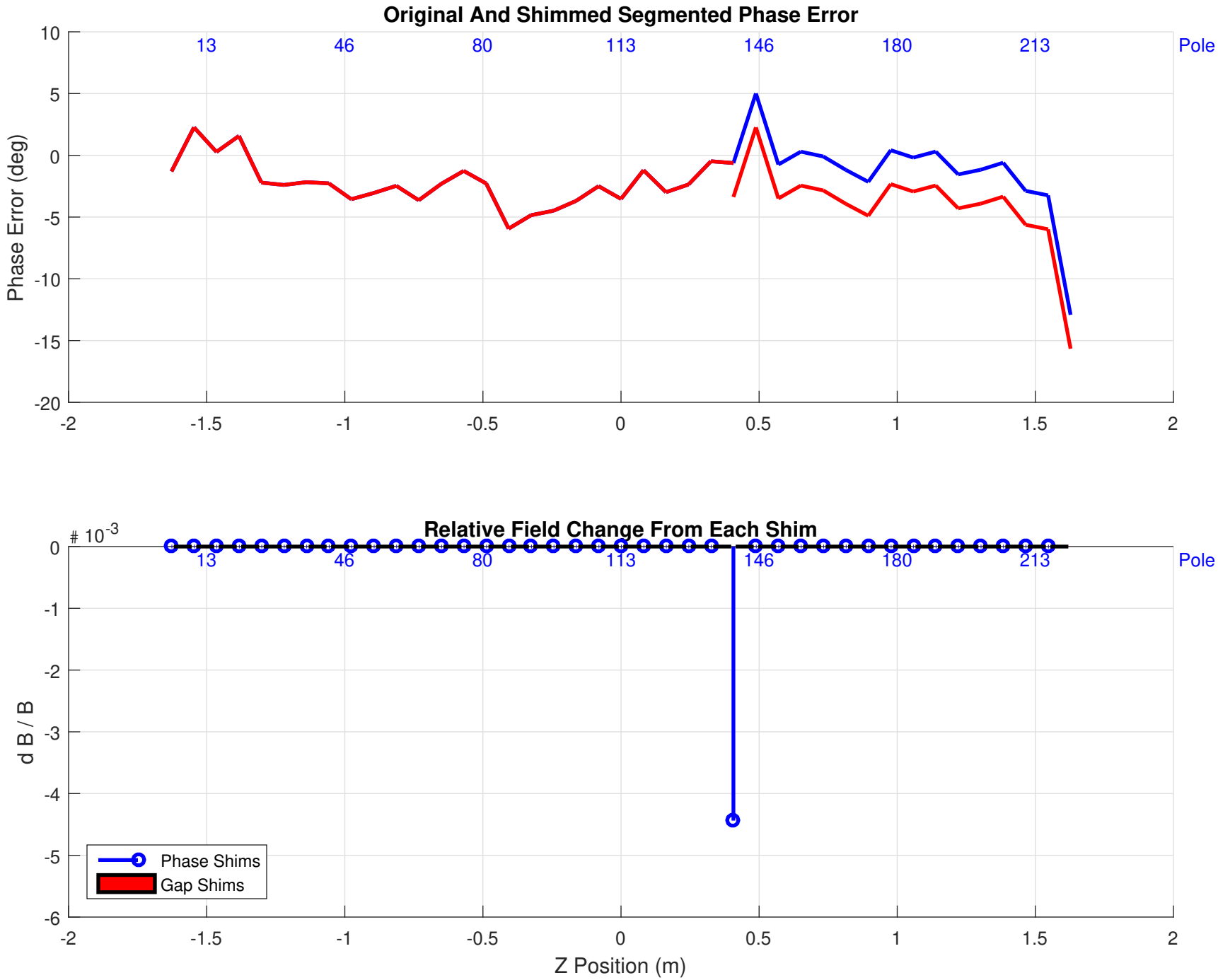

Y Shimmed Segmented Trajectory
10-7
Y (m)
13
46
80
113
146
180
213
Pole
Y Slope Change From Each Shim
Y Slope Change
Z Position (m)

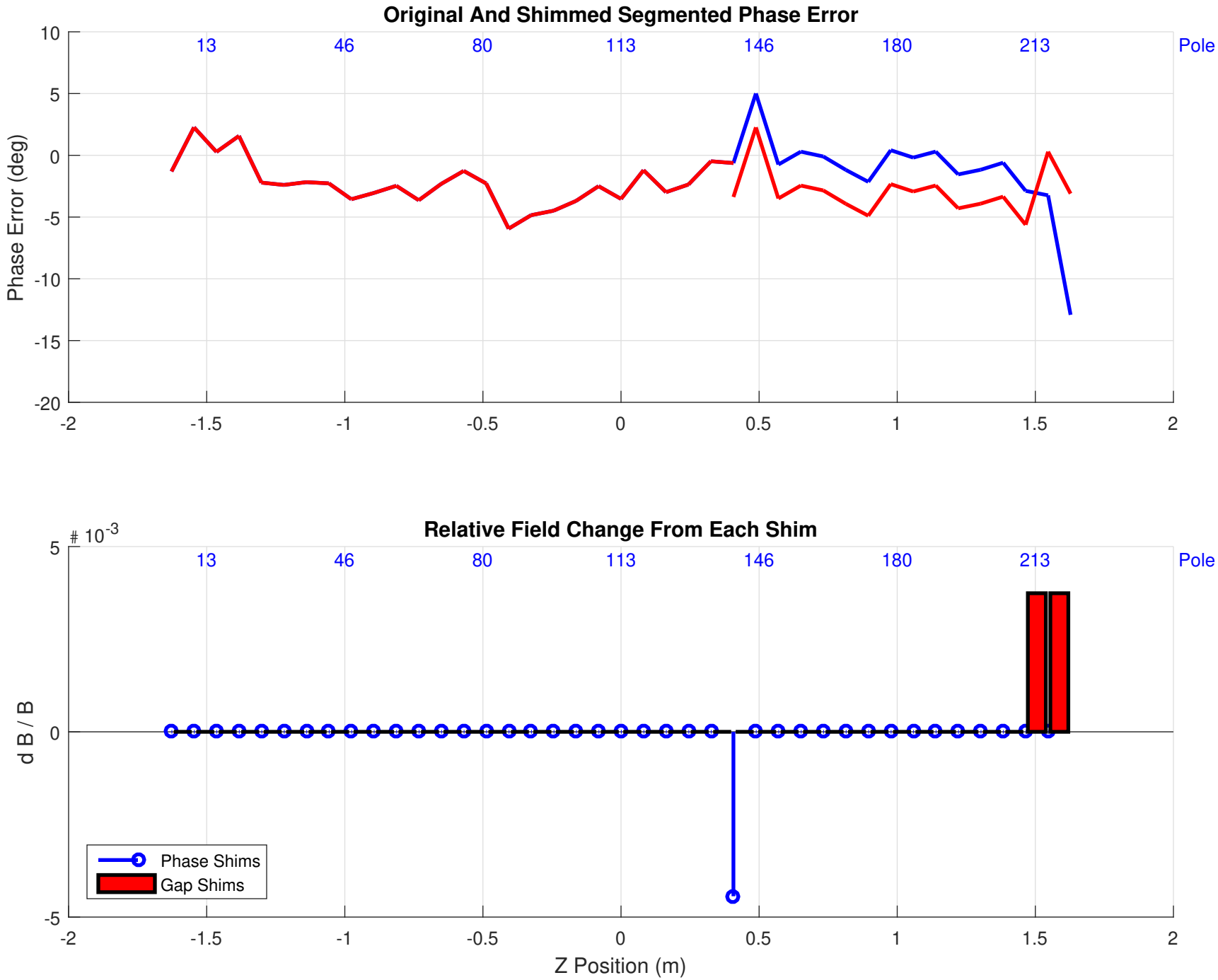

Modeled X Trajectory After Shimming
10^-7
8
6
4
2
0
-2
-4
-6
-8
-10
13
46
80
113
146
180
213
Pole
Modeled X (m)
-2.5
-2
-1.5
-1
-0.5
0
0.5
1
1.5
2
2.5
Z position (m)

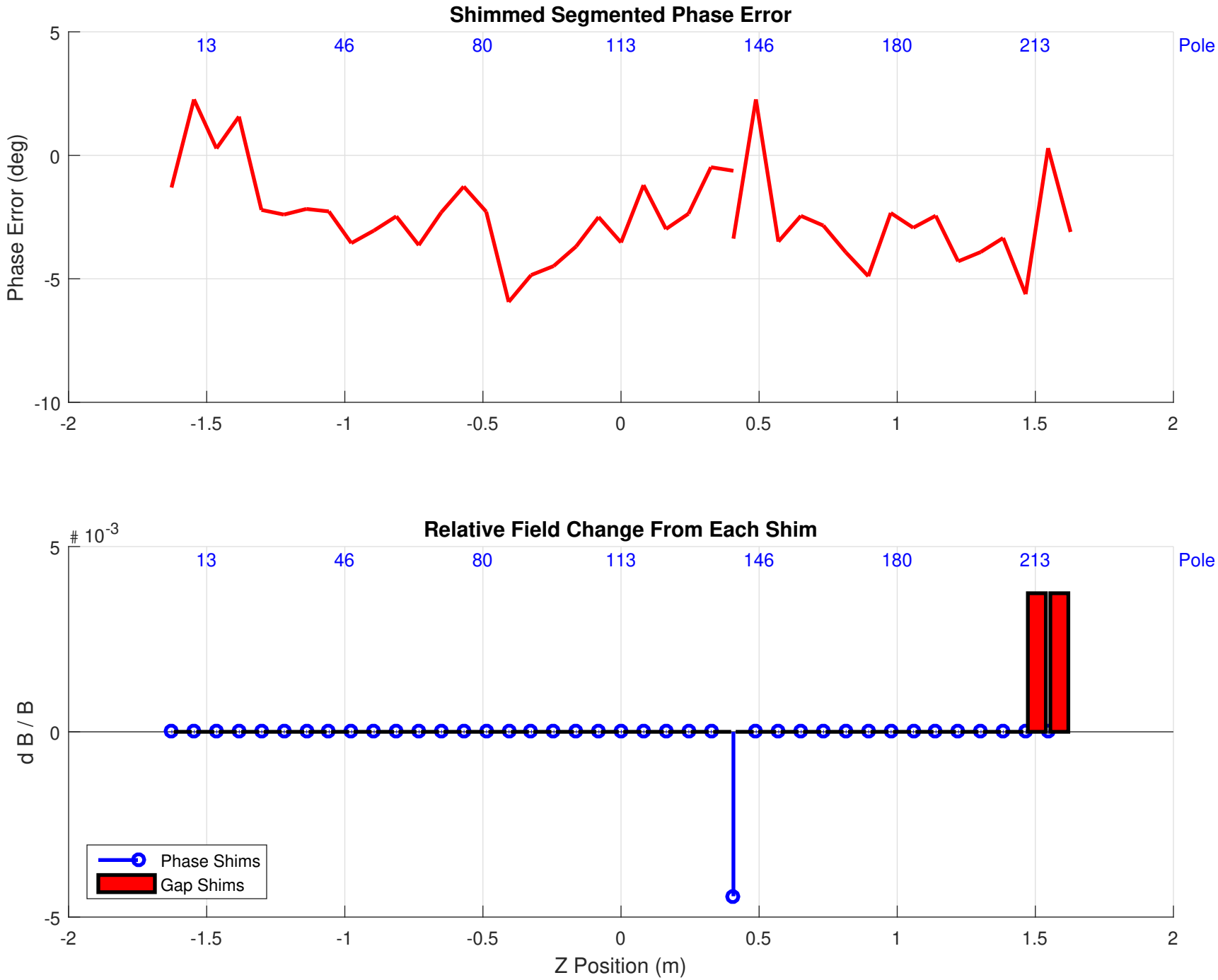

Modeled Y Trajectory After Shimming
10^-7
0
-1
-2
-3
-4
-5
-6
-7
13
46
80
113
146
180
213
Pole
Modeled Y (m)
-2.5
-2
-1.5
-1
-0.5
0
0.5
1
1.5
2
2.5
Z position (m)

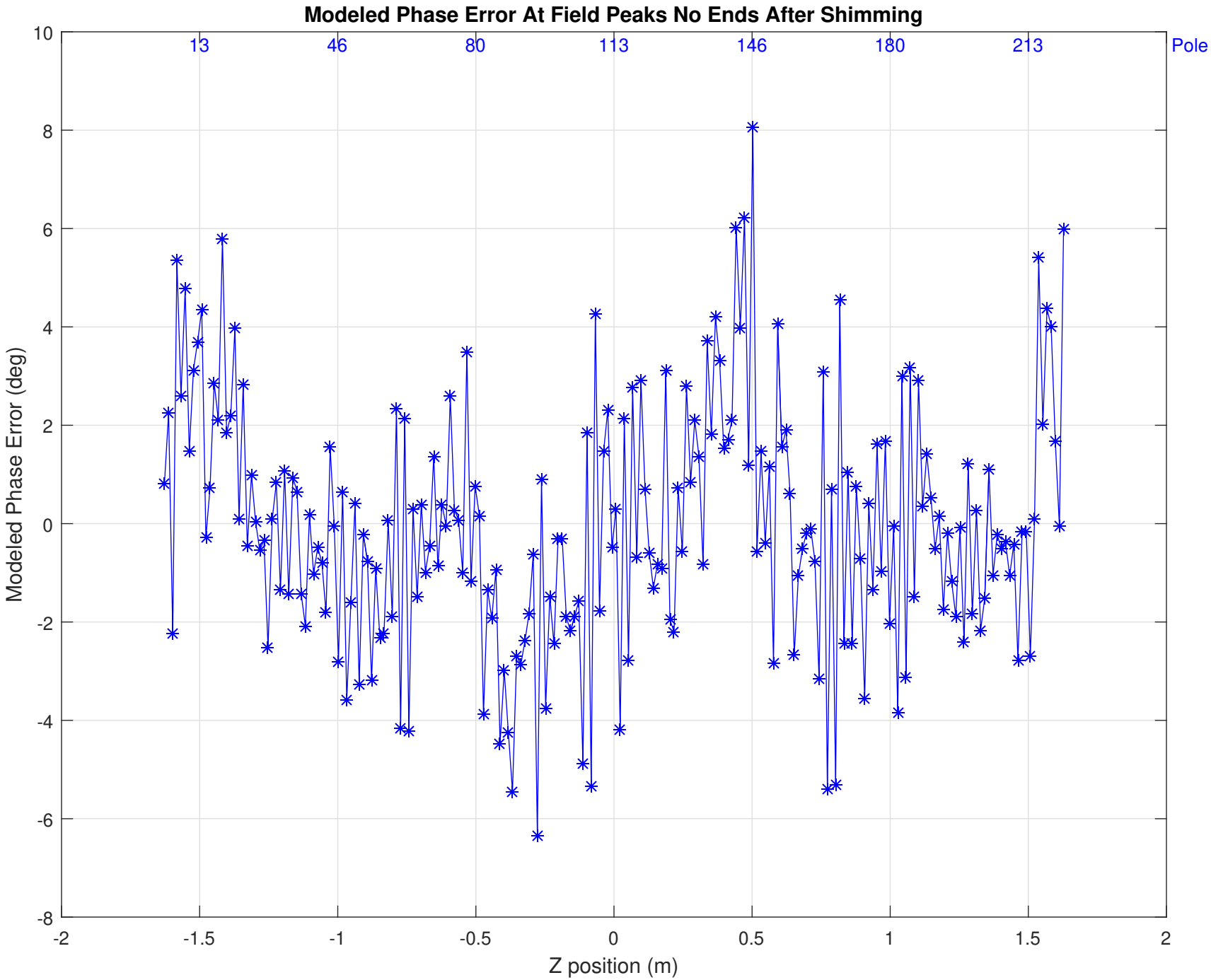

Phase Error At Poles, No Ends
Phase Error (deg)
Pole Number
10
5
0
-5
-10
-15
0
50
100
150
200


Phase Error and Segmented Fit
13
46
80
113
146
180
213
Pole
10
5
0
-5
-10
-15
Phase Error (deg)
-2
-1.5
-1
-0.5
0
0.5
1
1.5
2
Z Position (m)
Phase Error
Segments


Original And Shimmed Segmented Phase Error
Phase Error (deg)
Pole
13
46
80
113
146
180
213
10
5
0
-5
-10
-15
-20
-2
-1.5
-1
-0.5
0
0.5
1
1.5
2
Relative Field Change From Each Shim
10-3
d B / B
Z Position (m)
Phase Shims
Gap Shims
0
-1
-2
-3
-4
-5
-6


Original And Shimmed Segmented Phase Error
Pole
13
46
80
113
146
180
213
Phase Error (deg)
10
5
0
-5
-10
-15
-20
-2
-1.5
-1
-0.5
0
0.5
1
1.5
2
Relative Field Change From Each Shim
10-3
d B / B
Phase Shims
Gap Shims
Z Position (m)


Shimmed Segmented Phase Error
Phase Error (deg)
5
0
-5
-10
13
46
80
113
146
180
213
Pole
-2
-1.5
-1
-0.5
0
0.5
1
1.5
2
Relative Field Change From Each Shim
10-3
d B / B
Phase Shims
Gap Shims
Z Position (m)



Phase Error: Ave = -0.000000 deg, RMS = 2.475103 deg