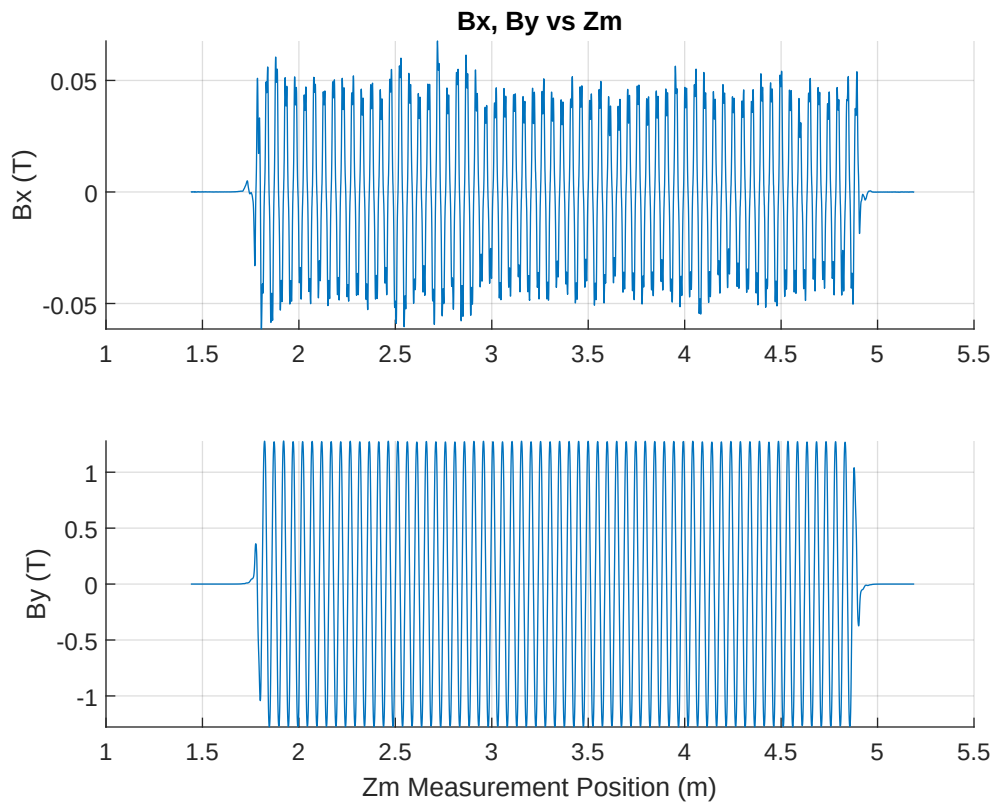
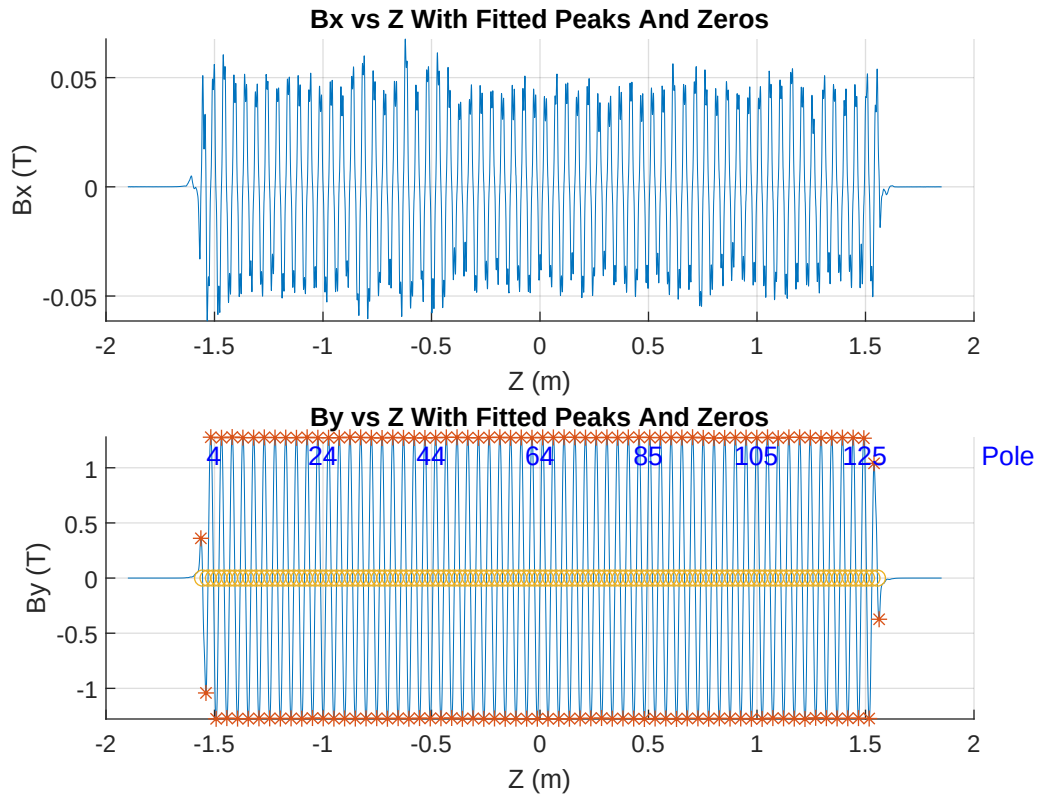
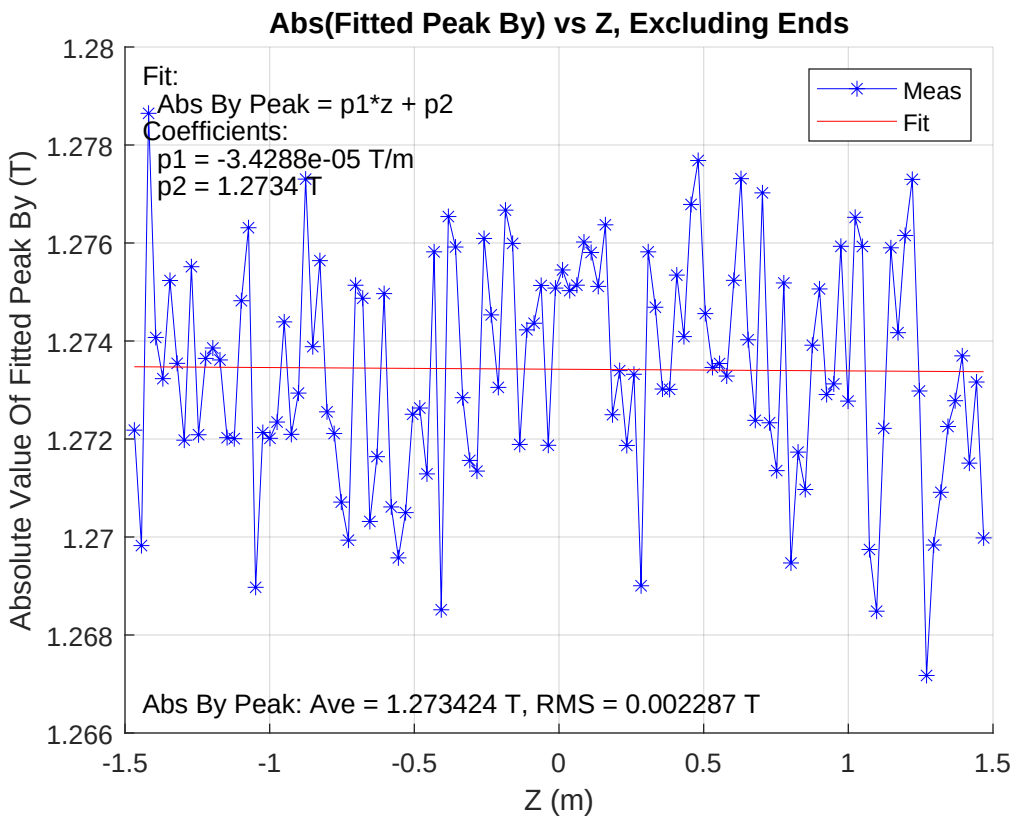
SLAC Magnetic Measurements

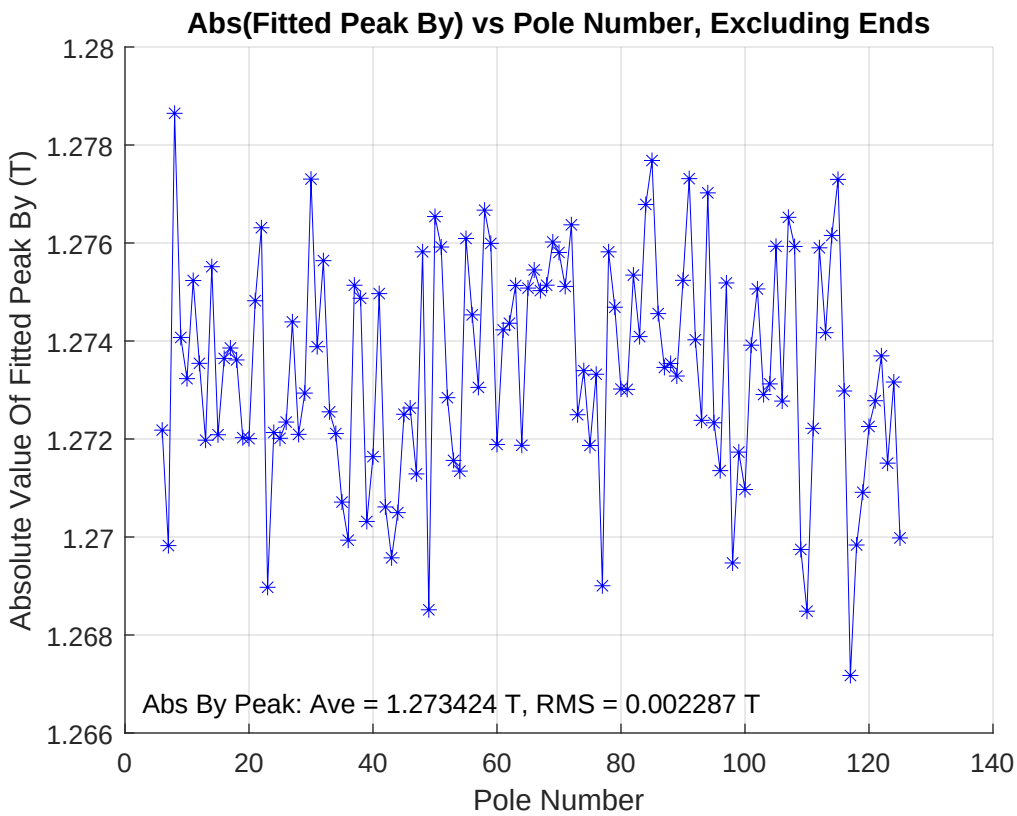
Planar Insertion Device Analysis

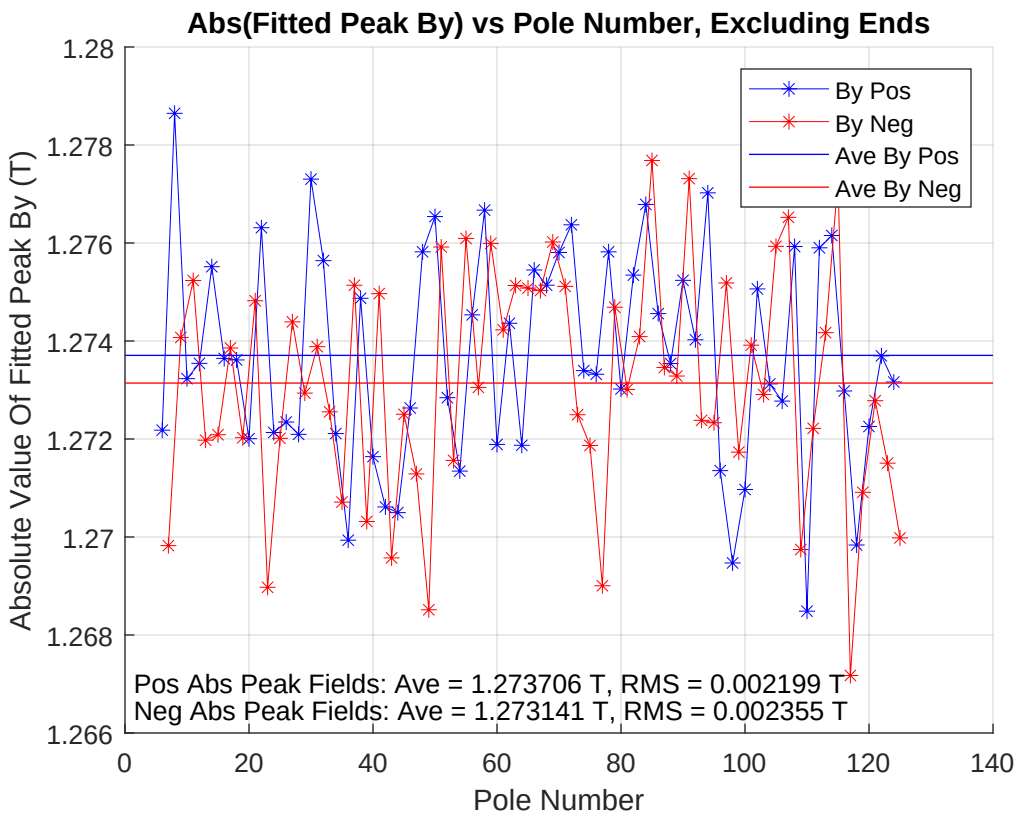
Parameters:
INPUT-FILE-DIR =S:\magdata\LCLS-II-HE\Undulator\DELTA-II\QUADRANT 4\DATASET0001\Final Resul
INPUT-FILE-NAME =zscan.dat
INPUT-FILE-TYPE =ZVXYBXYH
CORR-REQUIRED =0
GAMMA =7827.79
NOM-LAMBDA-U =0.049333
NOM-K-VALUE =3.5
NOM-LAMBDA-R =2.8682e-09
NUM-POLES =128
NUM-END-POLES =4
CELL-LENGTH =4

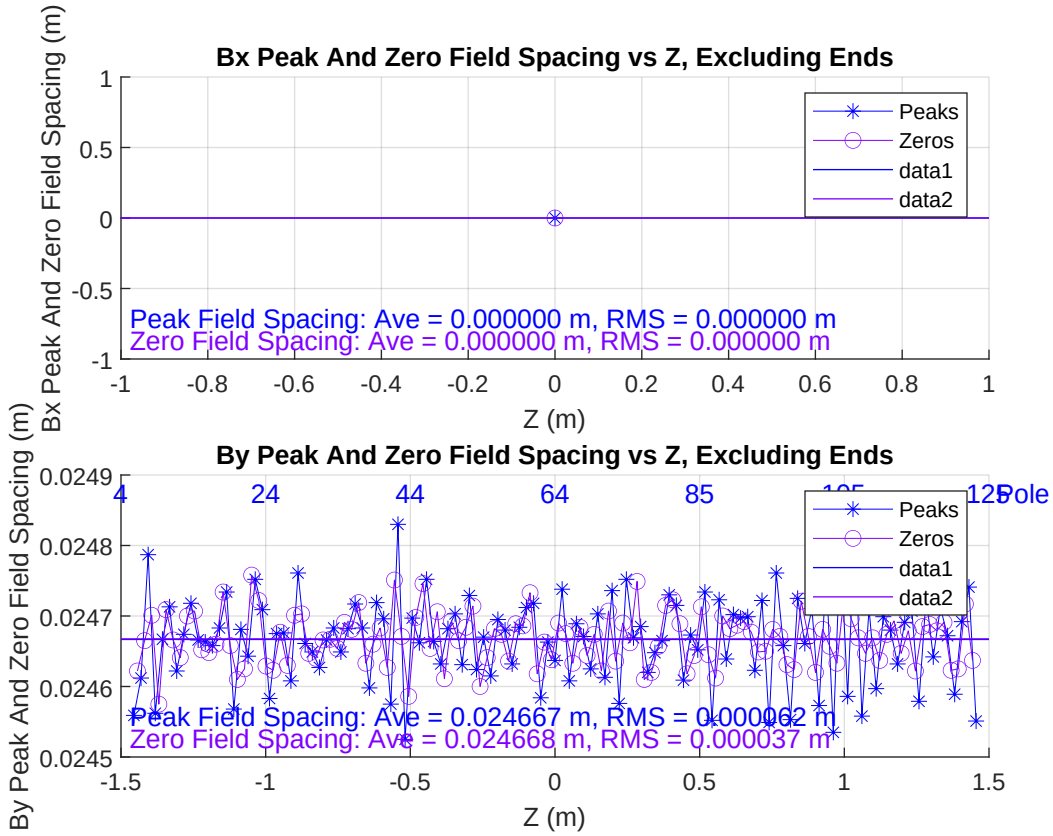

Bx, By vs Zm
Bx (T)
0.05
0
-0.05
1
1.5
2
2.5
3
3.5
4
4.5
5
5.5
By (T)
1
0.5
0
-0.5
-1
Zm Measurement Position (m)

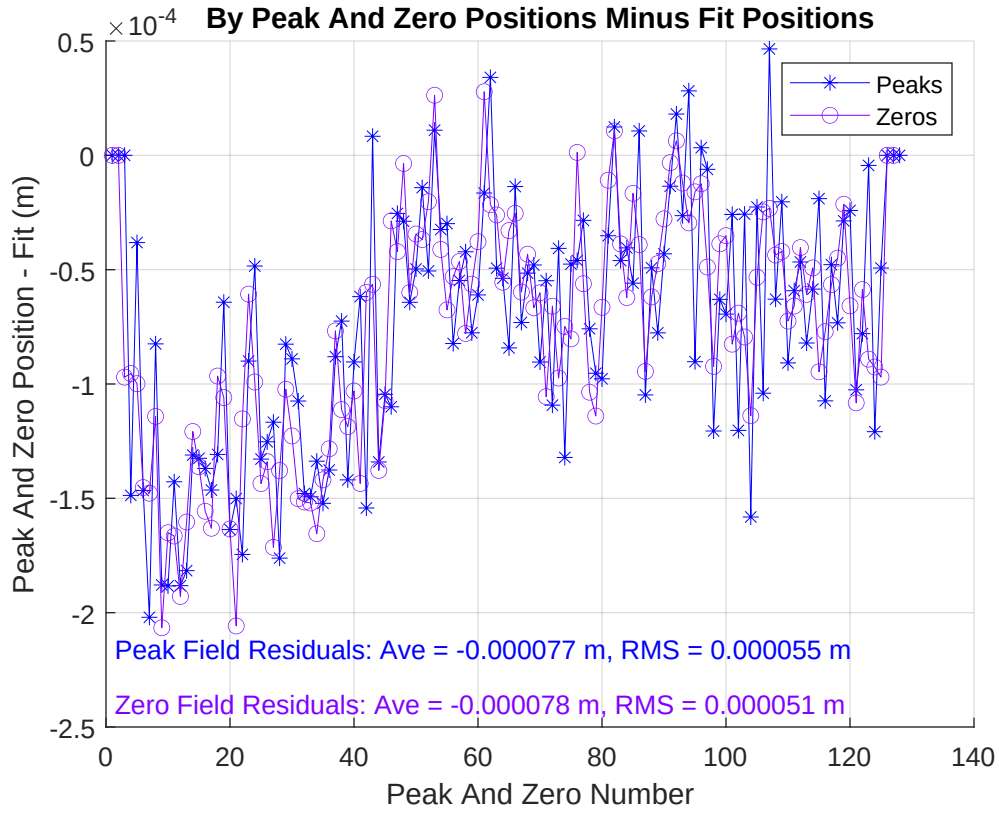

Bx vs Z With Fitted Peaks And Zeros
Bx (T)
0.05
0
-0.05
-2
-1.5
-1
-0.5
0
0.5
1
1.5
2
Z (m)
By vs Z With Fitted Peaks And Zeros
By (T)
1
0.5
0
-0.5
-1
4
24
44
64
85
105
125
Pole
-2
-1.5
-1
-0.5
0
0.5
1
1.5
2
Z (m)

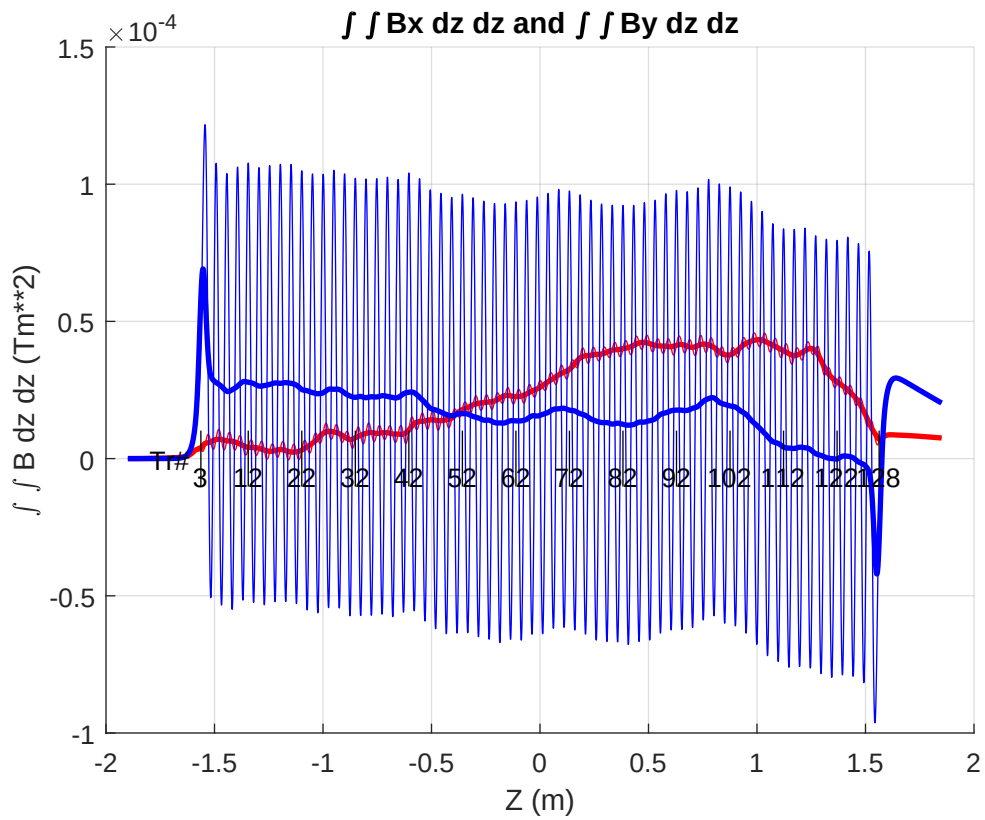

Abs(Fitted Peak By) vs Z, Excluding Ends
Fit:
Abs By Peak = p1*z + p2
Coefficients:
p1 = -3.4288e-05 T/m
p2 = 1.2734 T
Meas
Fit
Abs By Peak: Ave = 1.273424 T, RMS = 0.002287 T
Absolute Value Of Fitted Peak By (T)
Z (m)
1.28
1.278
1.276
1.274
1.272
1.27
1.268
1.266
-1.5
-1
-0.5
0
0.5
1
1.5

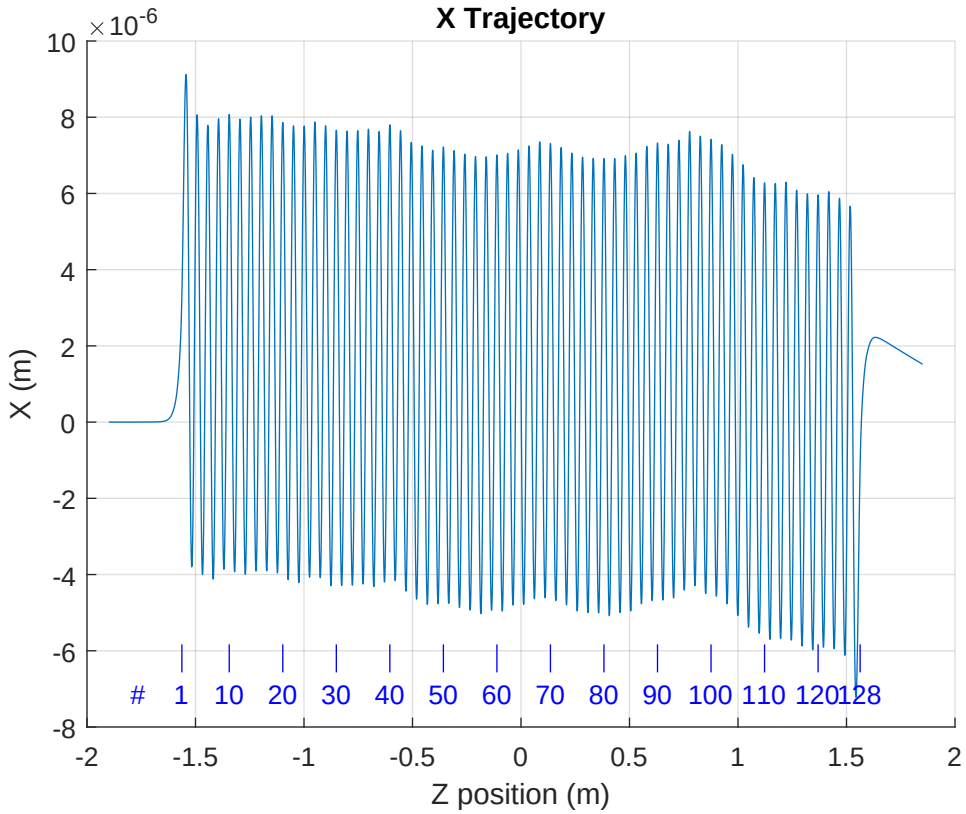

Abs(Fitted Peak By) vs Pole Number, Excluding Ends
Absolute Value Of Fitted Peak By (T)
Pole Number
Abs By Peak: Ave = 1.273424 T, RMS = 0.002287 T
1.28
1.278
1.276
1.274
1.272
1.27
1.268
1.266
0
20
40
60
80
100
120
140

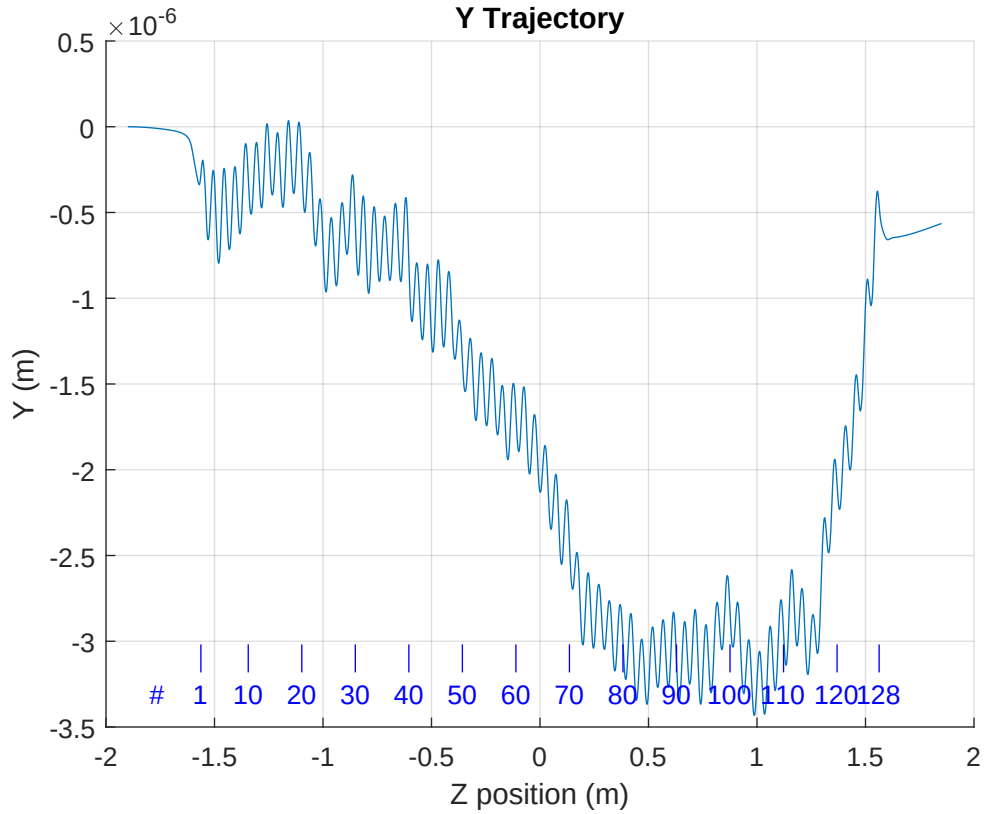

Abs(Fitted Peak By) vs Pole Number, Excluding Ends
Absolute Value Of Fitted Peak By (T)
Pole Number
1.28
1.278
1.276
1.274
1.272
1.27
1.268
1.266
0
20
40
60
80
100
120
140
By Pos
By Neg
Ave By Pos
Ave By Neg
Pos Abs Peak Fields: Ave = 1.273706 T, RMS = 0.002199 T
Neg Abs Peak Fields: Ave = 1.273141 T, RMS = 0.002355 T

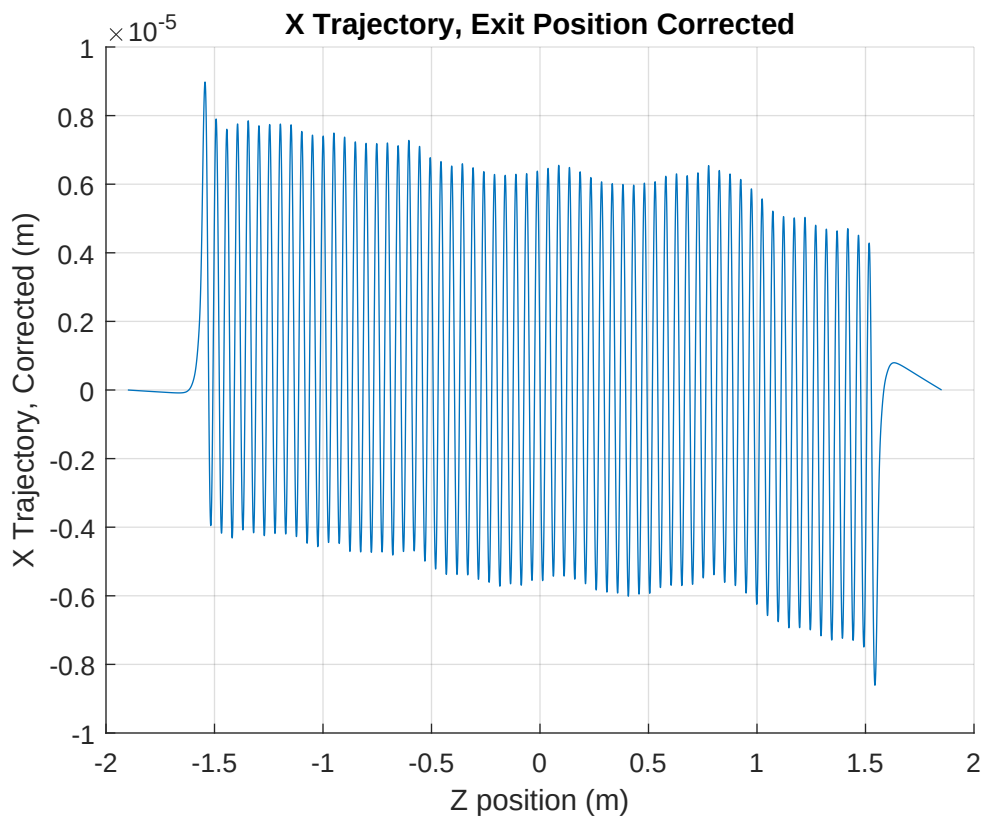

Bx Peak And Zero Field Spacing vs Z, Excluding Ends
Bx Peak And Zero Field Spacing (m)
Z (m)
Peaks
Zeros
data1
data2
Peak Field Spacing: Ave = 0.000000 m, RMS = 0.000000 m
Zero Field Spacing: Ave = 0.000000 m, RMS = 0.000000 m
By Peak And Zero Field Spacing vs Z, Excluding Ends
By Peak And Zero Field Spacing (m)
Z (m)
Pole
Peaks
Zeros
data1
data2
Peak Field Spacing: Ave = 0.024667 m, RMS = 0.000062 m
Zero Field Spacing: Ave = 0.024668 m, RMS = 0.000037 m

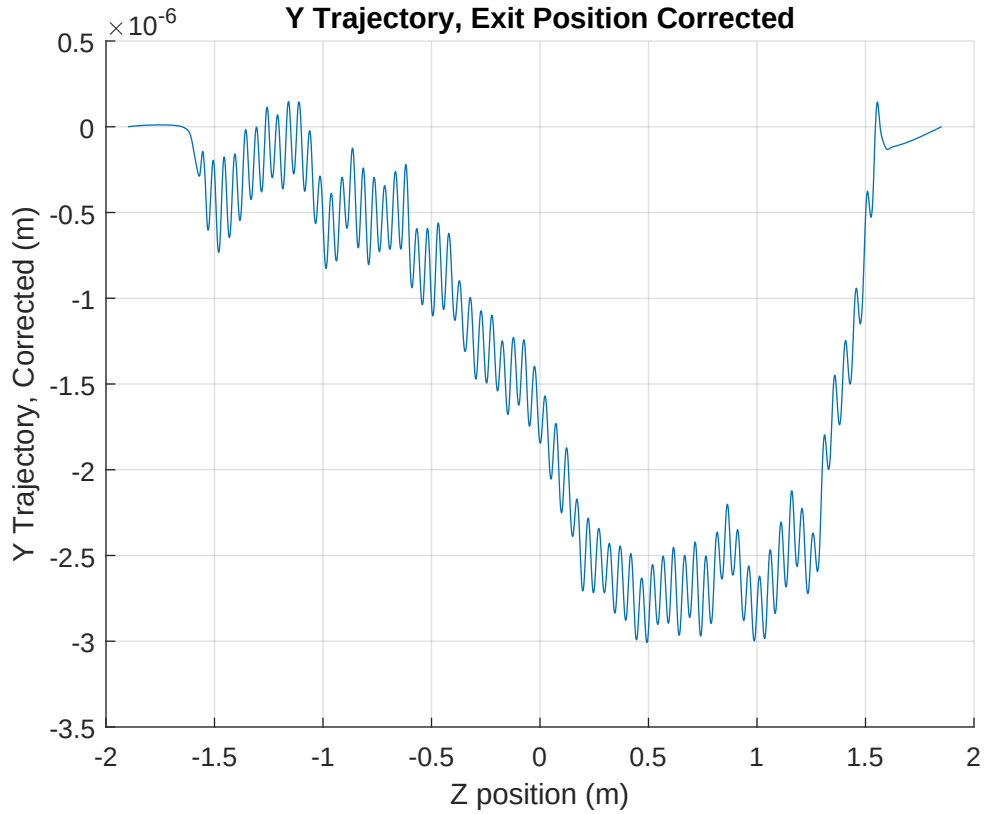

By Peak And Zero Positions Minus Fit Positions
×10^-4
0.5
0
-0.5
-1
-1.5
-2
-2.5
Peak And Zero Position - Fit (m)
0
20
40
60
80
100
120
140
Peak And Zero Number
Peaks
Zeros
Peak Field Residuals: Ave = -0.000077 m, RMS = 0.000055 m
Zero Field Residuals: Ave = -0.000078 m, RMS = 0.000051 m

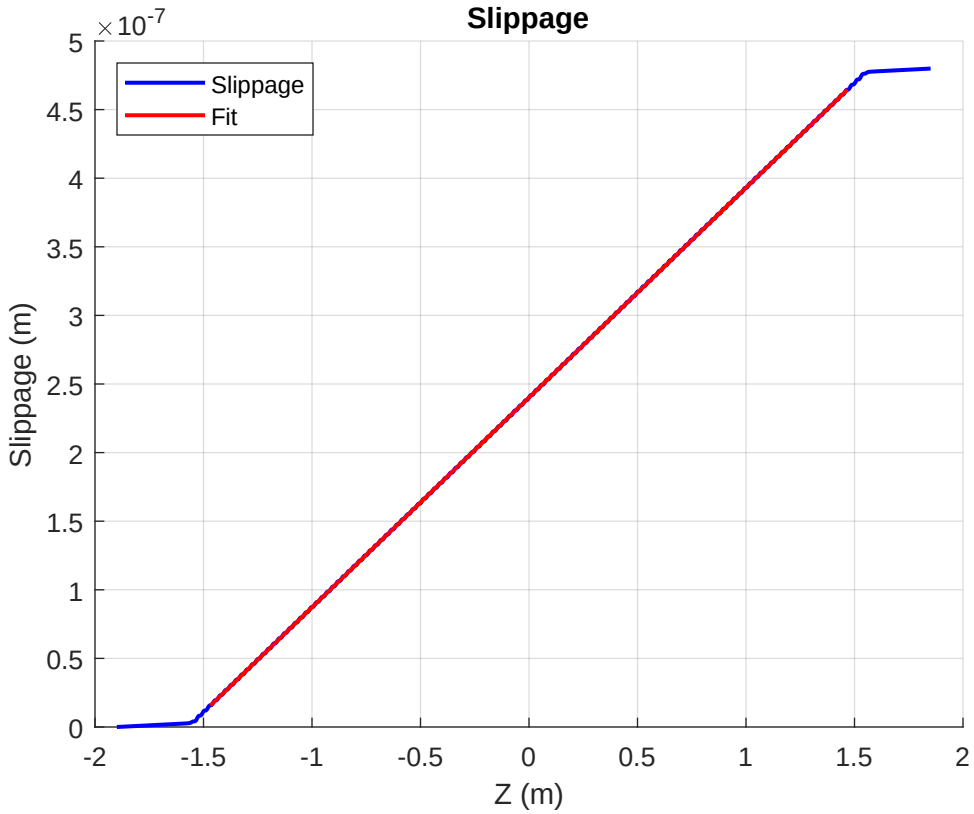

∫ ∫ Bx dz dz and ∫ ∫ By dz dz
×10^-4
1.5
1
0.5
0
-0.5
-1
∫ ∫ B dz dz (Tm**2)
Tm#
3
12
22
32
42
52
62
72
82
92
102
112
122
128
-2
-1.5
-1
-0.5
0
0.5
1
1.5
2
Z (m)

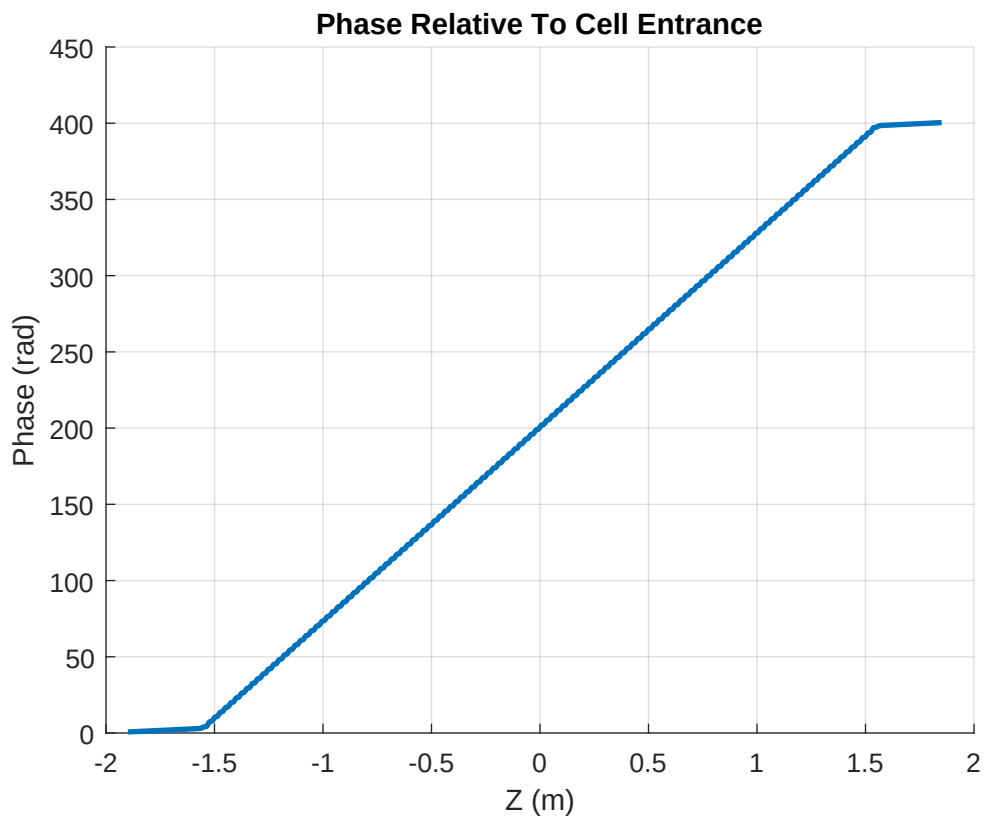

X Trajectory
×10^-6
10
8
6
4
2
0
-2
-4
-6
-8
X (m)
1 10 20 30 40 50 60 70 80 90 100 110 120 128
-2
-1.5
-1
-0.5
0
0.5
1
1.5
2
Z position (m)

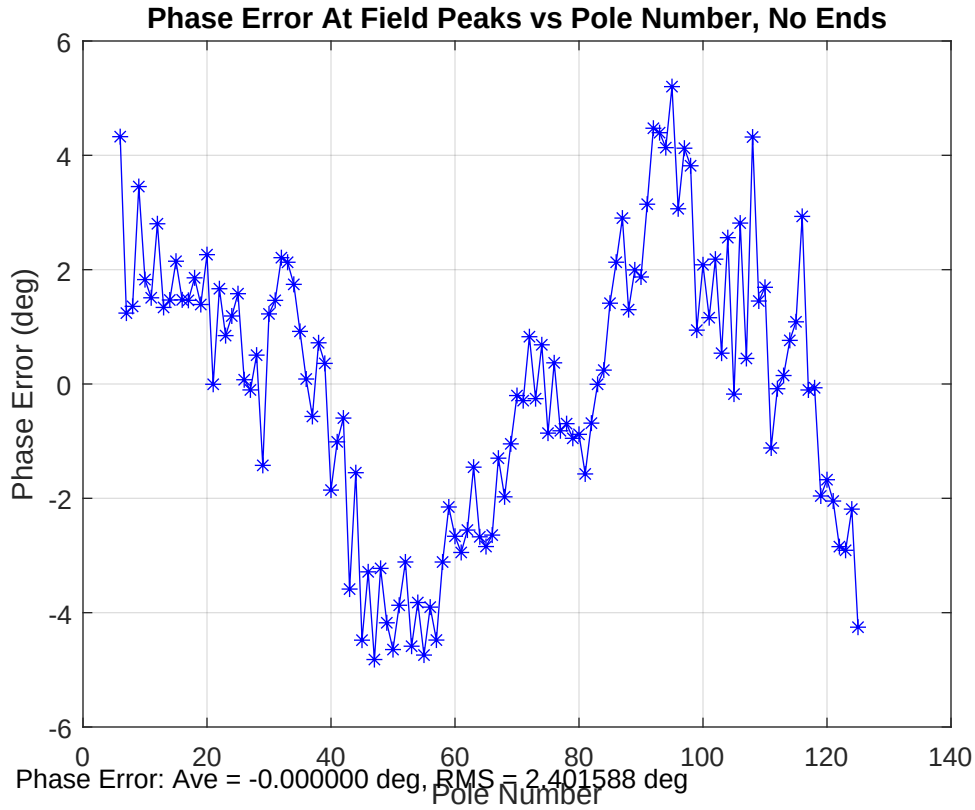

Y Trajectory
×10^-6
0.5
0
-0.5
-1
-1.5
-2
-2.5
-3
-3.5
Y (m)
1 10 20 30 40 50 60 70 80 90 100 110 120 128
-2
-1.5
-1
-0.5
0
0.5
1
1.5
2
Z position (m)


X Trajectory, Exit Position Corrected
×10^-5
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
X Trajectory, Corrected (m)
-2
-1.5
-1
-0.5
0
0.5
1
1.5
2
Z position (m)

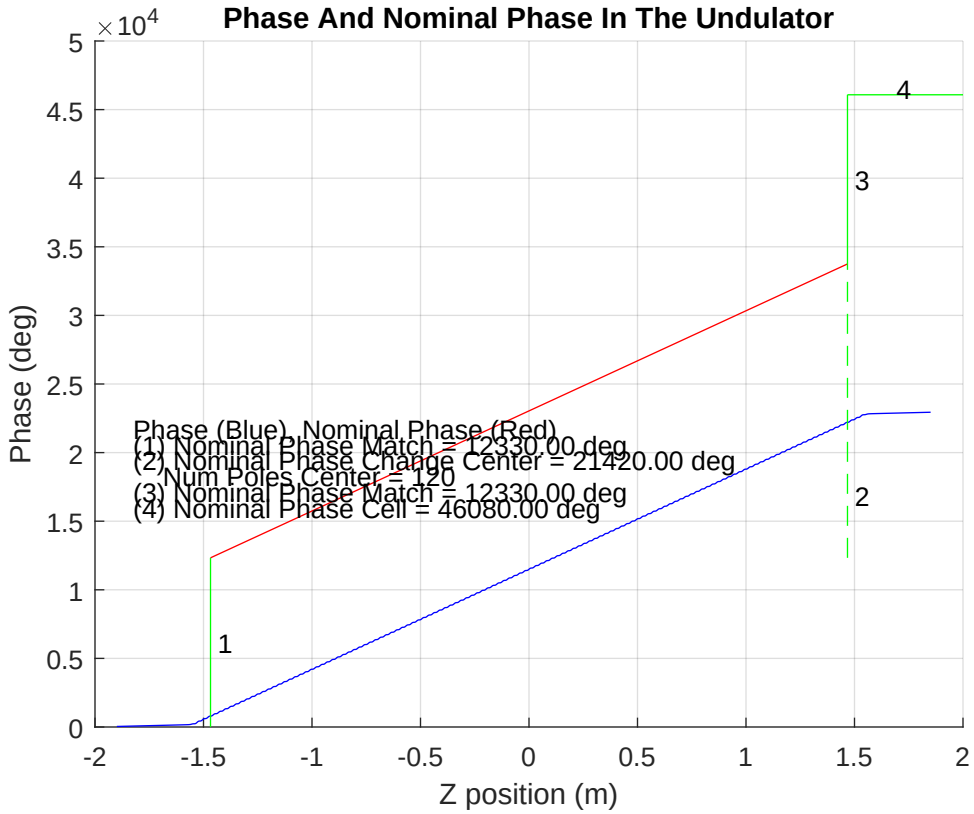

Y Trajectory, Exit Position Corrected
×10^-6
0.5
0
-0.5
-1
-1.5
-2
-2.5
-3
-3.5
Y Trajectory, Corrected (m)
-2
-1.5
-1
-0.5
0
0.5
1
1.5
2
Z position (m)

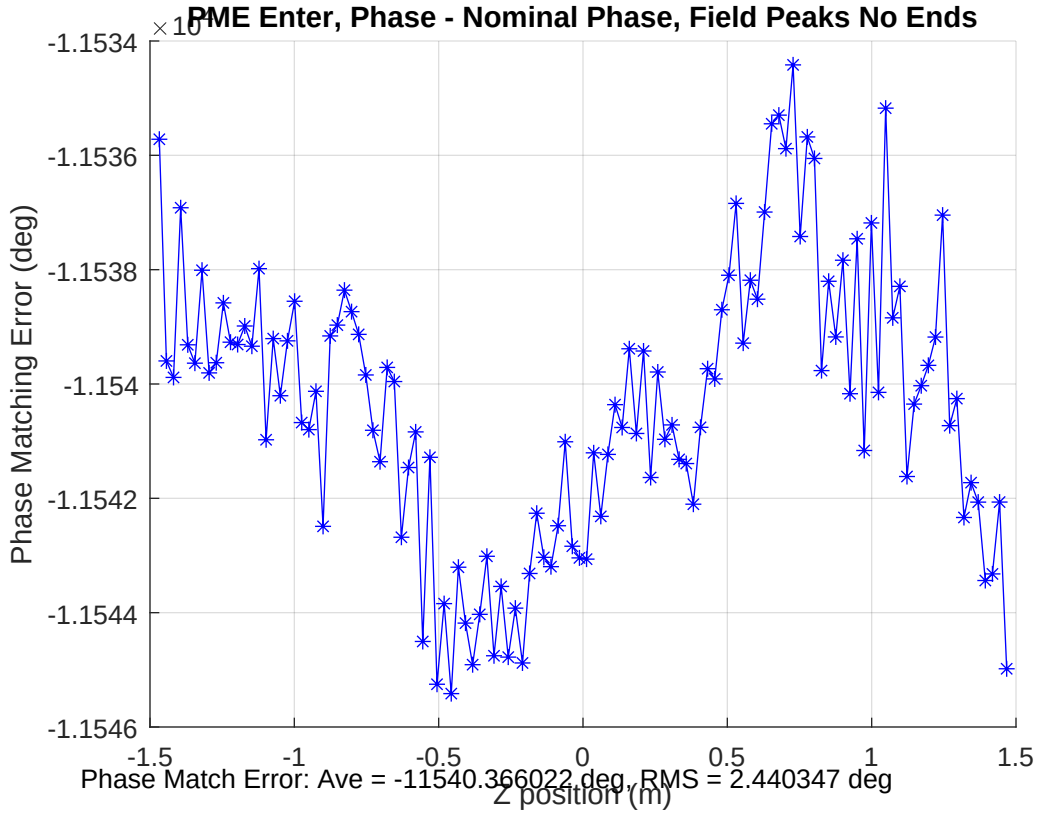

Slippage
×10^-7
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
Slippage (m)
-2
-1.5
-1
-0.5
0
0.5
1
1.5
2
Z (m)
Slippage
Fit

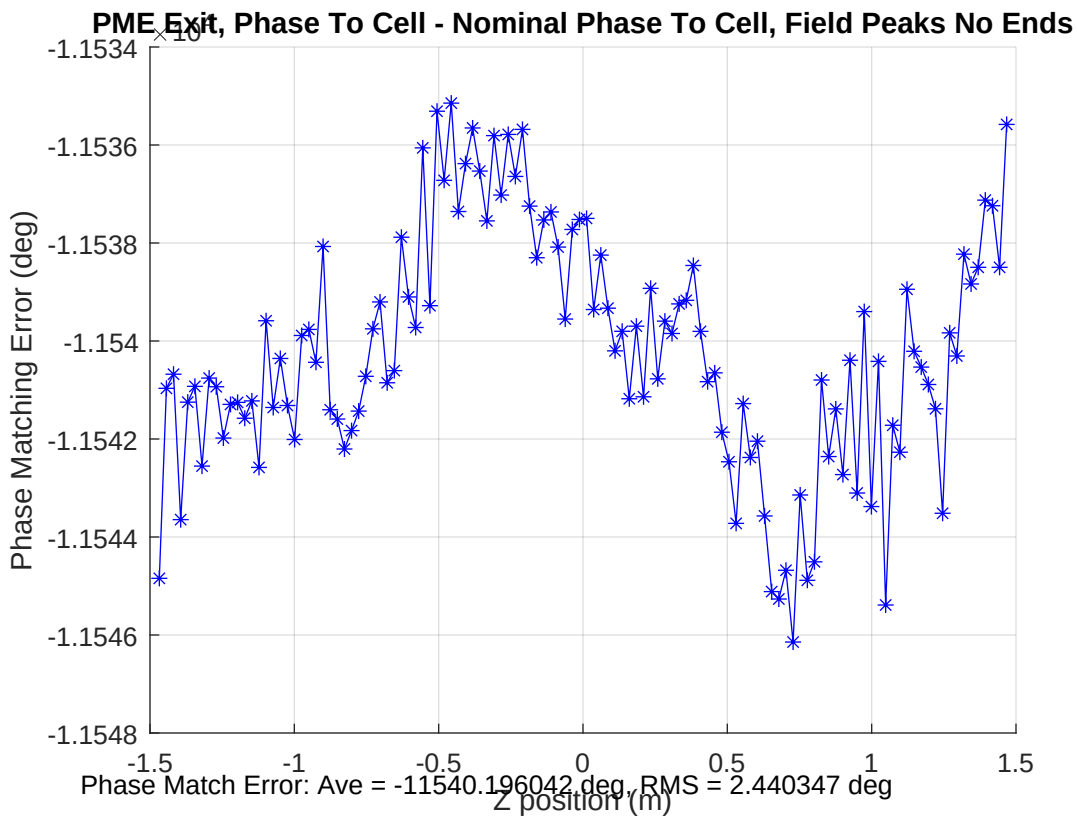

Phase Relative To Cell Entrance
Phase (rad)
450
400
350
300
250
200
150
100
50
0
-2
-1.5
-1
-0.5
0
0.5
1
1.5
2
Z (m)

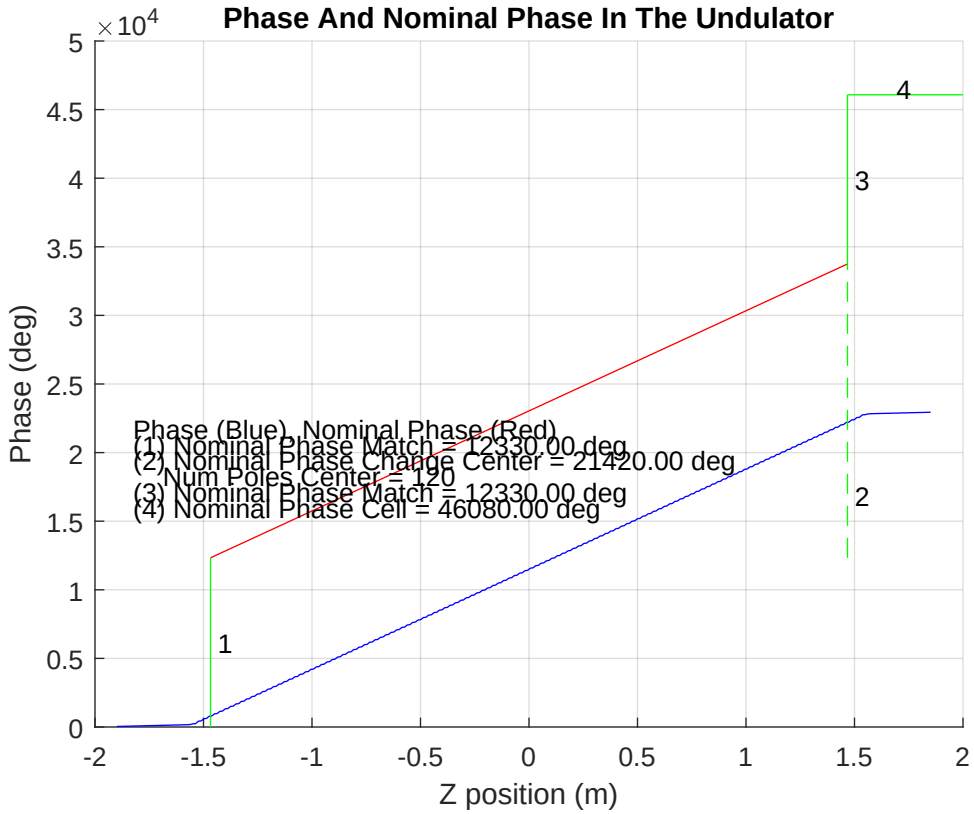


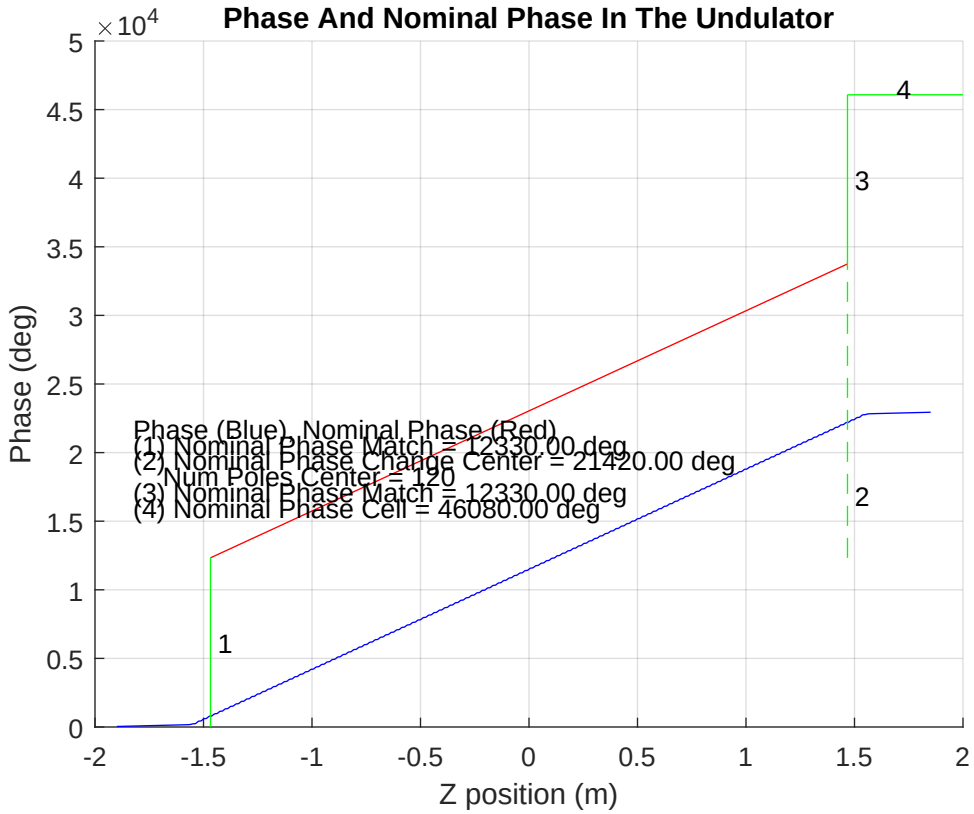
Phase Error: Ave = -0.000000 deg, RMS = 2.401588 deg


Phase And Nominal Phase In The Undulator
×10^4
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
Phase (deg)
-2
-1.5
-1
-0.5
0
0.5
1
1.5
2
Z position (m)
Phase (Blue), Nominal Phase (Red)
(1) Nominal Phase Match = 12330.00 deg
(2) Nominal Phase Change Center = 21420.00 deg
Num Poles Center = 190
(3) Nominal Phase Match = 12330.00 deg
(4) Nominal Phase Cell = 46080.00 deg
1
2
3
4


PME Enter, Phase - Nominal Phase, Field Peaks No Ends
×10
-1.1534
-1.1536
-1.1538
-1.154
-1.1542
-1.1544
-1.1546
Phase Matching Error (deg)
-1.5
-1
-0.5
0
0.5
1
1.5
Z position (m)
Phase Match Error: Ave = -11540.366022 deg, RMS = 2.440347 deg


PME Exit, Phase To Cell - Nominal Phase To Cell, Field Peaks No Ends
×10
-1.1534
-1.1536
-1.1538
-1.154
-1.1542
-1.1544
-1.1546
-1.1548
Phase Matching Error (deg)
-1.5
-1
-0.5
0
0.5
1
1.5
Z position (m)
Phase Match Error: Ave = -11540.196042 deg, RMS = 2.440347 deg


Phase And Nominal Phase In The Undulator
×10^4
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
Phase (deg)
-2
-1.5
-1
-0.5
0
0.5
1
1.5
2
Z position (m)
Phase (Blue), Nominal Phase (Red)
(1) Nominal Phase Match = 12330.00 deg
(2) Nominal Phase Change Center = 21420.00 deg
Num Poles Center = 190
(3) Nominal Phase Match = 12330.00 deg
(4) Nominal Phase Cell = 46080.00 deg
1
2
3
4


Phase And Nominal Phase In The Undulator
×10^4
Phase (deg)
Z position (m)
Phase (Blue), Nominal Phase (Red)
(1) Nominal Phase Match = 12330.00 deg
(2) Nominal Phase Change Center = 21420.00 deg
Num Poles Center = 120
(3) Nominal Phase Match = 12330.00 deg
(4) Nominal Phase Cell = 46080.00 deg
1
2
3
4