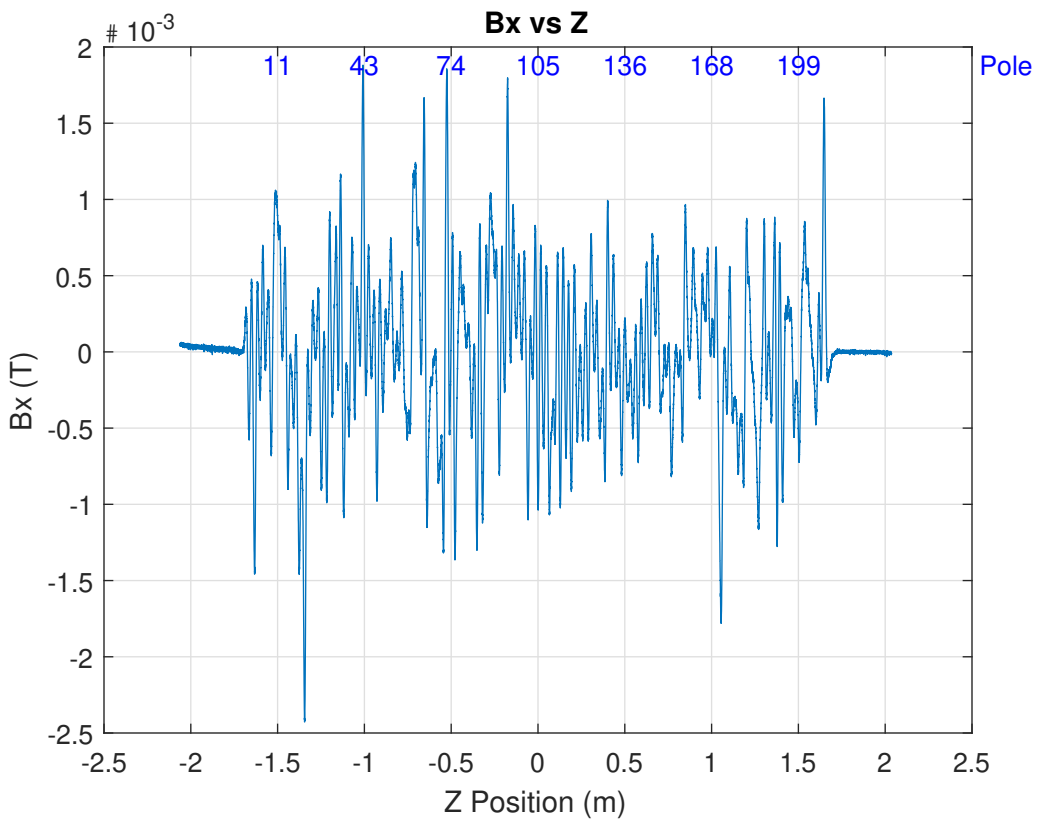
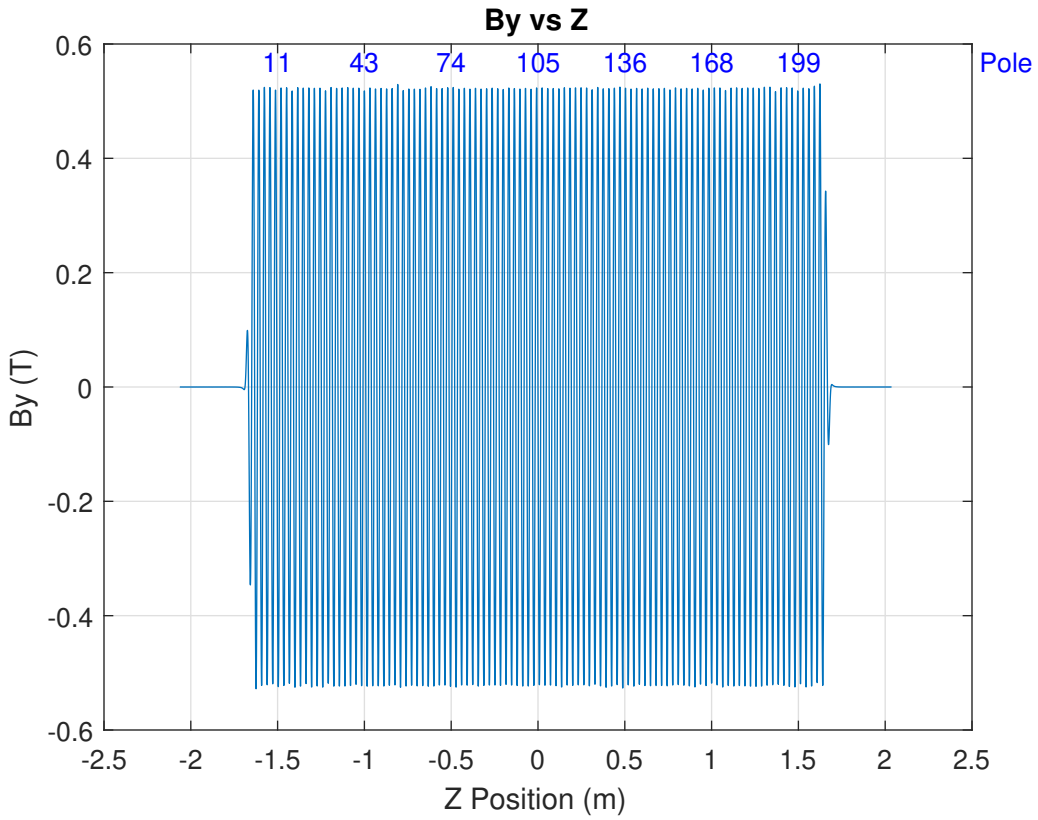
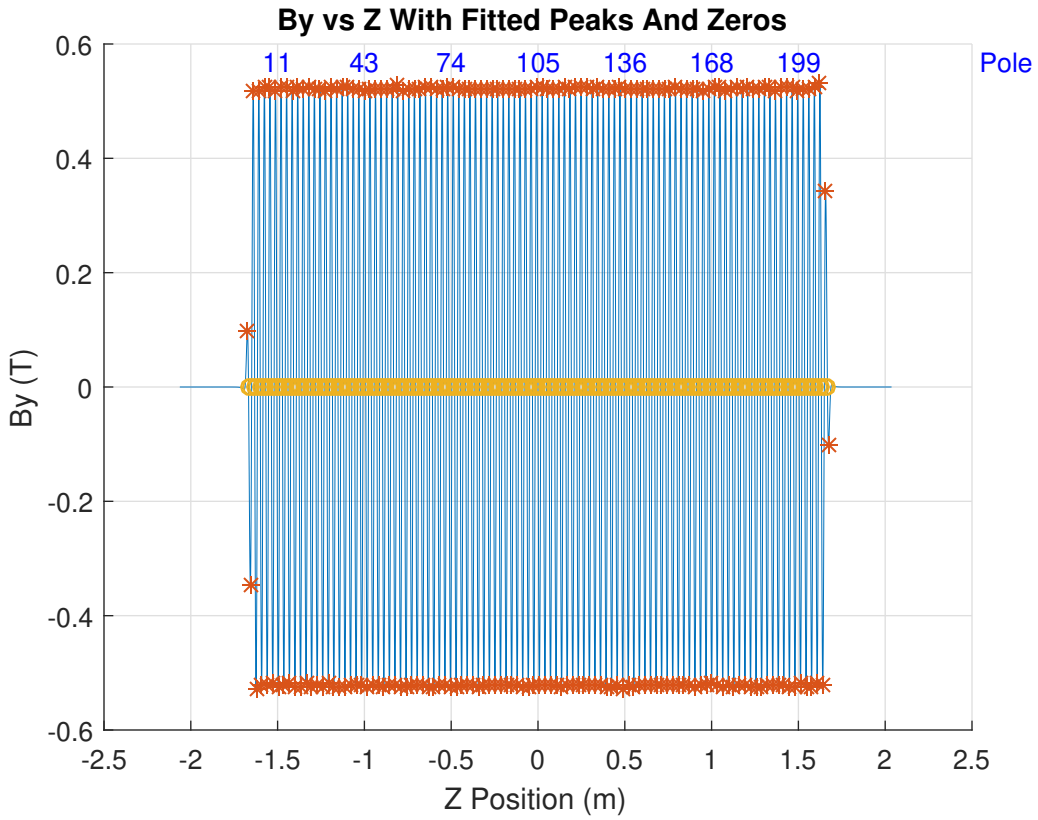
SLAC Magnetic Measurements

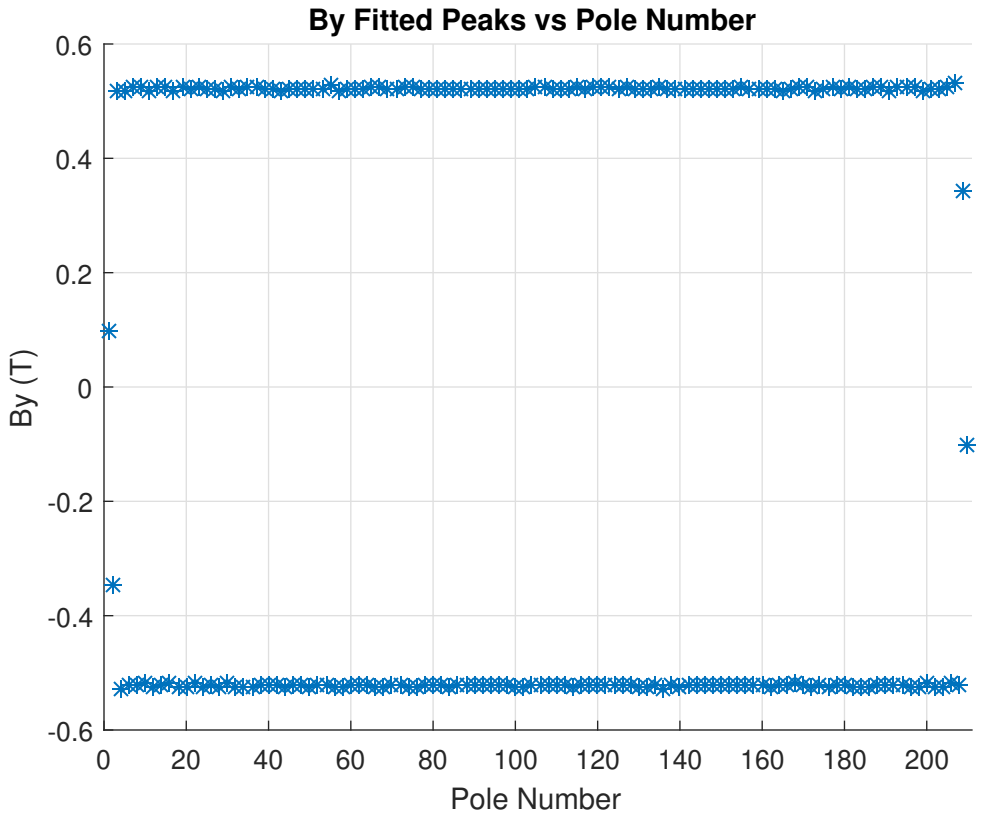
Planar Insertion Device Analysis

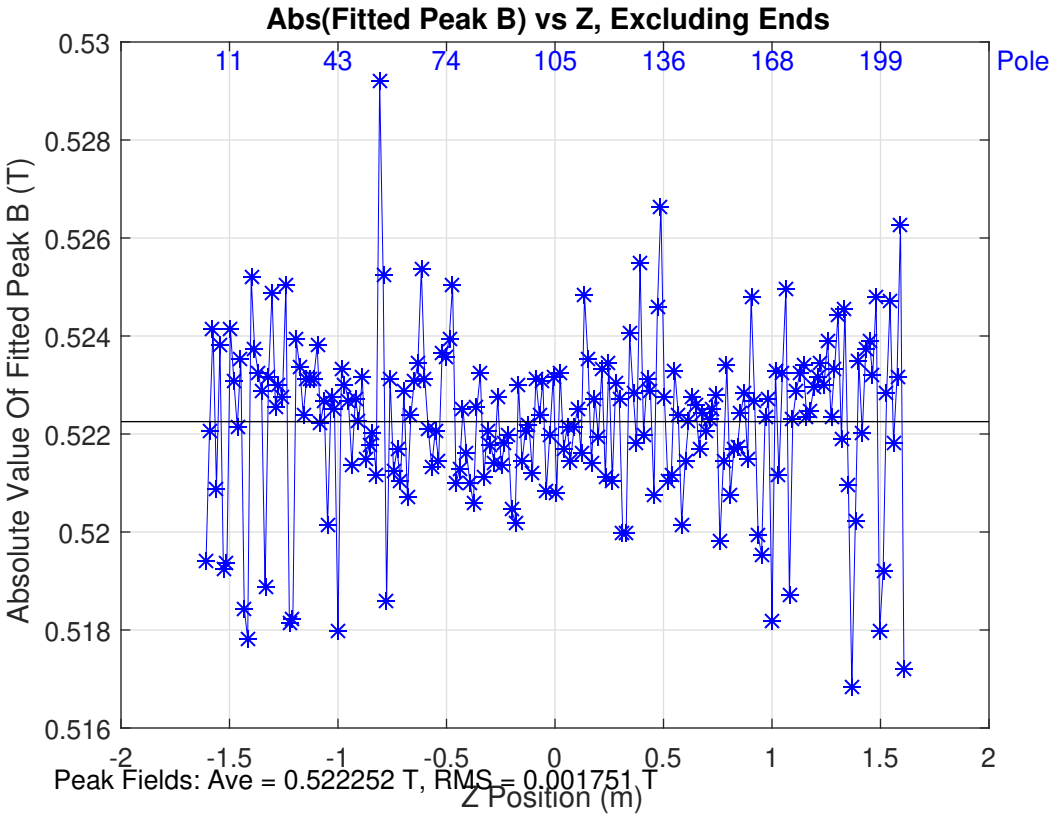
Parameters:
INPUT-FILE-DIR =S:\MagData\LCLS\Undulator\HXU-32\DATASET0001\Fine Tuning\Z Scans\Run 023\
INPUT-FILE-NAME =x+00000-y+000-bscanz.dat
INPUT-FILE-TYPE =ZVXYBXYH
CORR-REQUIRED =0
GAMMA =7827.79
NOM-LAMBDA-U =0.032
NOM-K-VALUE =2.6963
NOM-LAMBDA-R =1.2103e-09
NUM-POLES =210
NUM-END-POLES =4
CELL-LENGTH =3.656

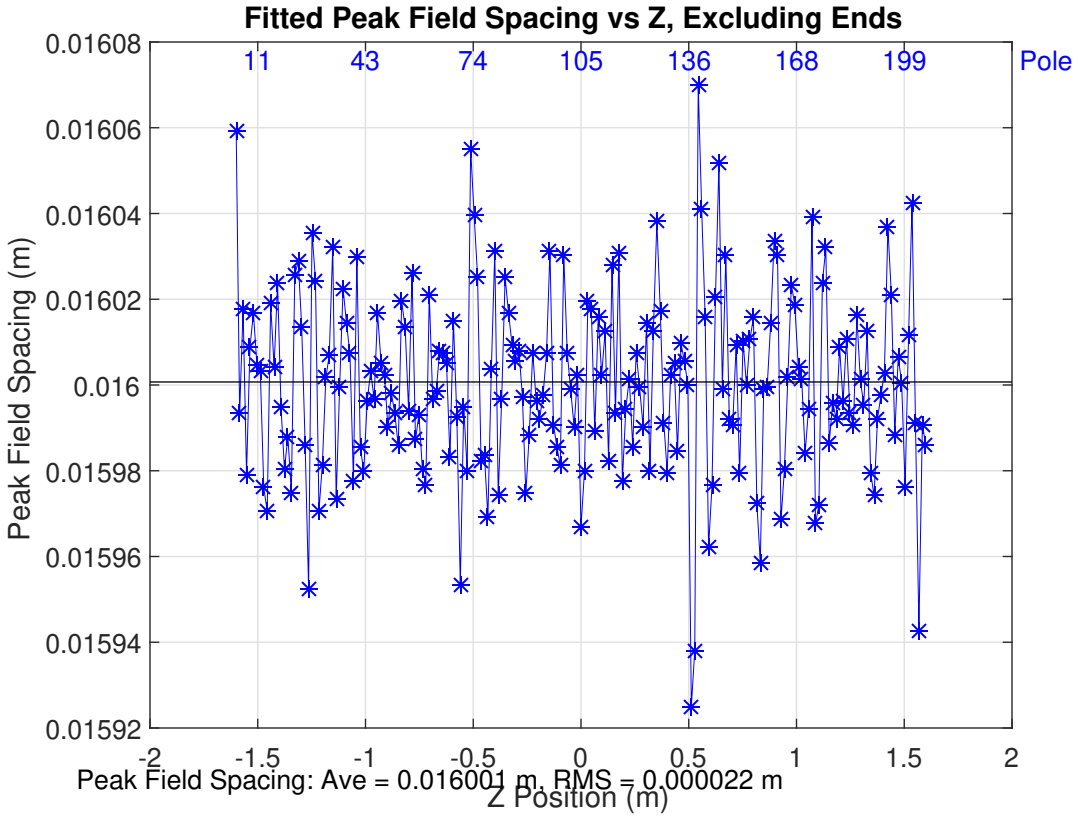

Bx vs Z
10^-3
11
43
74
105
136
168
199
Pole
2
1.5
1
0.5
0
-0.5
-1
-1.5
-2
-2.5
Bx (T)
-2.5
-2
-1.5
-1
-0.5
0
0.5
1
1.5
2
2.5
Z Position (m)

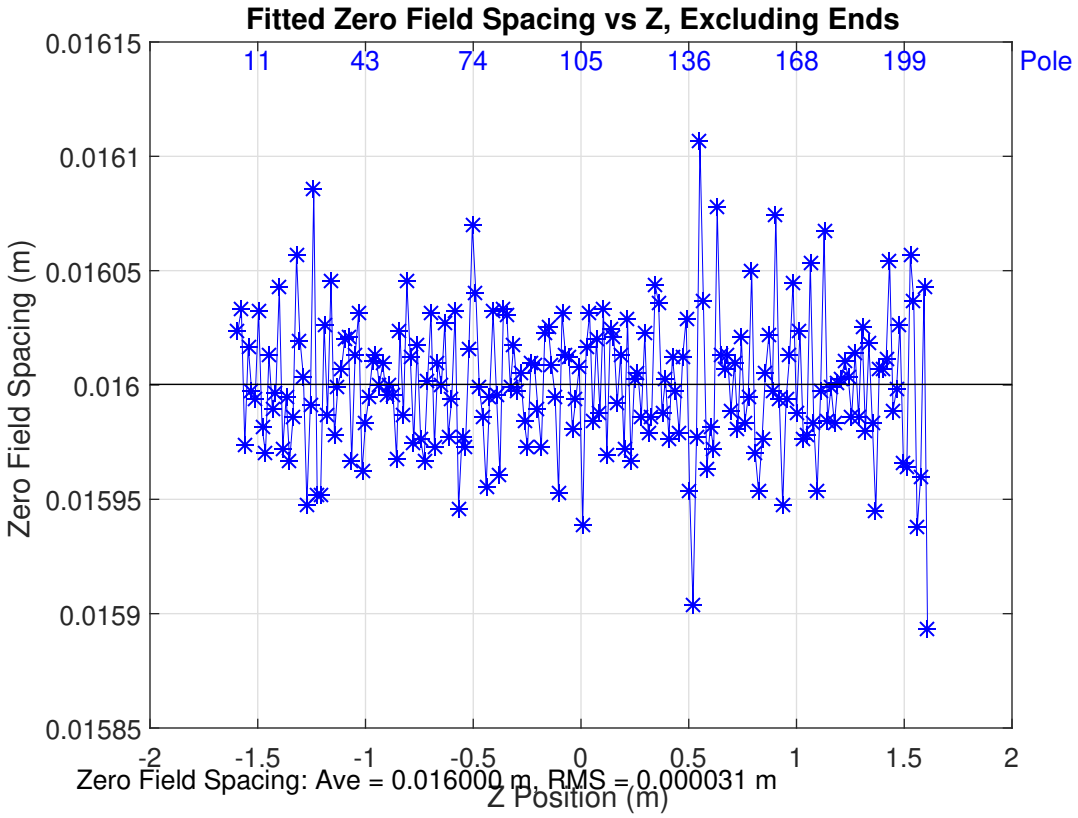

By vs Z
11
43
74
105
136
168
199
Pole
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
By (T)
-2.5
-2
-1.5
-1
-0.5
0
0.5
1
1.5
2
2.5
Z Position (m)


By vs Z With Fitted Peaks And Zeros
11
43
74
105
136
168
199
Pole
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
By (T)
-2.5
-2
-1.5
-1
-0.5
0
0.5
1
1.5
2
2.5
Z Position (m)

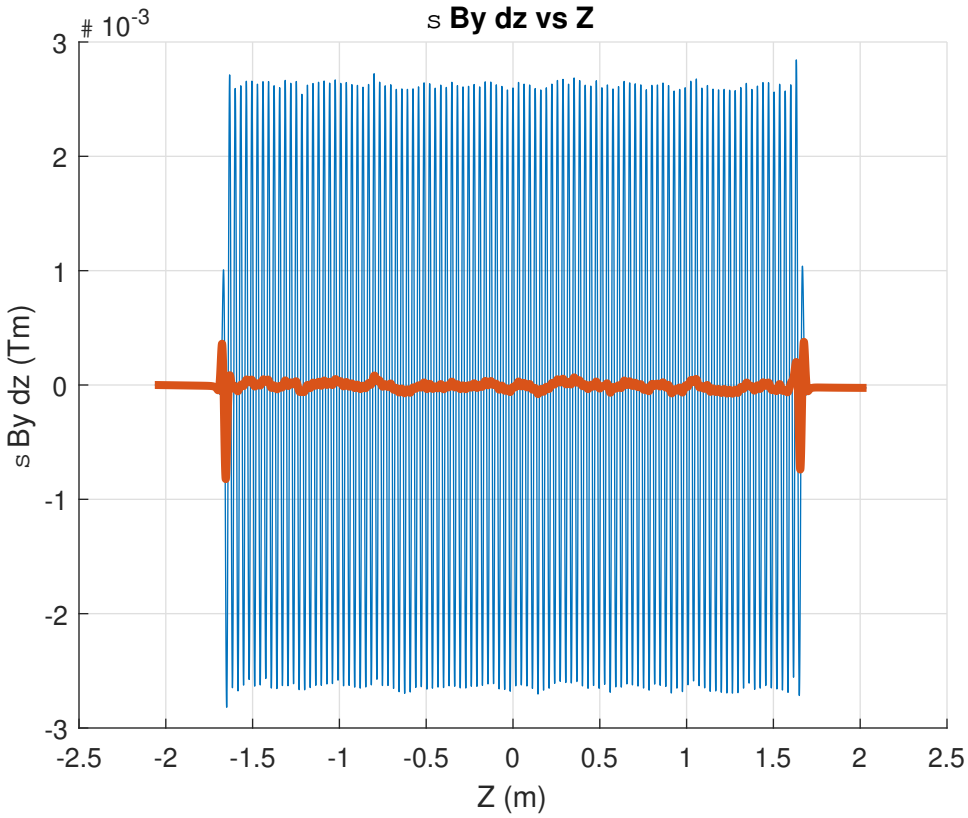

By Fitted Peaks vs Pole Number
By (T)
Pole Number
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
0
20
40
60
80
100
120
140
160
180
200

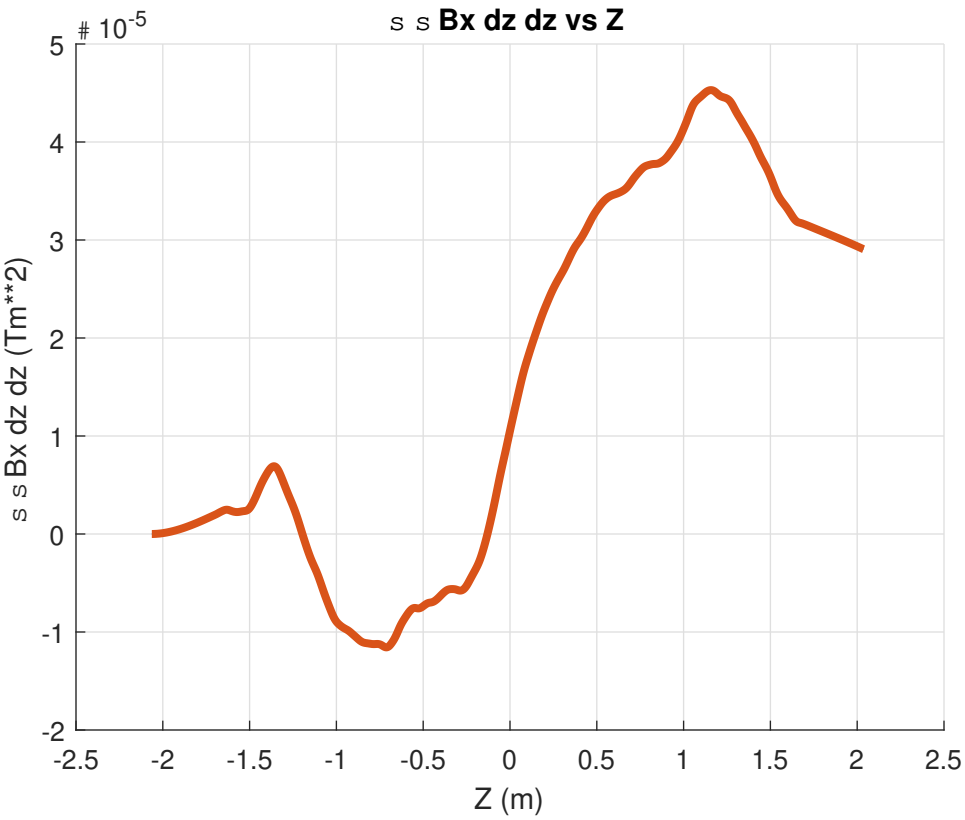

Abs(Fitted Peak B) vs Z, Excluding Ends
11
43
74
105
136
168
199
Pole
0.53
0.528
0.526
0.524
0.522
0.52
0.518
0.516
Absolute Value Of Fitted Peak B (T)
-2
-1.5
-1
-0.5
0
0.5
1
1.5
2
Z Position (m)
Peak Fields: Ave = 0.522252 T, RMS = 0.001751 T

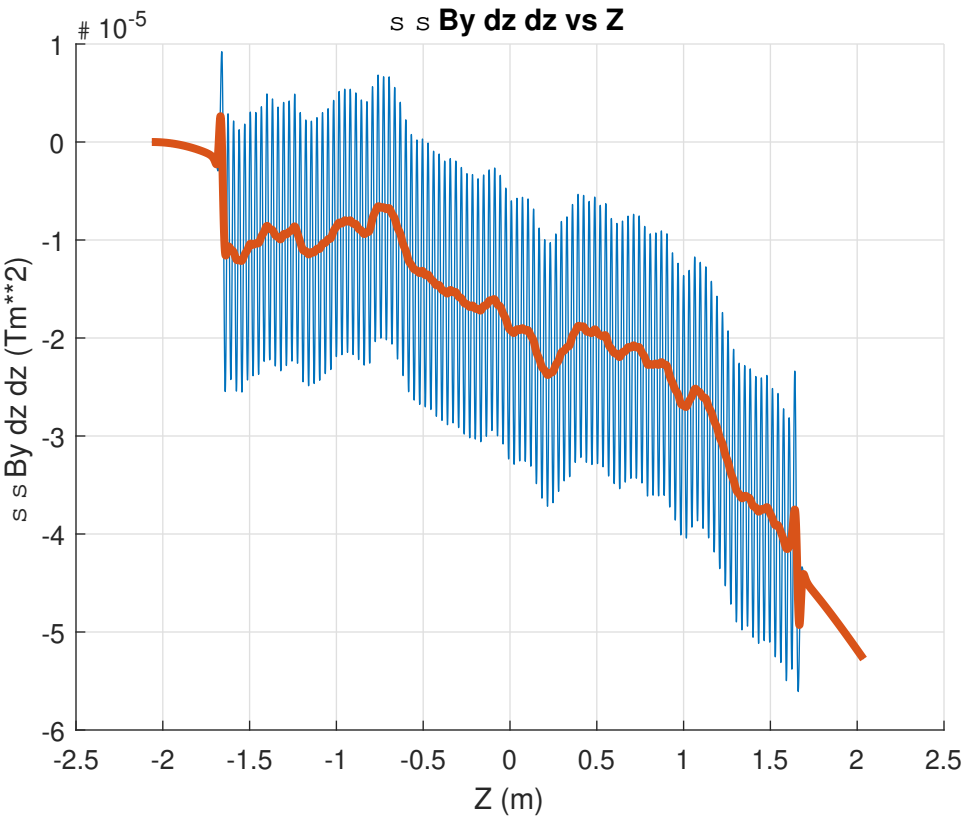

Fitted Peak Field Spacing vs Z, Excluding Ends
11
43
74
105
136
168
199
Pole
0.01608
0.01606
0.01604
0.01602
0.016
0.01598
0.01596
0.01594
0.01592
Peak Field Spacing (m)
-2
-1.5
-1
-0.5
0
0.5
1
1.5
2
Z Position (m)
Peak Field Spacing: Ave = 0.016001 m, RMS = 0.000022 m

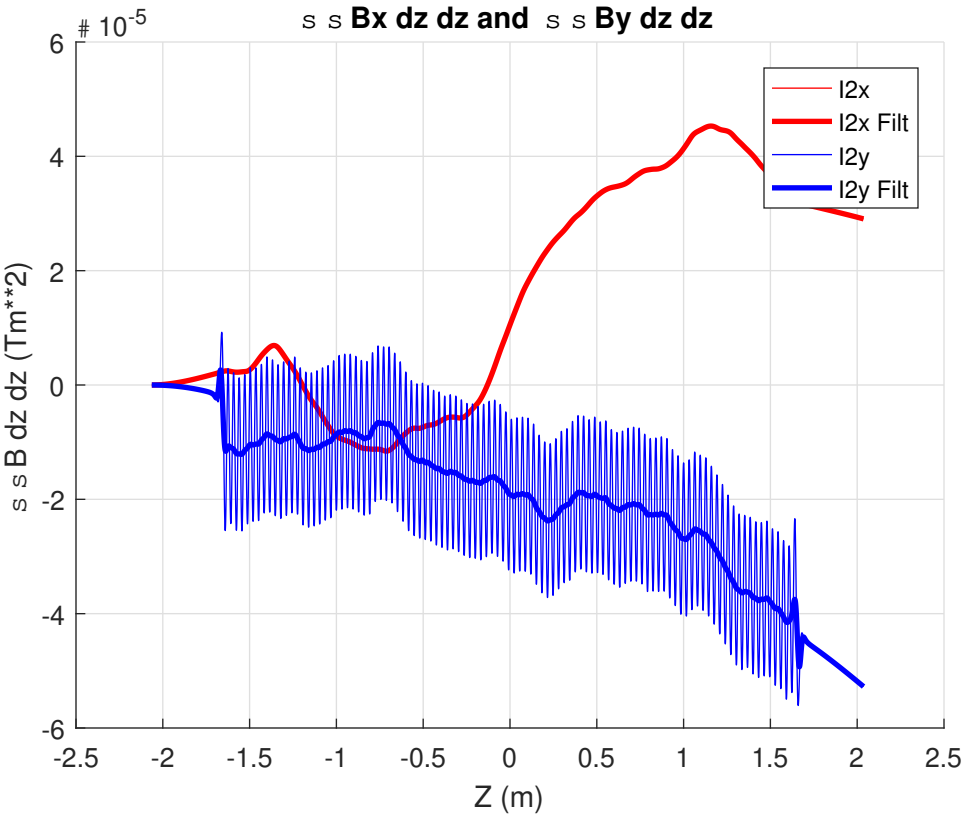

Fitted Zero Field Spacing vs Z, Excluding Ends
11
43
74
105
136
168
199
Pole
0.01615
0.0161
0.01605
0.016
0.01595
0.0159
0.01585
Zero Field Spacing (m)
-2
-1.5
-1
-0.5
0
0.5
1
1.5
2
Z Position (m)
Zero Field Spacing: Ave = 0.016000 m, RMS = 0.000031 m

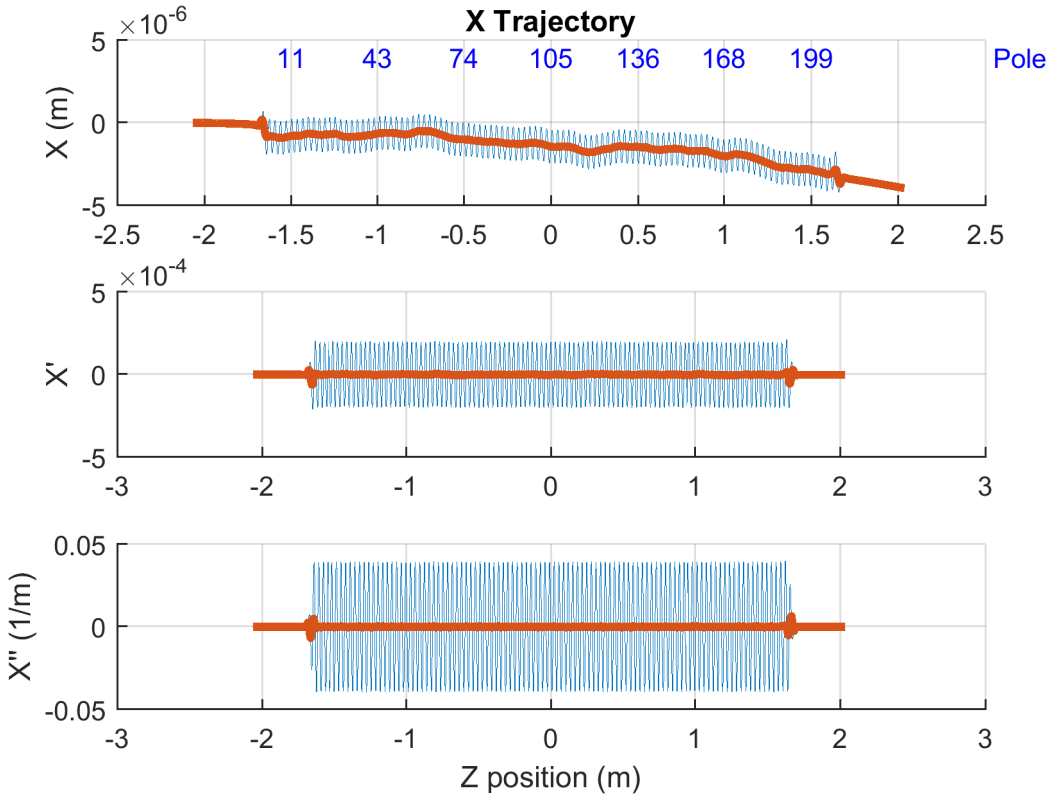
s Bx dz vs Z
10^-5
s Bx dz (Tm)
Z (m)
10
8
6
4
2
0
-2
-4
-6
-8
-2.5
-2
-1.5
-1
-0.5
0
0.5
1
1.5
2
2.5

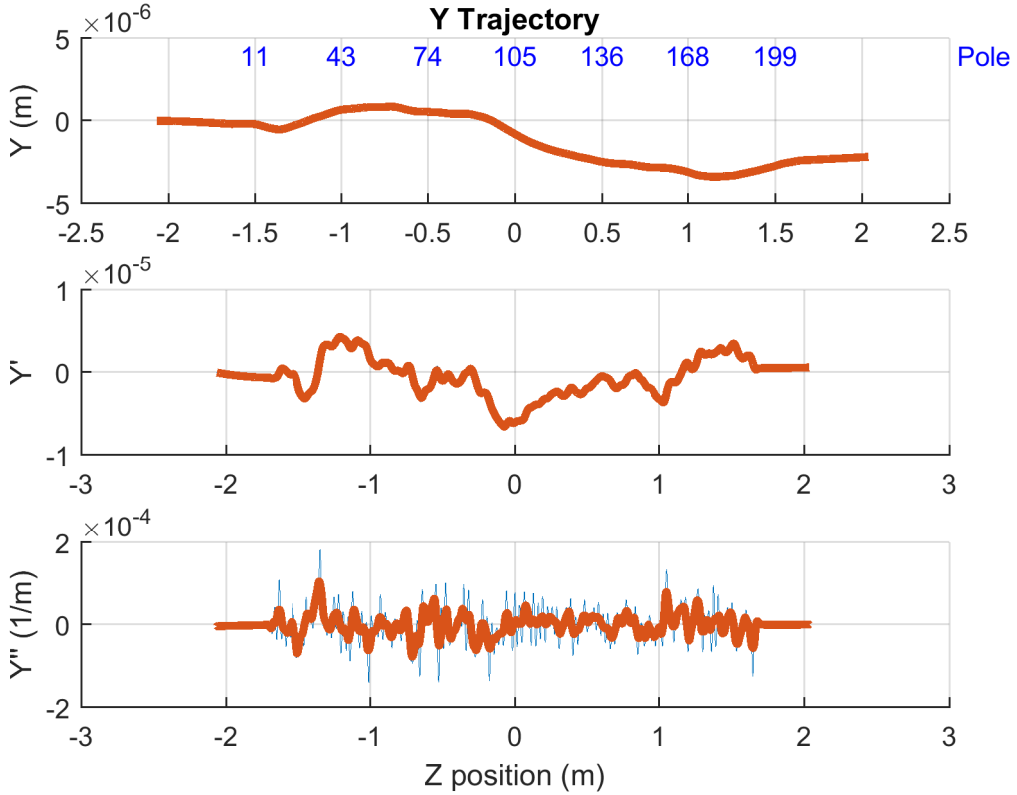

s By dz vs Z
10^-3
3
2
1
0
-1
-2
-3
s By dz (Tm)
-2.5
-2
-1.5
-1
-0.5
0
0.5
1
1.5
2
2.5
Z (m)

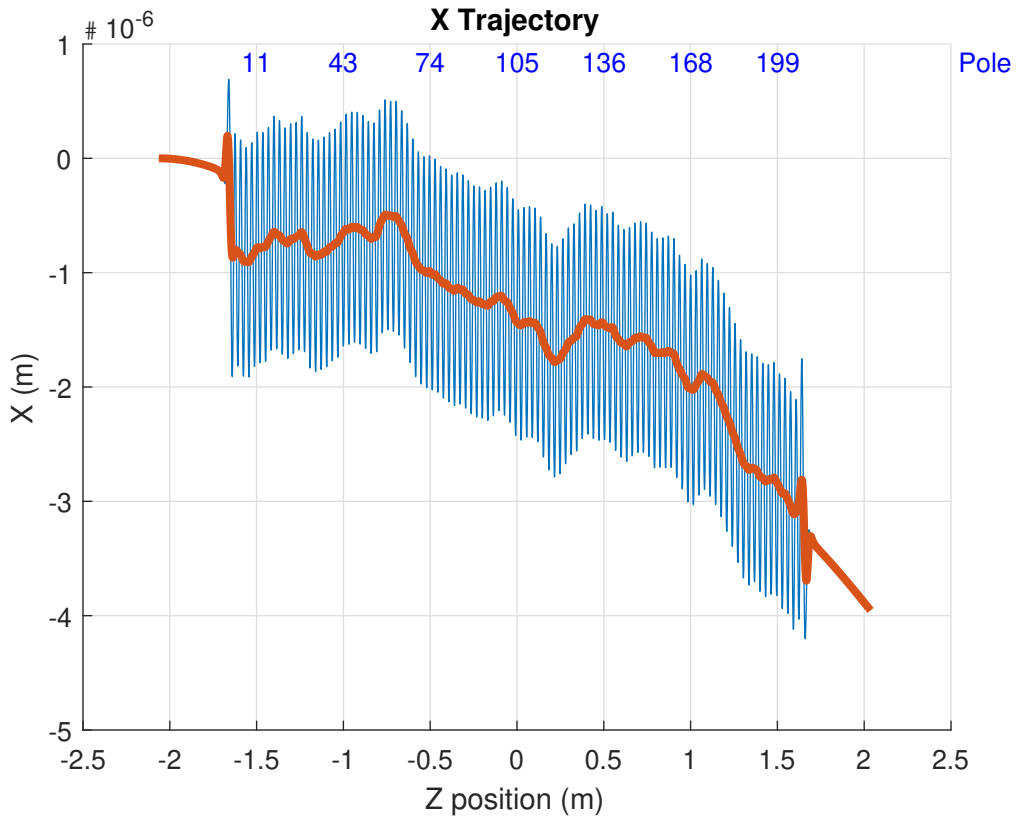

s s Bx dz dz vs Z
10^-5
s s Bx dz dz (Tm**2)
Z (m)
5
4
3
2
1
0
-1
-2
-2.5
-2
-1.5
-1
-0.5
0
0.5
1
1.5
2
2.5

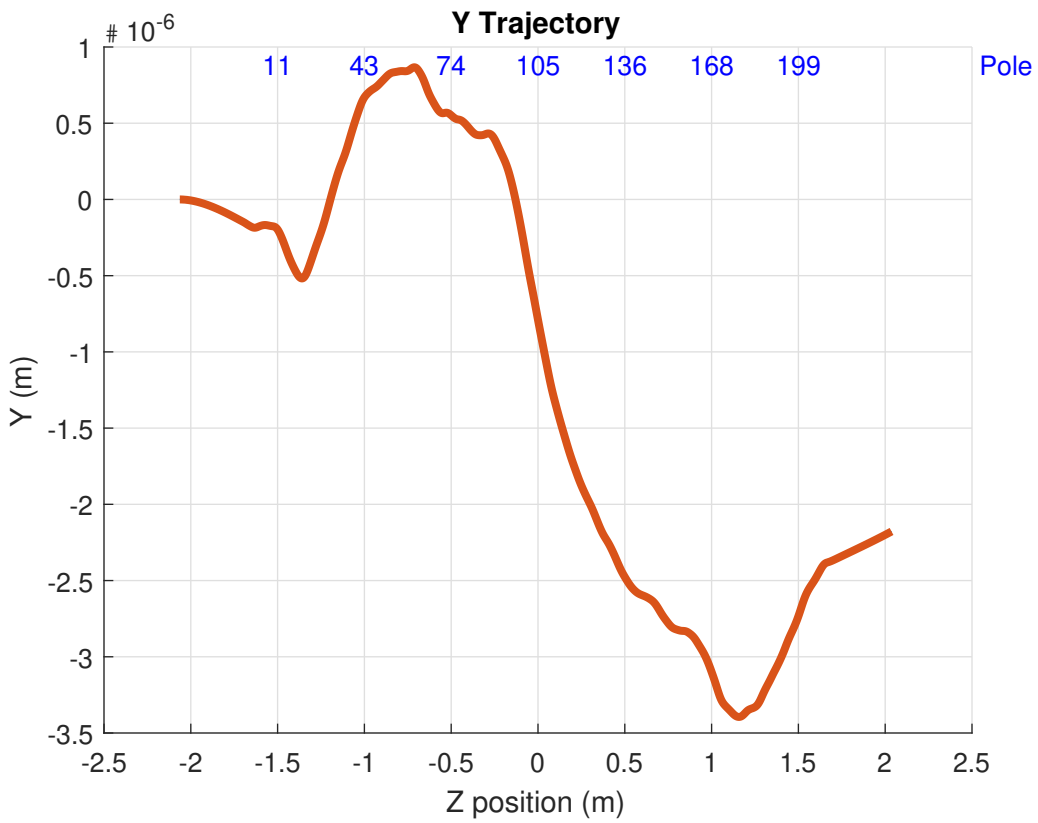

s s By dz dz vs Z
10^-5
s s By dz dz (Tm**2)
Z (m)
1
0
-1
-2
-3
-4
-5
-6
-2.5
-2
-1.5
-1
-0.5
0
0.5
1
1.5
2
2.5

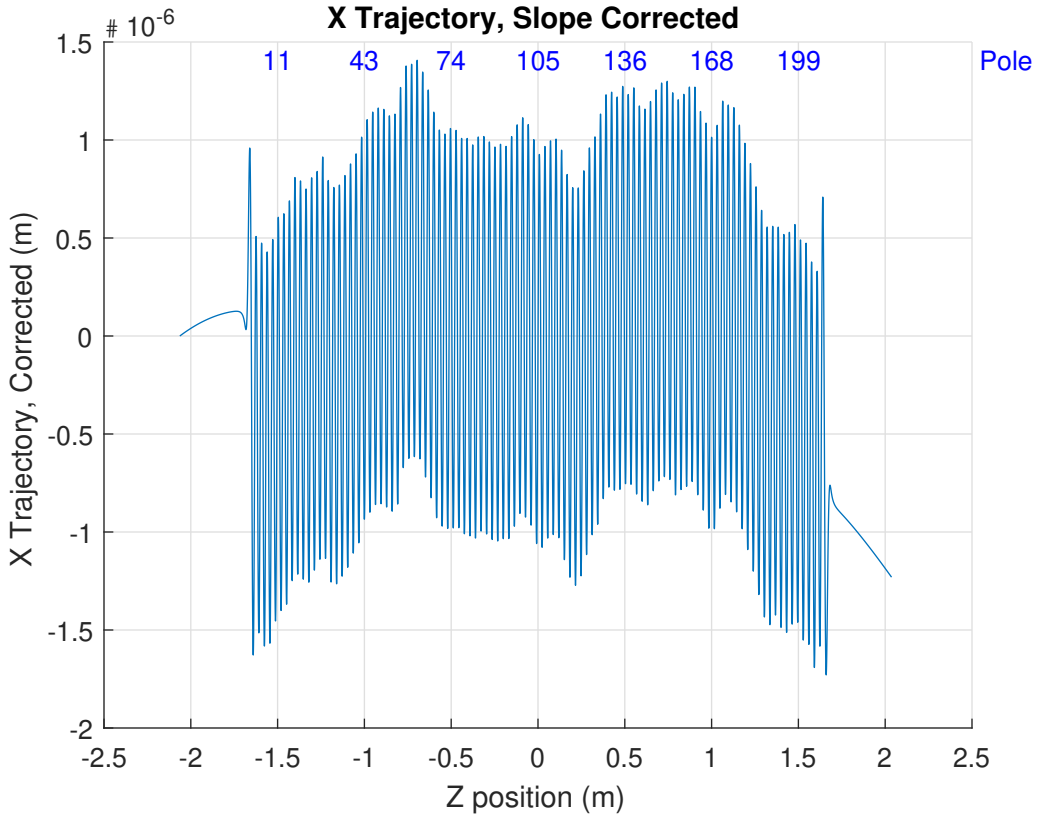

∫∫ Bx dz dz and ∫∫ By dz dz
10^-5
∫∫B dz dz (Tm**2)
Z (m)
I2x
I2x Filt
I2y
I2y Filt
6
4
2
0
-2
-4
-6
-2.5
-2
-1.5
-1
-0.5
0
0.5
1
1.5
2
2.5

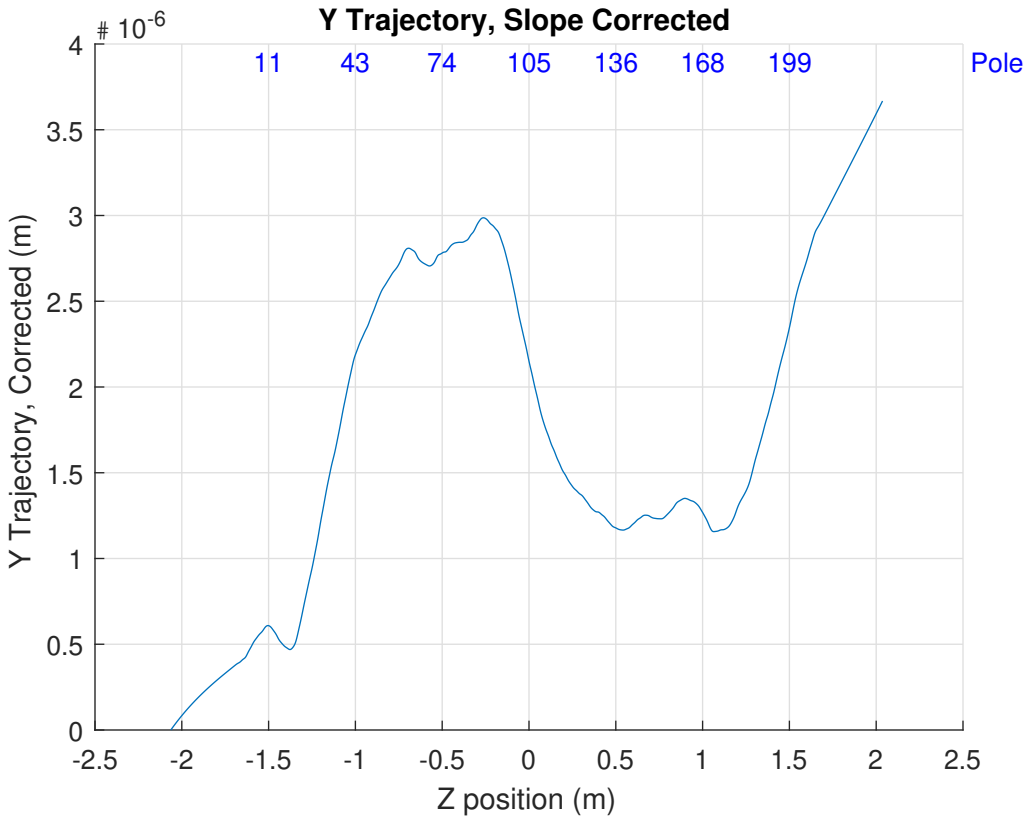

X Trajectory
×10^-6
11
43
74
105
136
168
199
Pole
X (m)
5
0
-5
-2.5
-2
-1.5
-1
-0.5
0
0.5
1
1.5
2
2.5
×10^-4
X'
5
0
-5
-3
-2
-1
0
1
2
3
X'' (1/m)
0.05
0
-0.05
-3
-2
-1
0
1
2
3
Z position (m)

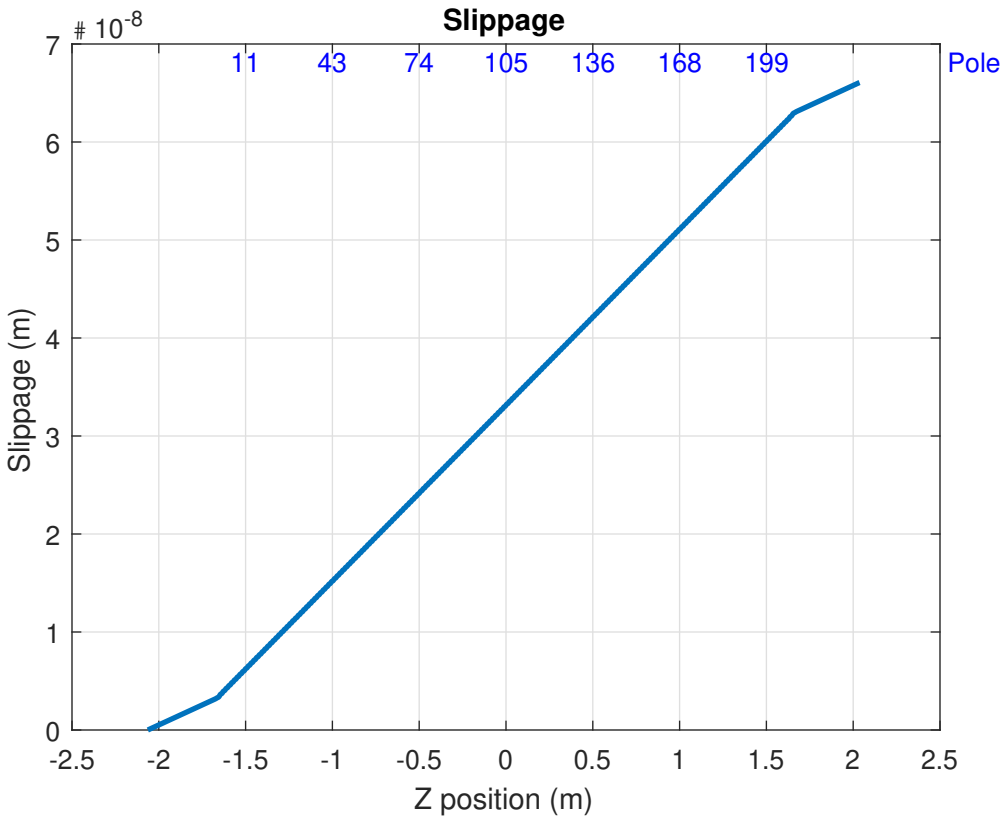

Y Trajectory
×10^-6
5
0
-5
Y (m)
11
43
74
105
136
168
199
Pole
-2.5
-2
-1.5
-1
-0.5
0
0.5
1
1.5
2
2.5
×10^-5
1
0
-1
Y'
-3
-2
-1
0
1
2
3
×10^-4
2
0
-2
Y'' (1/m)
-3
-2
-1
0
1
2
3
Z position (m)

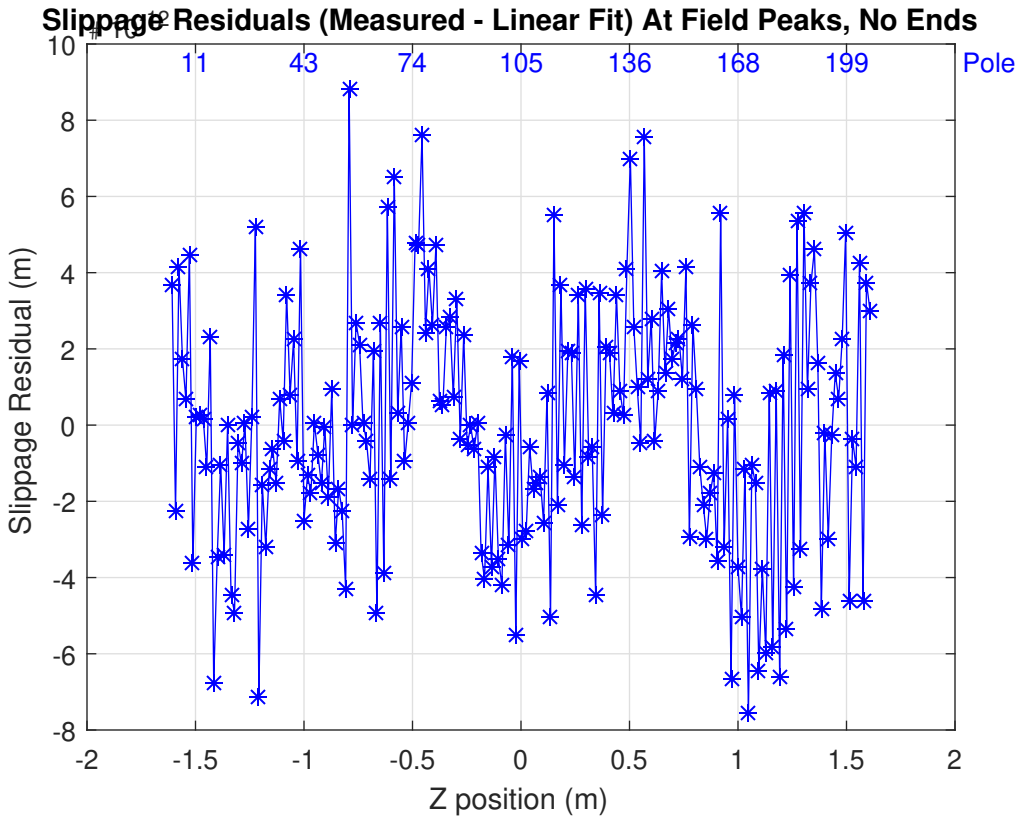

X Trajectory
10^-6
11
43
74
105
136
168
199
Pole
1
0
-1
-2
-3
-4
-5
X (m)
-2.5
-2
-1.5
-1
-0.5
0
0.5
1
1.5
2
2.5
Z position (m)

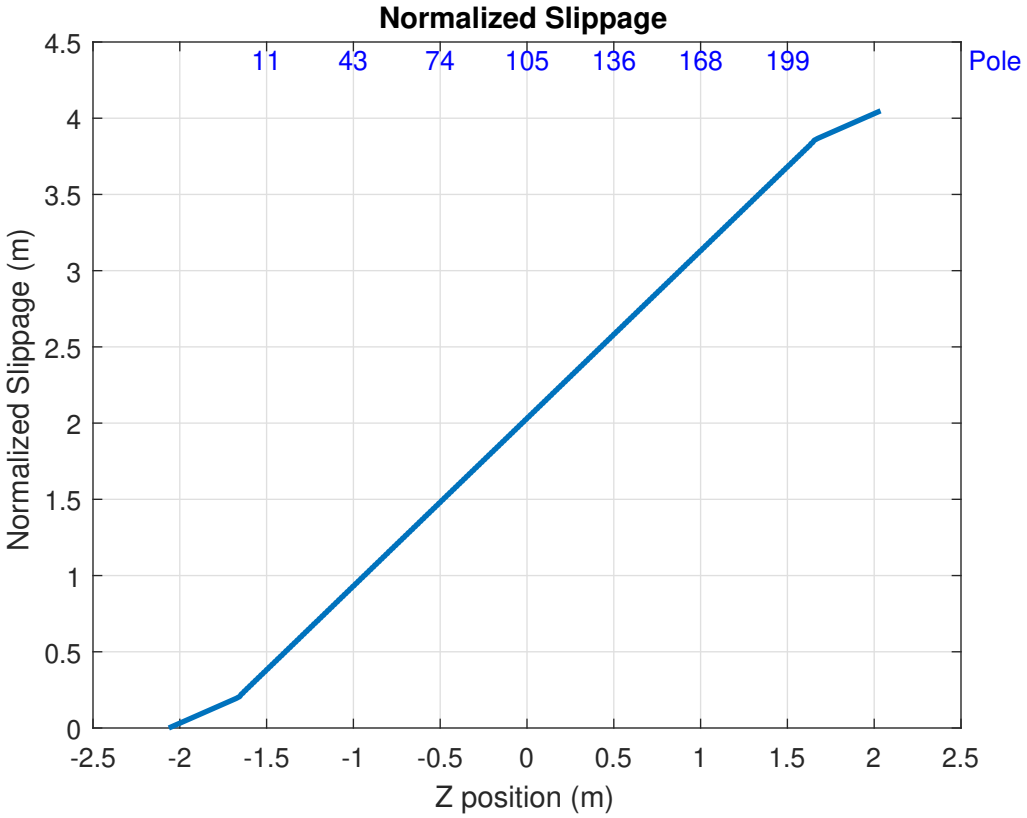

Y Trajectory
10^-6
11
43
74
105
136
168
199
Pole
1
0.5
0
-0.5
-1
-1.5
-2
-2.5
-3
-3.5
Y (m)
-2.5
-2
-1.5
-1
-0.5
0
0.5
1
1.5
2
2.5
Z position (m)

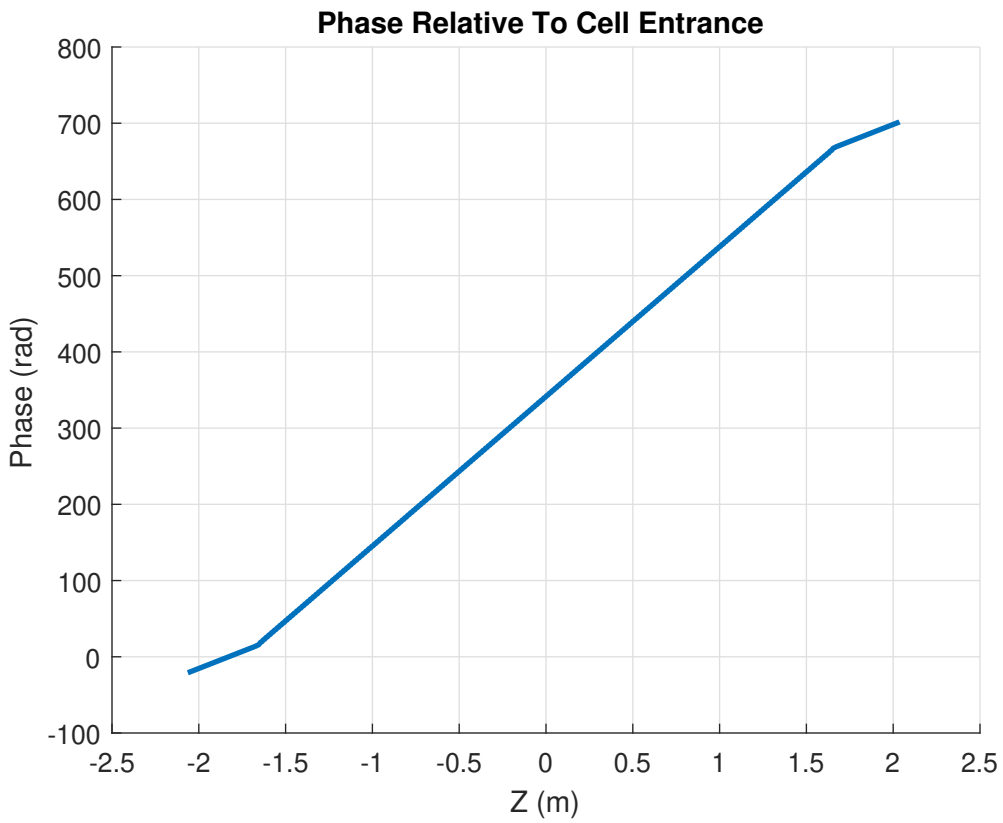

X Trajectory, Slope Corrected
10^-6
11
43
74
105
136
168
199
Pole
X Trajectory, Corrected (m)
Z position (m)
1.5
1
0.5
0
-0.5
-1
-1.5
-2
-2.5
-2
-1.5
-1
-0.5
0
0.5
1
1.5
2
2.5

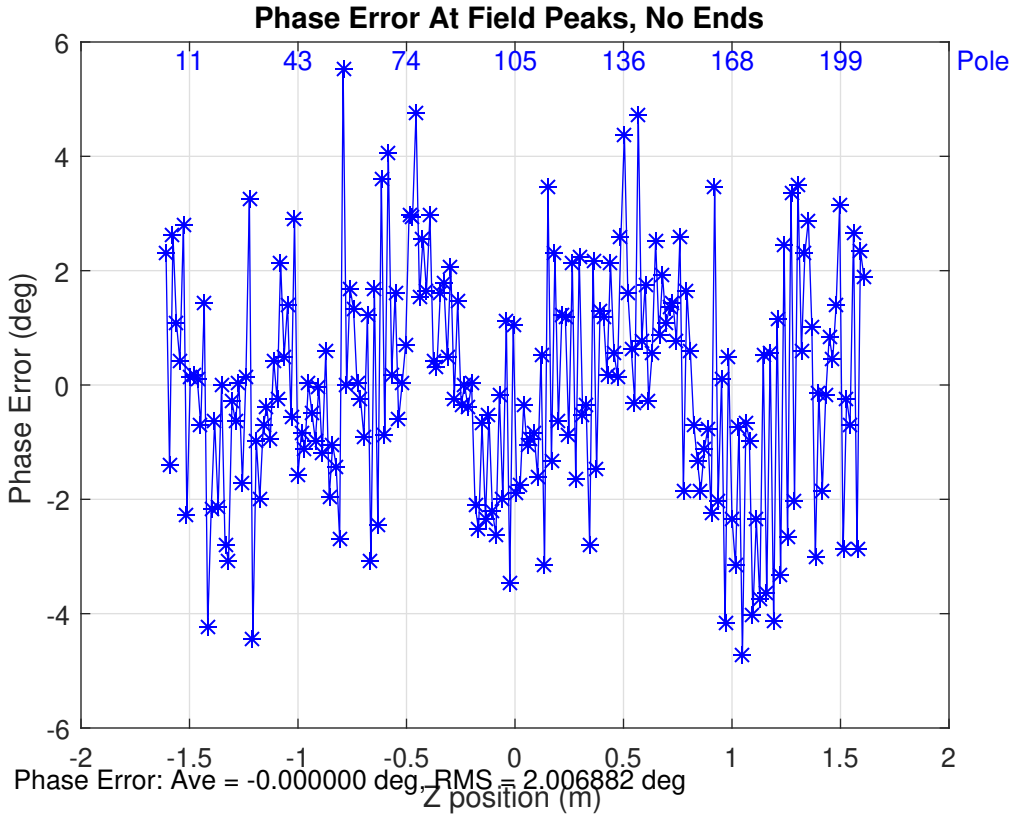

Y Trajectory, Slope Corrected
10^-6
11
43
74
105
136
168
199
Pole
Y Trajectory, Corrected (m)
Z position (m)
4
3.5
3
2.5
2
1.5
1
0.5
0
-2.5
-2
-1.5
-1
-0.5
0
0.5
1
1.5
2
2.5

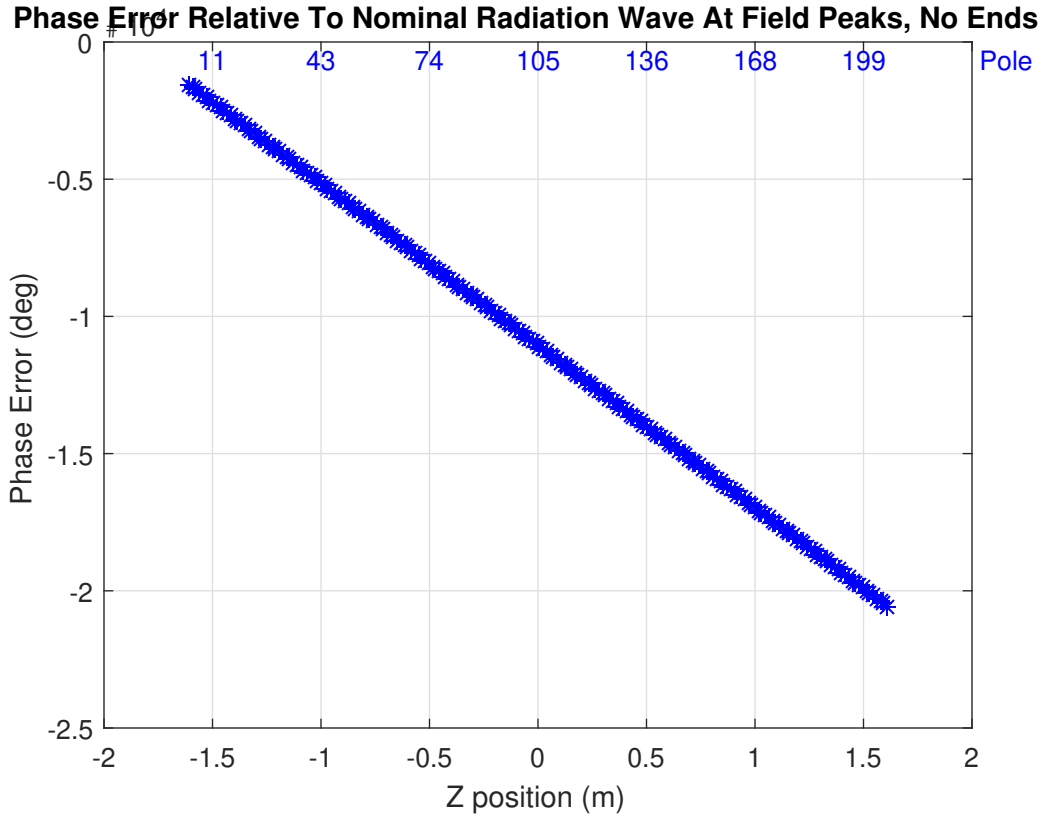

Slippage
10^-8
7
6
5
4
3
2
1
0
Slippage (m)
11
43
74
105
136
168
199
Pole
-2.5
-2
-1.5
-1
-0.5
0
0.5
1
1.5
2
2.5
Z position (m)


Slippage Residuals (Measured - Linear Fit) At Field Peaks, No Ends
Pole
11
43
74
105
136
168
199
Slippage Residual (m)
Z position (m)
10
8
6
4
2
0
-2
-4
-6
-8
-2
-1.5
-1
-0.5
0
0.5
1
1.5
2


Normalized Slippage
11
43
74
105
136
168
199
Pole
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
Normalized Slippage (m)
-2.5
-2
-1.5
-1
-0.5
0
0.5
1
1.5
2
2.5
Z position (m)


Phase Relative To Cell Entrance
800
700
600
500
400
300
200
100
0
-100
Phase (rad)
-2.5
-2
-1.5
-1
-0.5
0
0.5
1
1.5
2
2.5
Z (m)


Phase Error At Field Peaks, No Ends
11
43
74
105
136
168
199
Pole
6
4
2
0
-2
-4
-6
-2
-1.5
-1
-0.5
0
0.5
1
1.5
2
Phase Error (deg)
Z position (m)
Phase Error: Ave = -0.000000 deg, RMS = 2.006882 deg


Phase Error Relative To Nominal Radiation Wave At Field Peaks, No Ends
#10
0
-0.5
-1
-1.5
-2
-2.5
Phase Error (deg)
11
43
74
105
136
168
199
Pole
-2
-1.5
-1
-0.5
0
0.5
1
1.5
2
Z position (m)