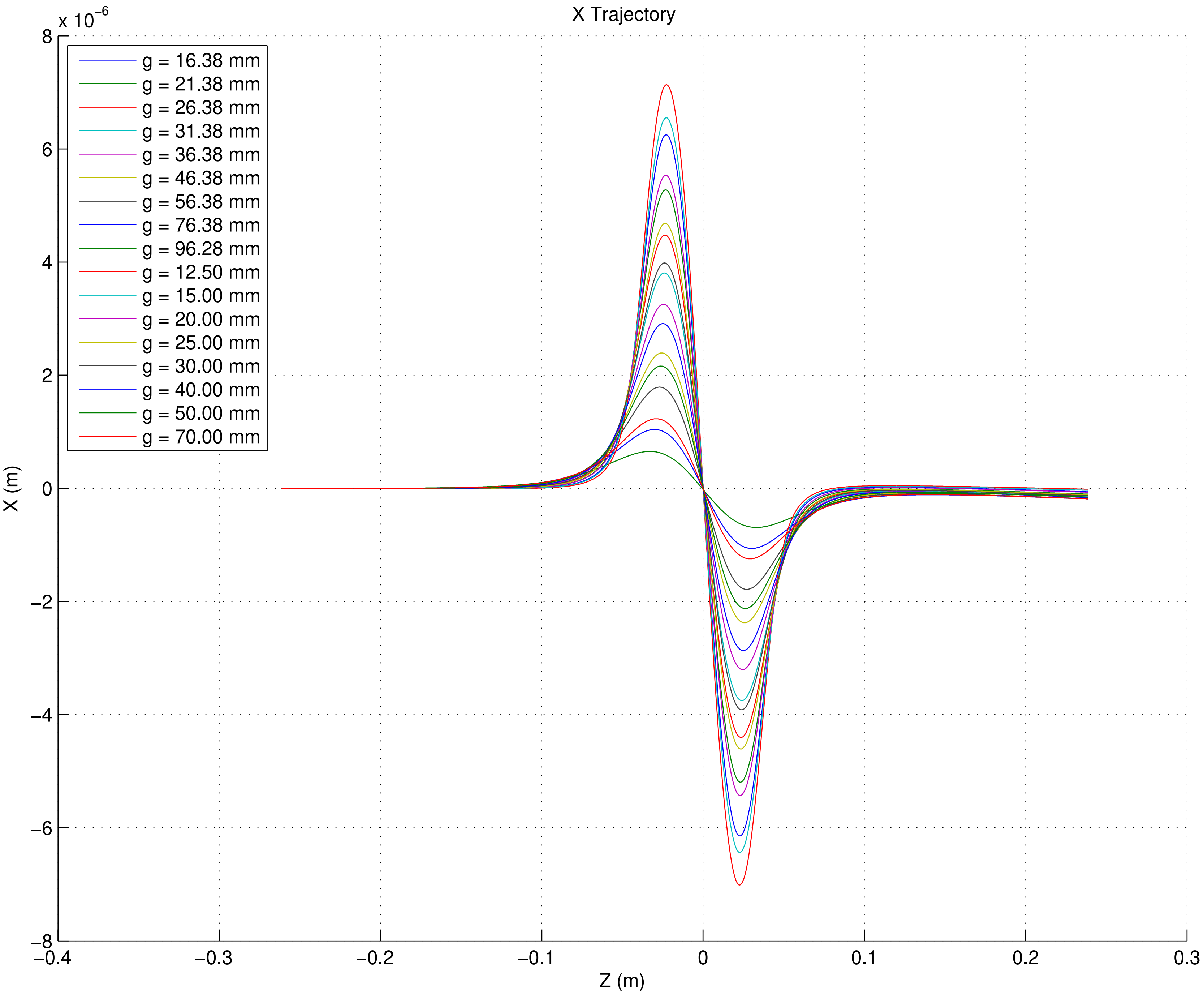
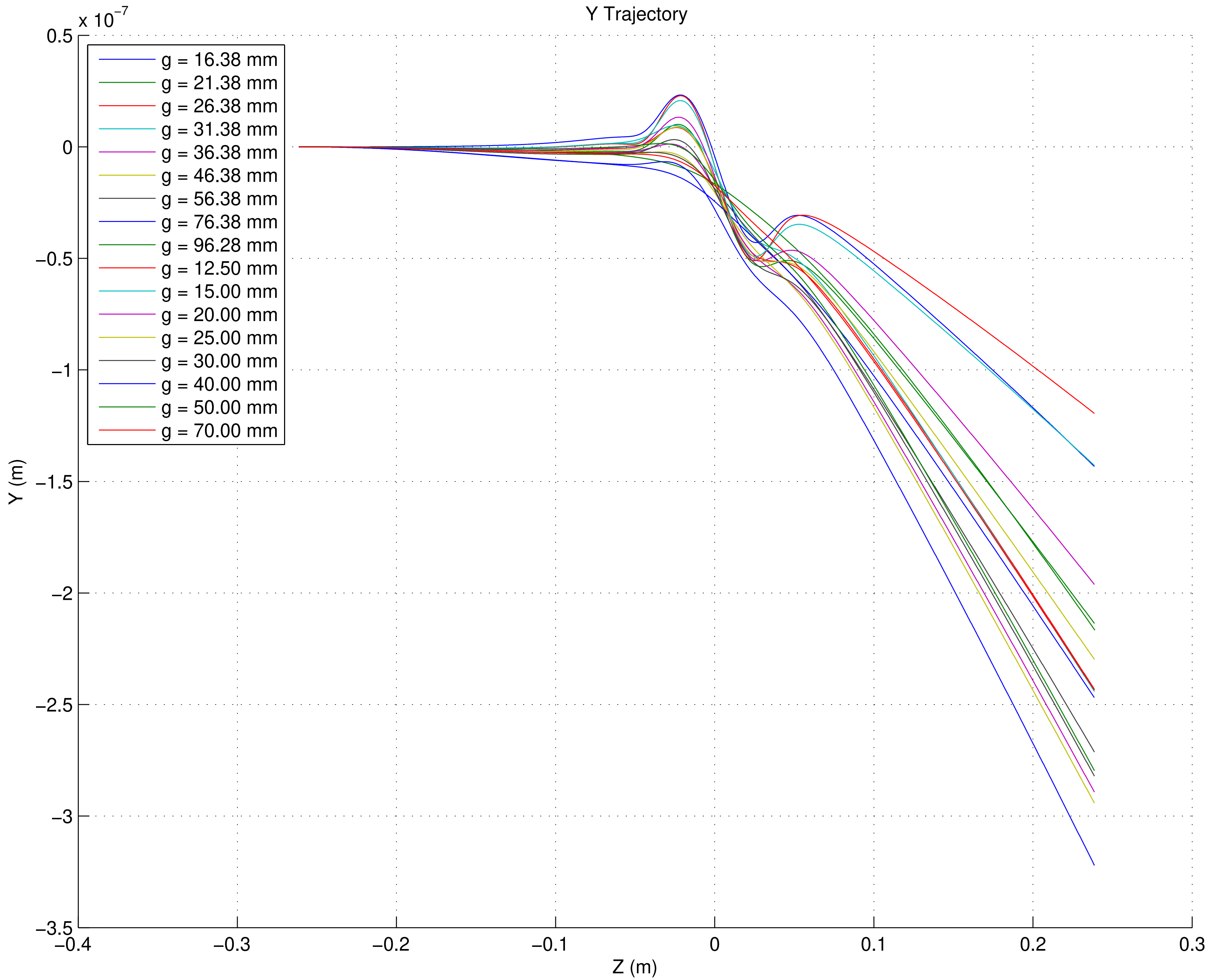
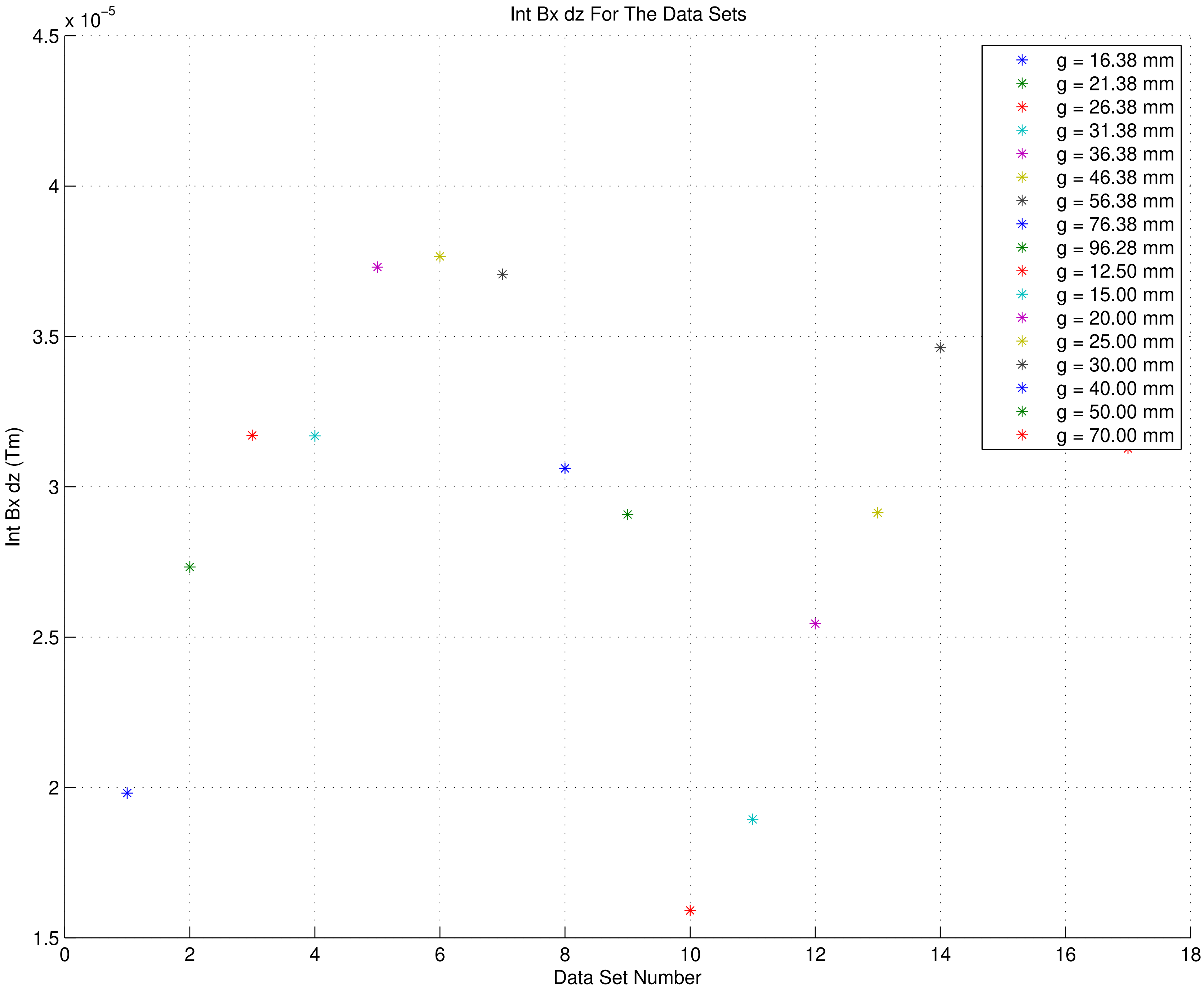
SLAC Magnetic Measurements
Phase Shifter Analysis Comparison

Title:
Delta Phase Shifter At Different Gaps

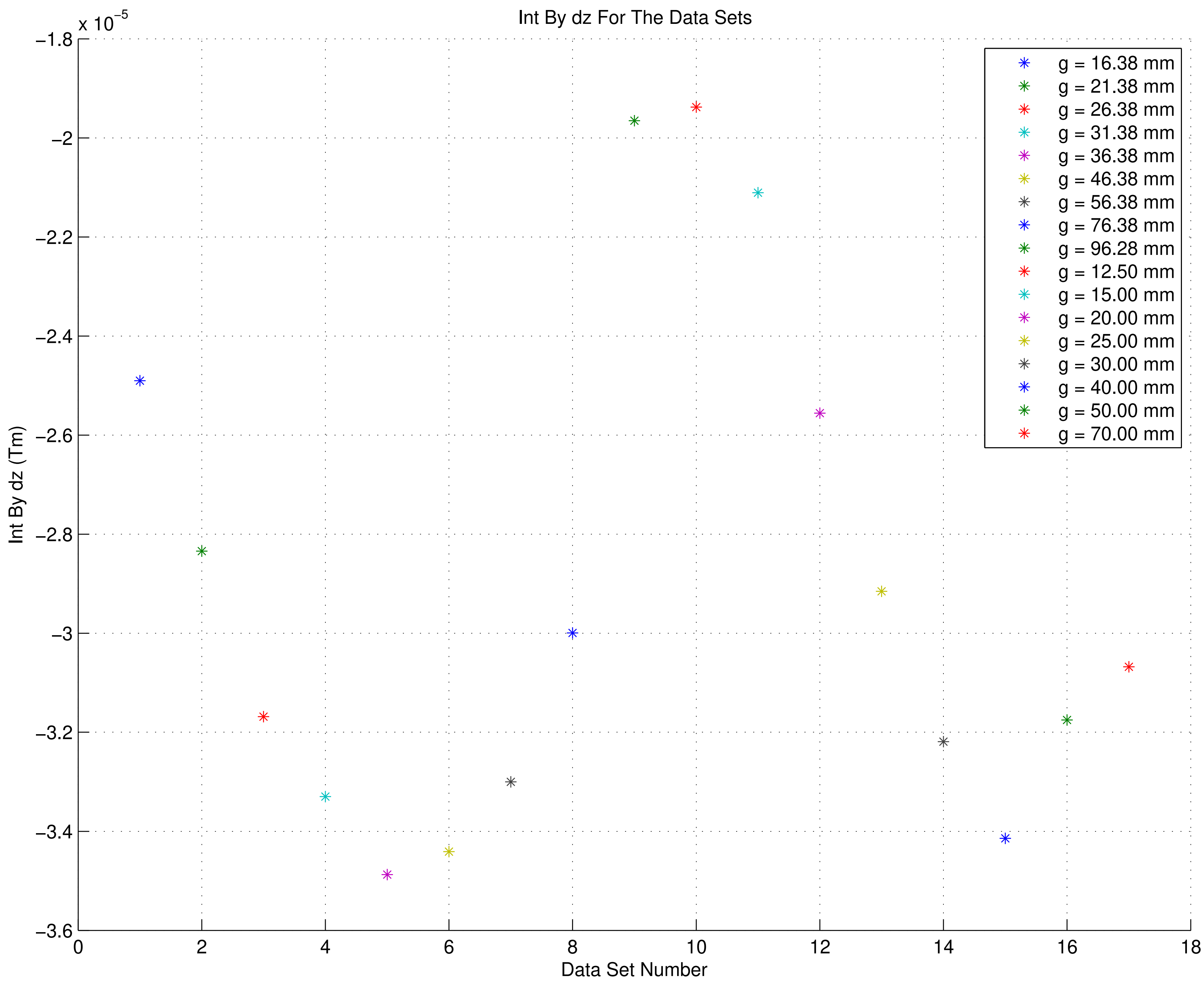
Input Files:
1) V:\MET\MagServe\MagData\DELTA Phase Shifter\DATASET0001\Fine Tuning\Z Scans\Run 003\phase_anal.mat
2) V:\MET\MagServe\MagData\DELTA Phase Shifter\DATASET0001\Fine Tuning\Z Scans\Run 004\phase_anal.mat
3) V:\MET\MagServe\MagData\DELTA Phase Shifter\DATASET0001\Fine Tuning\Z Scans\Run 005\phase_anal.mat
4) V:\MET\MagServe\MagData\DELTA Phase Shifter\DATASET0001\Fine Tuning\Z Scans\Run 006\phase_anal.mat
5) V:\MET\MagServe\MagData\DELTA Phase Shifter\DATASET0001\Fine Tuning\Z Scans\Run 007\phase_anal.mat
6) V:\MET\MagServe\MagData\DELTA Phase Shifter\DATASET0001\Fine Tuning\Z Scans\Run 008\phase_anal.mat
7) V:\MET\MagServe\MagData\DELTA Phase Shifter\DATASET0001\Fine Tuning\Z Scans\Run 009\phase_anal.mat
8) V:\MET\MagServe\MagData\DELTA Phase Shifter\DATASET0001\Fine Tuning\Z Scans\Run 010\phase_anal.mat
9) V:\MET\MagServe\MagData\DELTA Phase Shifter\DATASET0001\Fine Tuning\Z Scans\Run 011\phase_anal.mat
10) V:\MET\MagServe\MagData\DELTA Phase Shifter\DATASET0001\Fine Tuning\Z Scans\Run 012\phase_anal.mat
11) V:\MET\MagServe\MagData\DELTA Phase Shifter\DATASET0001\Fine Tuning\Z Scans\Run 013\phase_anal.mat
12) V:\MET\MagServe\MagData\DELTA Phase Shifter\DATASET0001\Fine Tuning\Z Scans\Run 014\phase_anal.mat
13) V:\MET\MagServe\MagData\DELTA Phase Shifter\DATASET0001\Fine Tuning\Z Scans\Run 015\phase_anal.mat
14) V:\MET\MagServe\MagData\DELTA Phase Shifter\DATASET0001\Fine Tuning\Z Scans\Run 016\phase_anal.mat
15) V:\MET\MagServe\MagData\DELTA Phase Shifter\DATASET0001\Fine Tuning\Z Scans\Run 017\phase_anal.mat
16) V:\MET\MagServe\MagData\DELTA Phase Shifter\DATASET0001\Fine Tuning\Z Scans\Run 018\phase_anal.mat
17) V:\MET\MagServe\MagData\DELTA Phase Shifter\DATASET0001\Fine Tuning\Z Scans\Run 019\phase_anal.mat

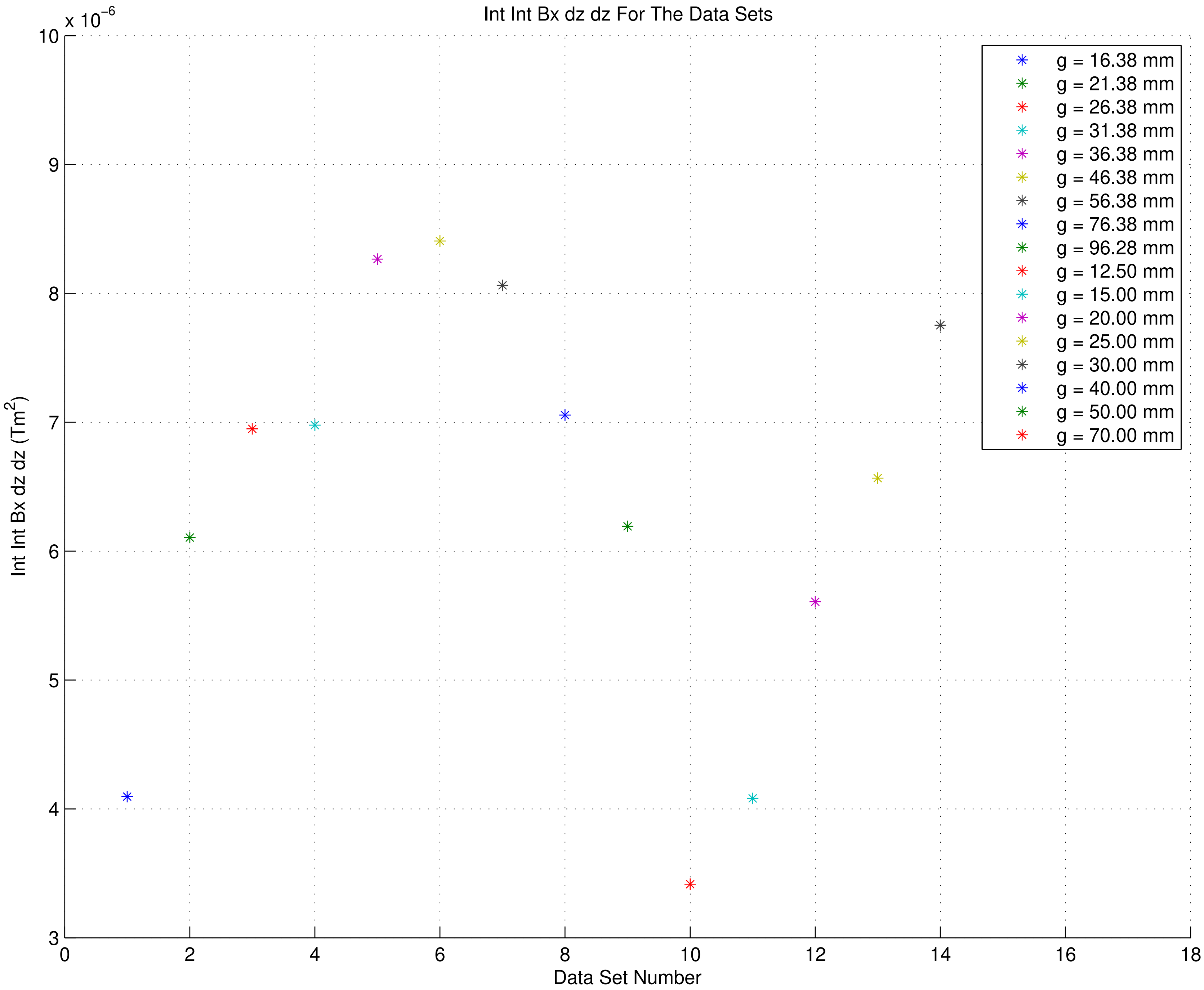

X Trajectory
x 10^-6
g = 16.38 mm
g = 21.38 mm
g = 26.38 mm
g = 31.38 mm
g = 36.38 mm
g = 46.38 mm
g = 56.38 mm
g = 76.38 mm
g = 96.28 mm
g = 12.50 mm
g = 15.00 mm
g = 20.00 mm
g = 25.00 mm
g = 30.00 mm
g = 40.00 mm
g = 50.00 mm
g = 70.00 mm
X (m)
Z (m)
8
6
4
2
0
−2
−4
−6
−8
−0.4
−0.3
−0.2
−0.1
0
0.1
0.2
0.3


Y Trajectory
x 10^-7
Y (m)
Z (m)
g = 16.38 mm
g = 21.38 mm
g = 26.38 mm
g = 31.38 mm
g = 36.38 mm
g = 46.38 mm
g = 56.38 mm
g = 76.38 mm
g = 96.28 mm
g = 12.50 mm
g = 15.00 mm
g = 20.00 mm
g = 25.00 mm
g = 30.00 mm
g = 40.00 mm
g = 50.00 mm
g = 70.00 mm
0.5
0
−0.5
−1
−1.5
−2
−2.5
−3
−3.5
−0.4
−0.3
−0.2
−0.1
0.1
0.2
0.3

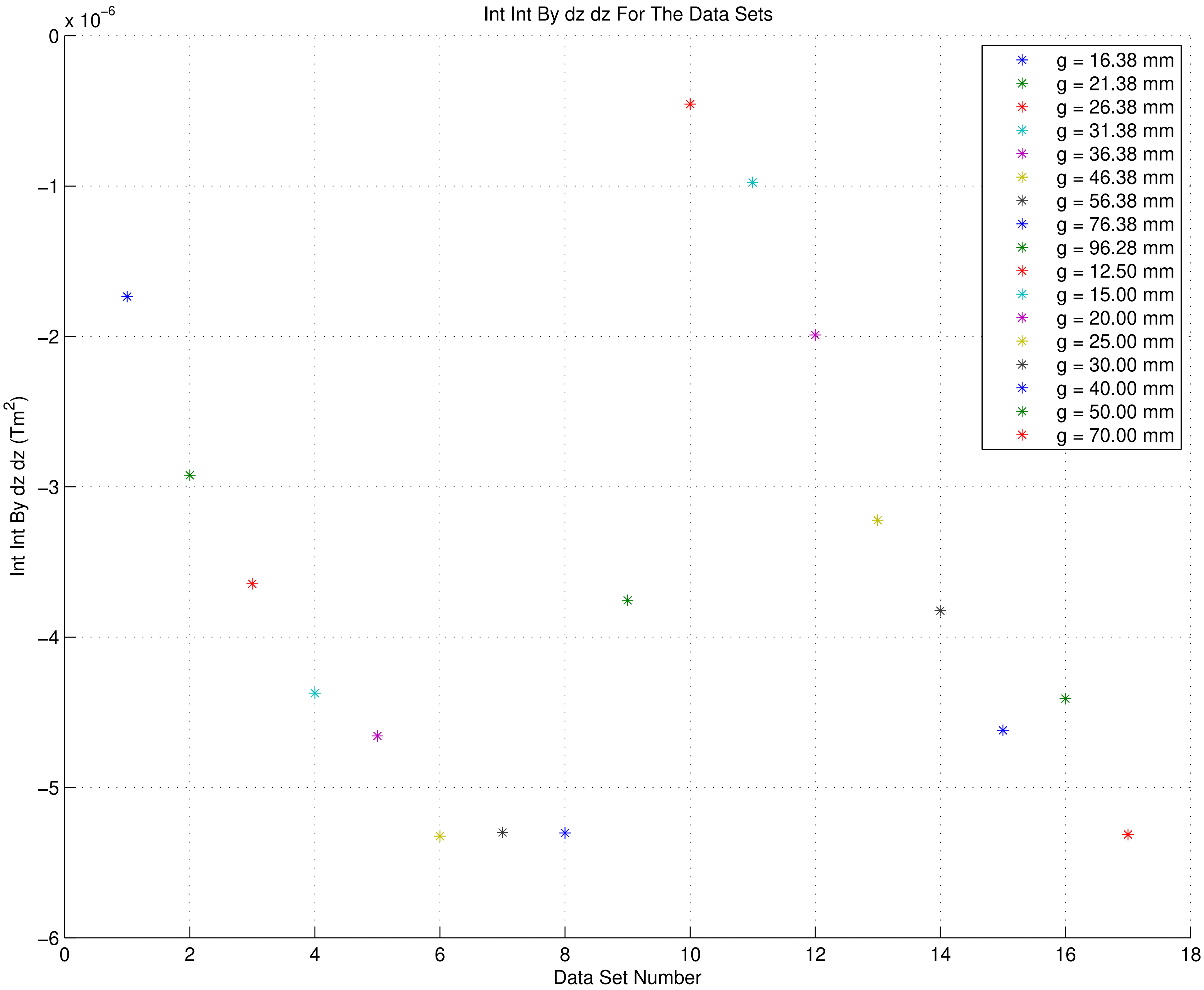


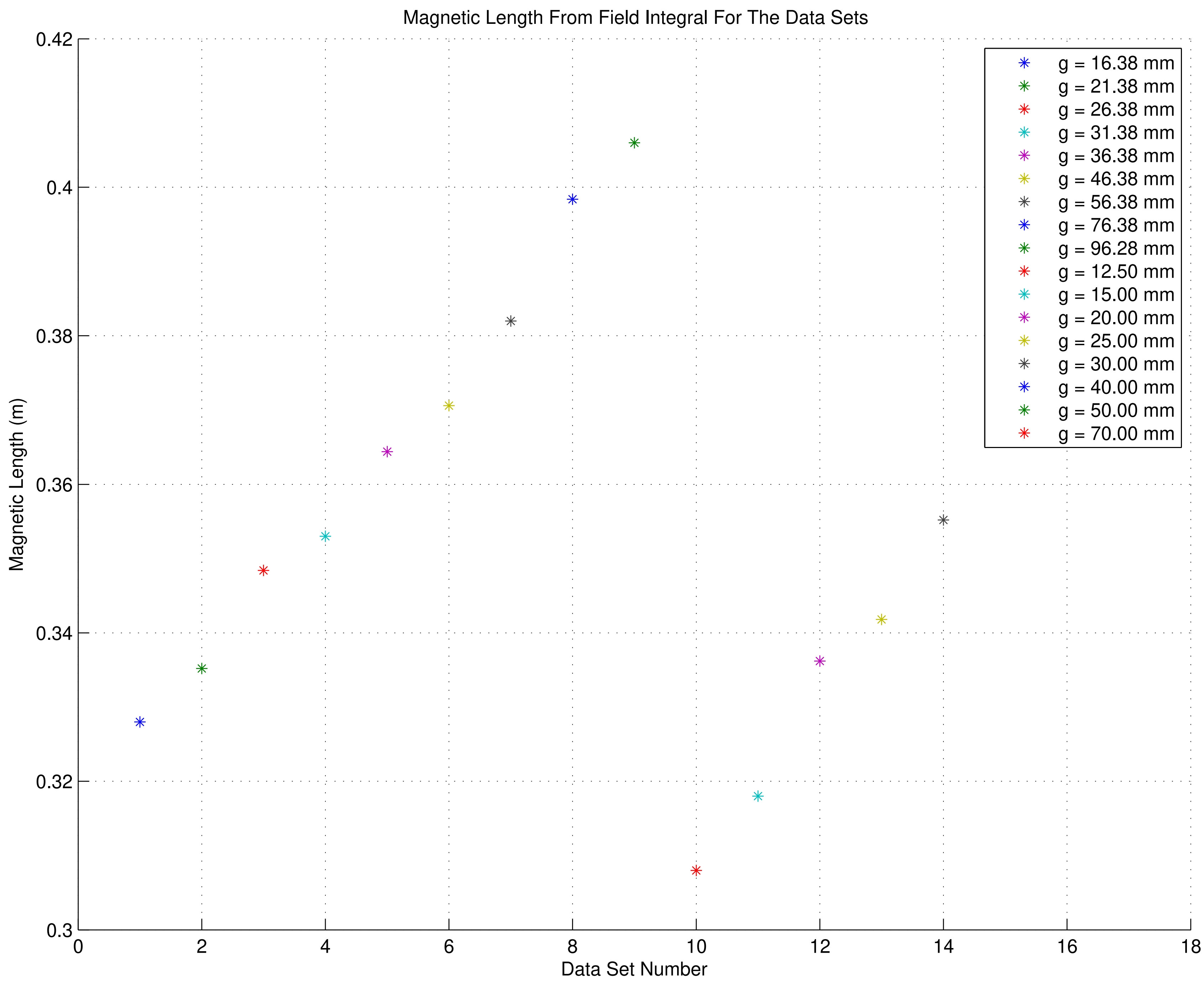
Int Bx dz For The Data Sets
x 10^-5
4.5
4
3.5
3
2.5
2
1.5
0
2
4
6
8
10
12
14
16
18
Int Bx dz (Tm)
Data Set Number
g = 16.38 mm
g = 21.38 mm
g = 26.38 mm
g = 31.38 mm
g = 36.38 mm
g = 46.38 mm
g = 56.38 mm
g = 76.38 mm
g = 96.28 mm
g = 12.50 mm
g = 15.00 mm
g = 20.00 mm
g = 25.00 mm
g = 30.00 mm
g = 40.00 mm
g = 50.00 mm
g = 70.00 mm

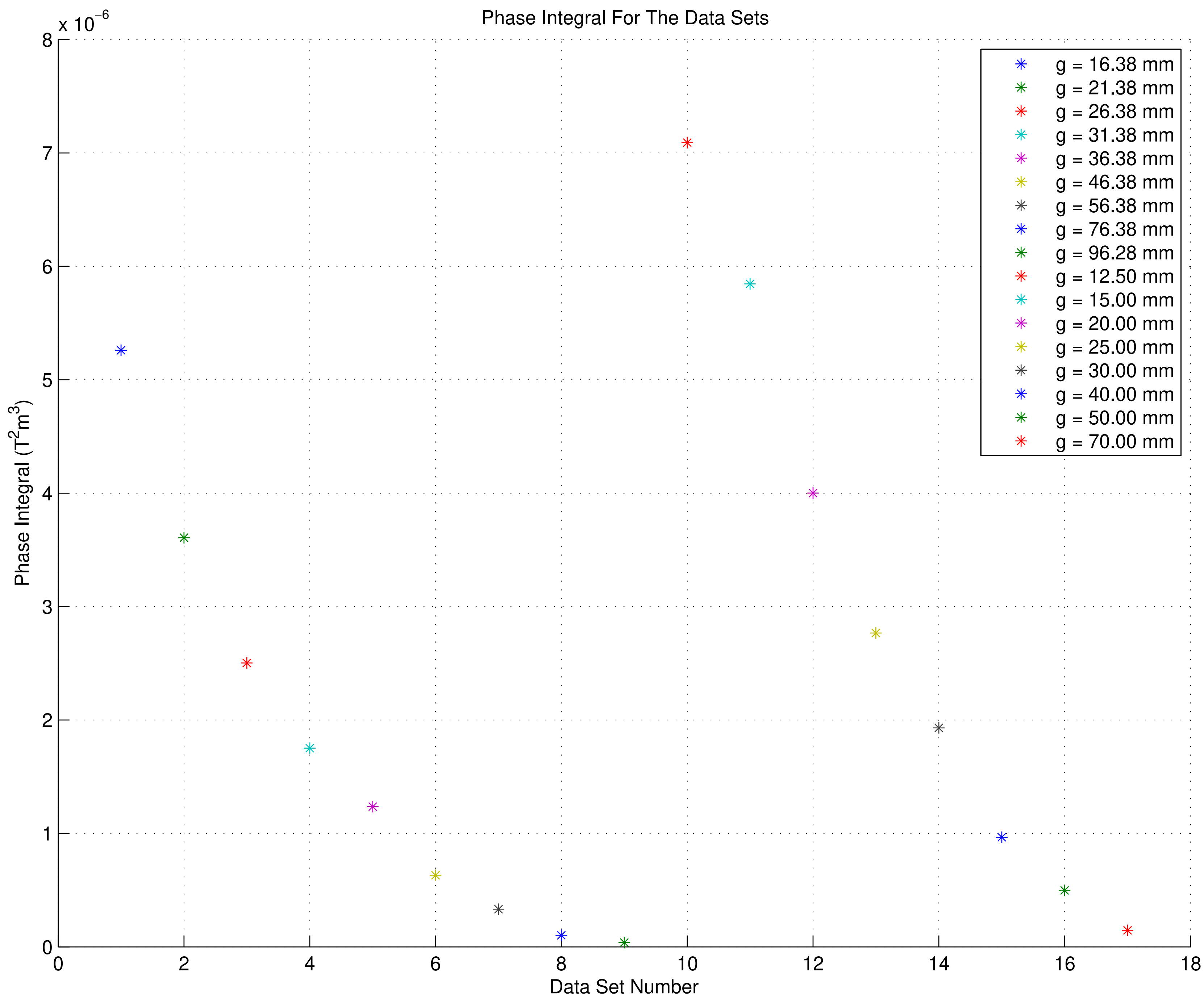

Int By dz For The Data Sets
x 10^-5
-1.8
-2
-2.2
-2.4
-2.6
-2.8
-3
-3.2
-3.4
-3.6
Int By dz (Tm)
0
2
4
6
8
10
12
14
16
18
Data Set Number
g = 16.38 mm
g = 21.38 mm
g = 26.38 mm
g = 31.38 mm
g = 36.38 mm
g = 46.38 mm
g = 56.38 mm
g = 76.38 mm
g = 96.28 mm
g = 12.50 mm
g = 15.00 mm
g = 20.00 mm
g = 25.00 mm
g = 30.00 mm
g = 40.00 mm
g = 50.00 mm
g = 70.00 mm



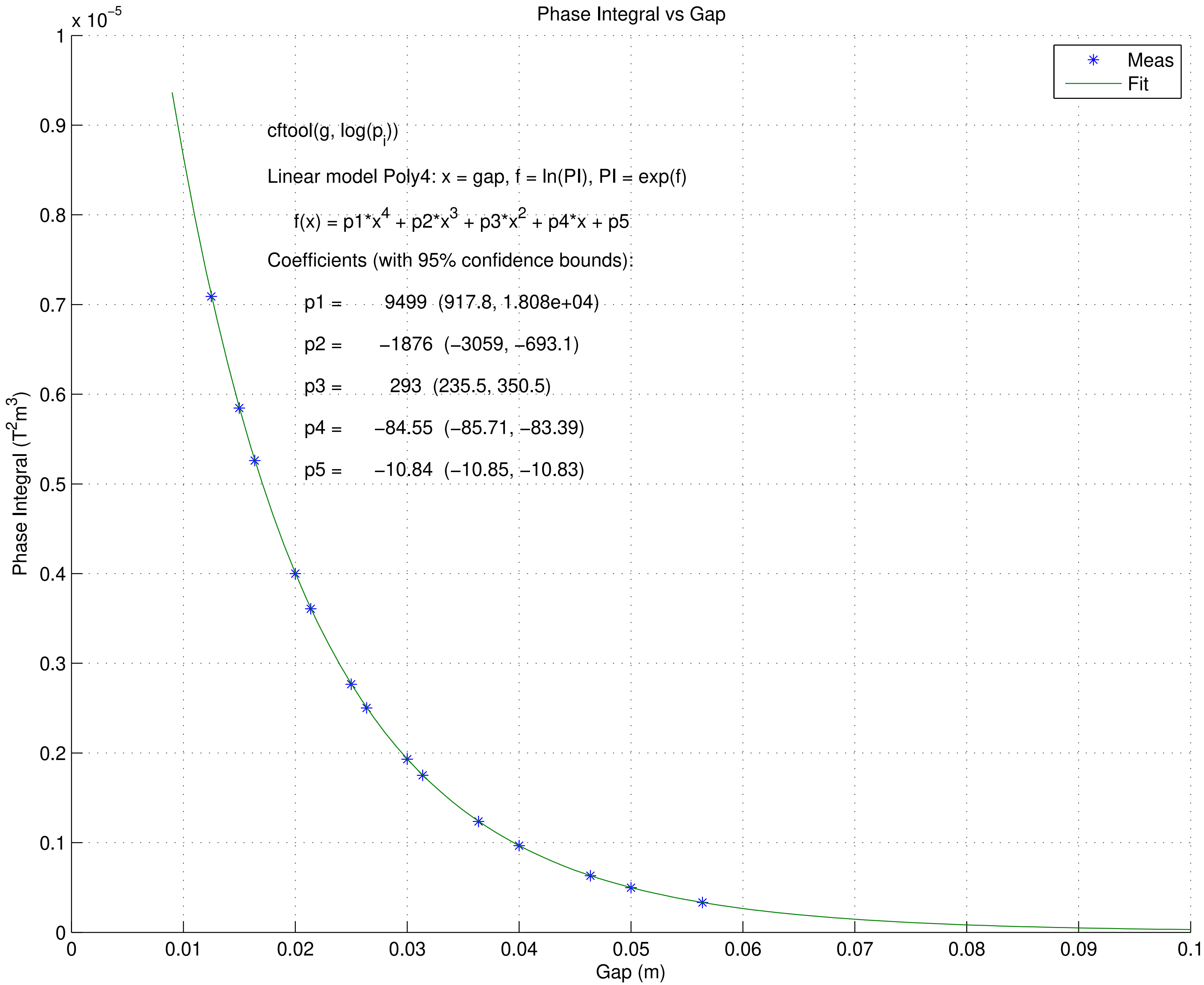
Int Int Bx dz dz For The Data Sets
x 10^-6
Int Int Bx dz dz (Tm^2)
Data Set Number
10
9
8
7
6
5
4
3
0
2
4
6
8
10
12
14
16
18
g = 16.38 mm
g = 21.38 mm
g = 26.38 mm
g = 31.38 mm
g = 36.38 mm
g = 46.38 mm
g = 56.38 mm
g = 76.38 mm
g = 96.28 mm
g = 12.50 mm
g = 15.00 mm
g = 20.00 mm
g = 25.00 mm
g = 30.00 mm
g = 40.00 mm
g = 50.00 mm
g = 70.00 mm

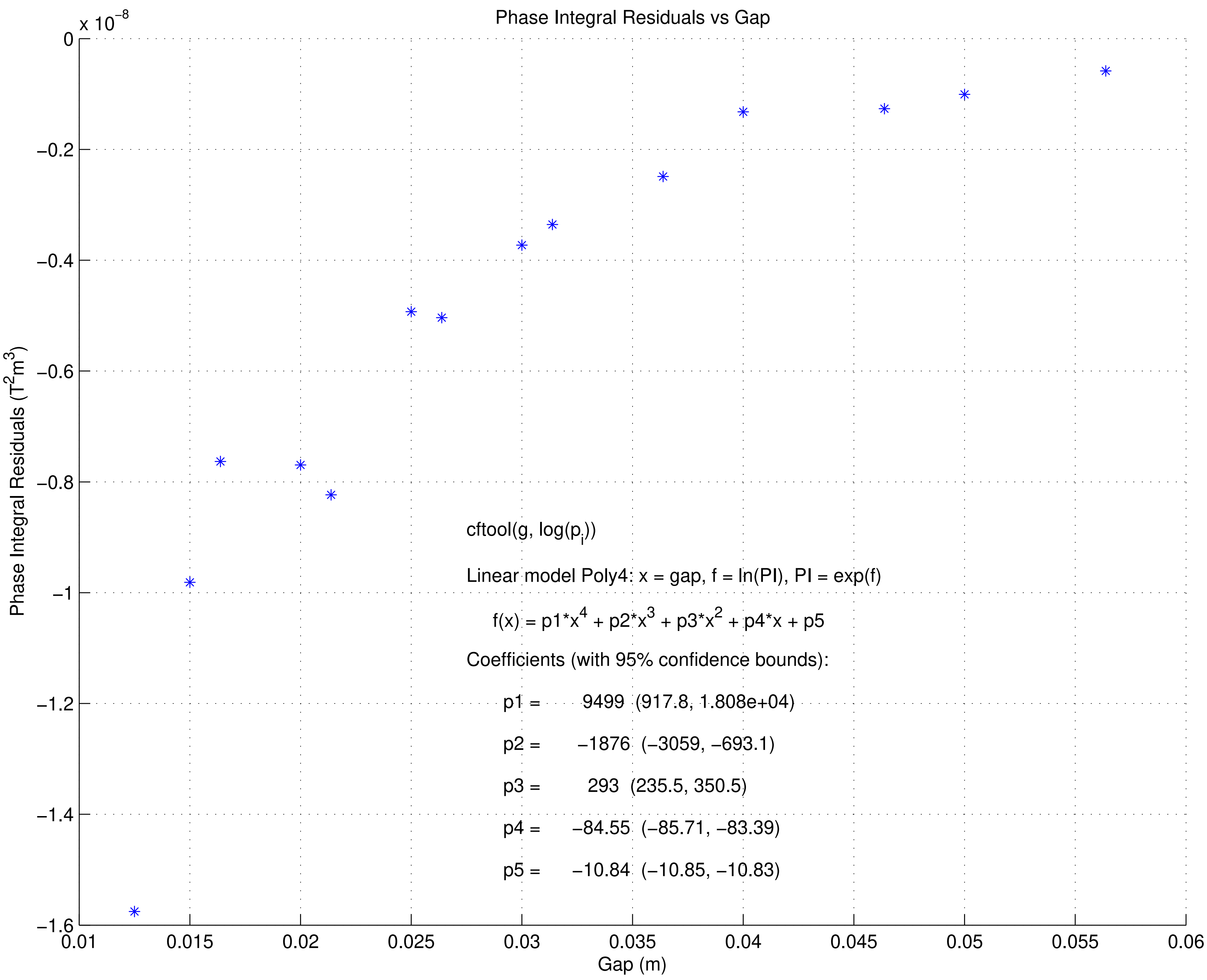

Int Int By dz dz For The Data Sets
x 10^{-6}
0
−1
−2
−3
−4
−5
−6
Int Int By dz dz (Tm^2)
0
2
4
6
8
10
12
14
16
18
Data Set Number
g = 16.38 mm
g = 21.38 mm
g = 26.38 mm
g = 31.38 mm
g = 36.38 mm
g = 46.38 mm
g = 56.38 mm
g = 76.38 mm
g = 96.28 mm
g = 12.50 mm
g = 15.00 mm
g = 20.00 mm
g = 25.00 mm
g = 30.00 mm
g = 40.00 mm
g = 50.00 mm
g = 70.00 mm

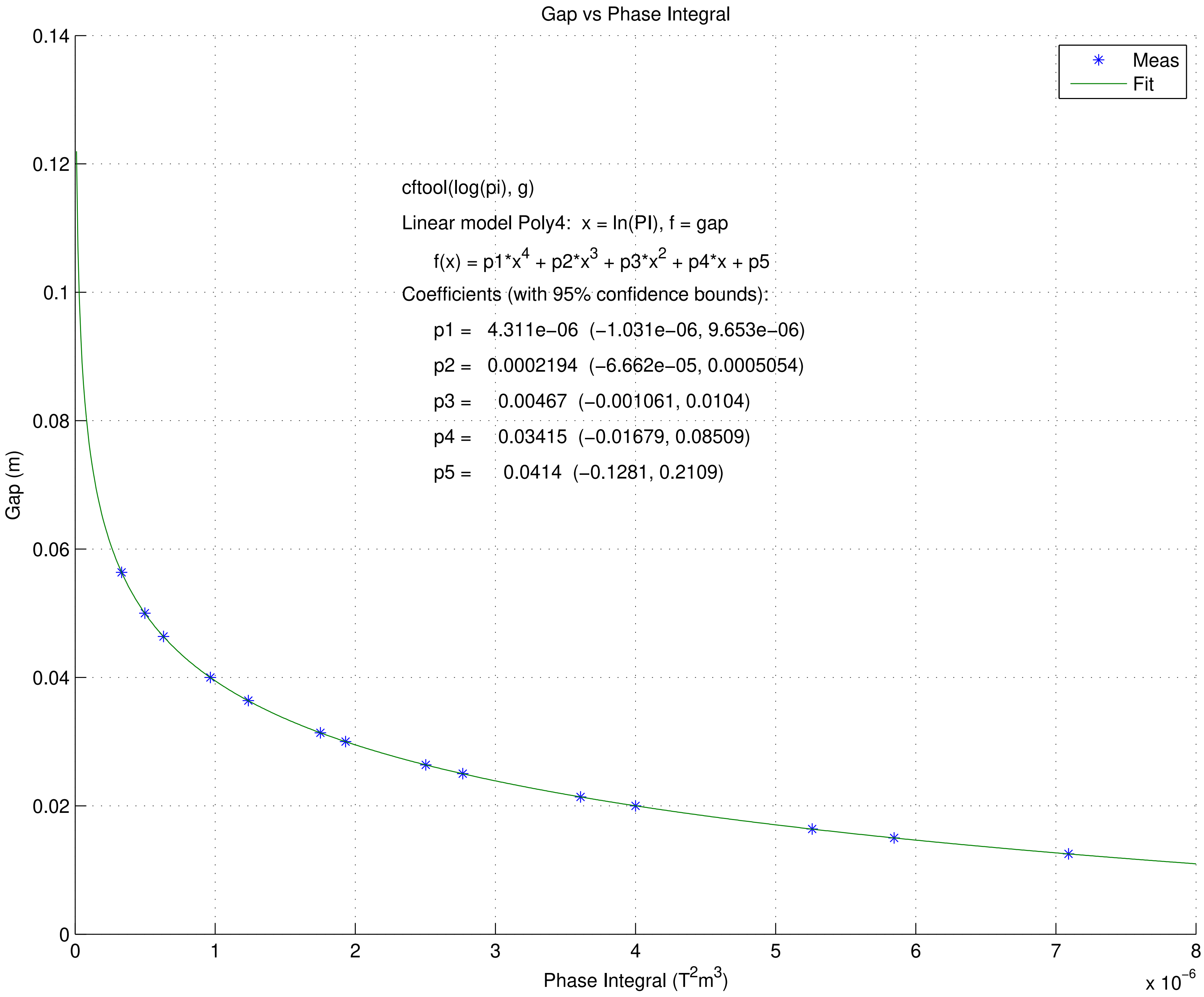

Magnetic Length From Field Integral For The Data Sets
Magnetic Length (m)
Data Set Number
0.42
0.4
0.38
0.36
0.34
0.32
0.3
0
2
4
6
8
10
12
14
16
18
g = 16.38 mm
g = 21.38 mm
g = 26.38 mm
g = 31.38 mm
g = 36.38 mm
g = 46.38 mm
g = 56.38 mm
g = 76.38 mm
g = 96.28 mm
g = 12.50 mm
g = 15.00 mm
g = 20.00 mm
g = 25.00 mm
g = 30.00 mm
g = 40.00 mm
g = 50.00 mm
g = 70.00 mm

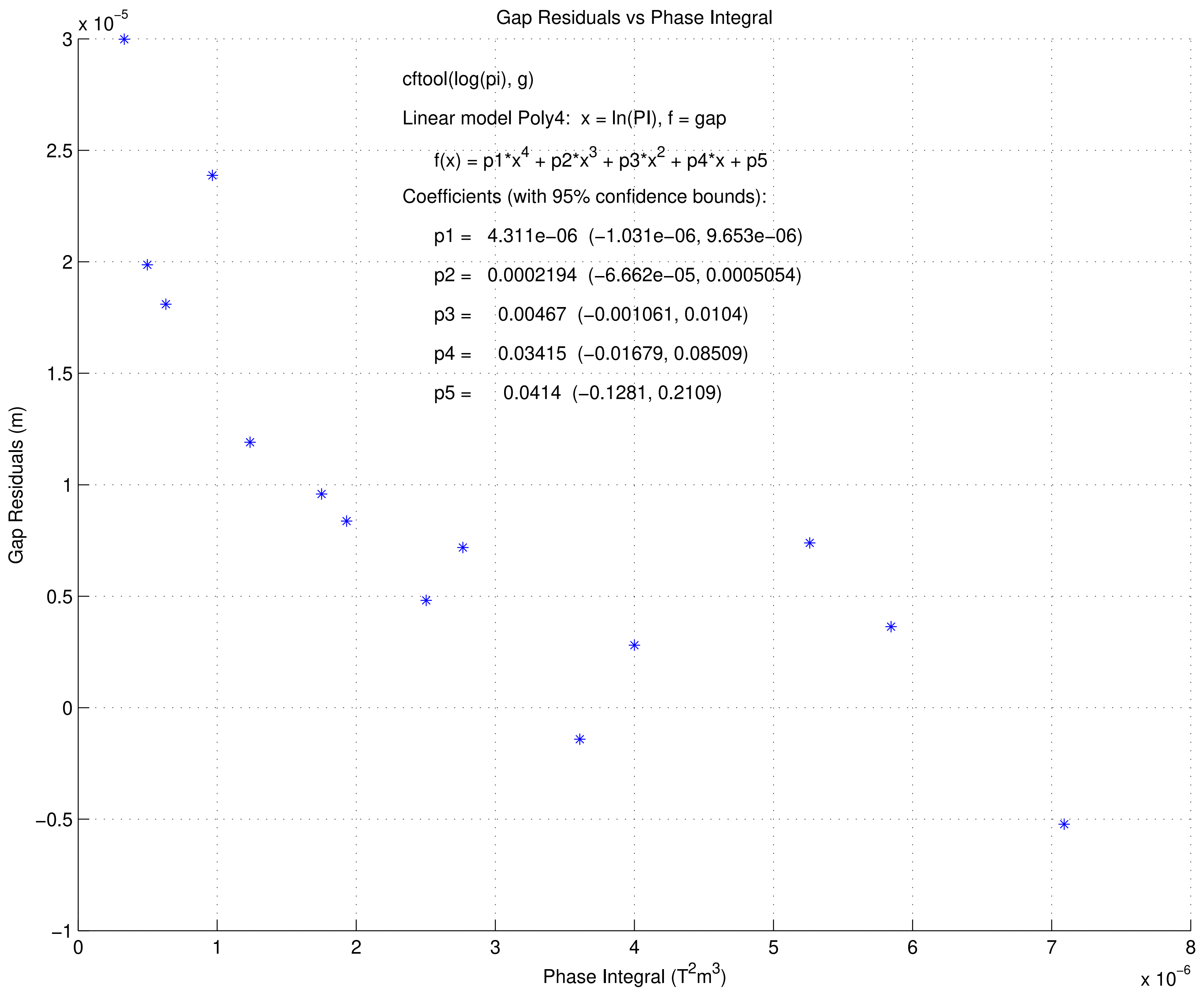


Phase Integral For The Data Sets
x 10^-6
Phase Integral (T^2m^3)
Data Set Number
0
1
2
3
4
5
6
7
8
0
2
4
6
8
10
12
14
16
18
g = 16.38 mm
g = 21.38 mm
g = 26.38 mm
g = 31.38 mm
g = 36.38 mm
g = 46.38 mm
g = 56.38 mm
g = 76.38 mm
g = 96.28 mm
g = 12.50 mm
g = 15.00 mm
g = 20.00 mm
g = 25.00 mm
g = 30.00 mm
g = 40.00 mm
g = 50.00 mm
g = 70.00 mm


Phase Integral vs Gap
x 10^-5
Meas
Fit
cftool(g, log(p_i))
Linear model Poly4: x = gap, f = ln(PI), PI = exp(f)
f(x) = p1*x^4 + p2*x^3 + p3*x^2 + p4*x + p5
Coefficients (with 95% confidence bounds):
p1 = 9499 (917.8, 1.808e+04)
p2 = −1876 (−3059, −693.1)
p3 = 293 (235.5, 350.5)
p4 = −84.55 (−85.71, −83.39)
p5 = −10.84 (−10.85, −10.83)
Phase Integral (T^2m^3)
Gap (m)
0
0.01
0.02
0.03
0.04
0.05
0.06
0.07
0.08
0.09
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1


Phase Integral Residuals vs Gap
x 10^-8
0
−0.2
−0.4
−0.6
−0.8
−1
−1.2
−1.4
−1.6
Phase Integral Residuals (T^2m^3)
0.01
0.015
0.02
0.025
0.03
0.035
0.04
0.045
0.05
0.055
0.06
Gap (m)
cftool(g, log(p_i))
Linear model Poly4: x = gap, f = ln(PI), PI = exp(f)
f(x) = p1*x^4 + p2*x^3 + p3*x^2 + p4*x + p5
Coefficients (with 95% confidence bounds):
p1 = 9499 (917.8, 1.808e+04)
p2 = −1876 (−3059, −693.1)
p3 = 293 (235.5, 350.5)
p4 = −84.55 (−85.71, −83.39)
p5 = −10.84 (−10.85, −10.83)


Gap vs Phase Integral
Meas
Fit
cftool(log(pi), g)
Linear model Poly4: x = ln(PI), f = gap
f(x) = p1*x^4 + p2*x^3 + p3*x^2 + p4*x + p5
Coefficients (with 95% confidence bounds):
p1 = 4.311e−06 (−1.031e−06, 9.653e−06)
p2 = 0.0002194 (−6.662e−05, 0.0005054)
p3 = 0.00467 (−0.001061, 0.0104)
p4 = 0.03415 (−0.01679, 0.08509)
p5 = 0.0414 (−0.1281, 0.2109)
Gap (m)
Phase Integral (T^2m^3)
x 10^-6
0.14
0.12
0.1
0.08
0.06
0.04
0.02
0
0
1
2
3
4
5
6
7
8


Gap Residuals vs Phase Integral
x 10^−5
cftool(log(pi), g)
Linear model Poly4: x = ln(PI), f = gap
f(x) = p1*x^4 + p2*x^3 + p3*x^2 + p4*x + p5
Coefficients (with 95% confidence bounds):
p1 = 4.311e−06 (−1.031e−06, 9.653e−06)
p2 = 0.0002194 (−6.662e−05, 0.0005054)
p3 = 0.00467 (−0.001061, 0.0104)
p4 = 0.03415 (−0.01679, 0.08509)
p5 = 0.0414 (−0.1281, 0.2109)
Gap Residuals (m)
Phase Integral (T^2m^3)
x 10^−6
3
2.5
2
1.5
1
0.5
0
−0.5
−1
0
1
2
3
4
5
6
7
8