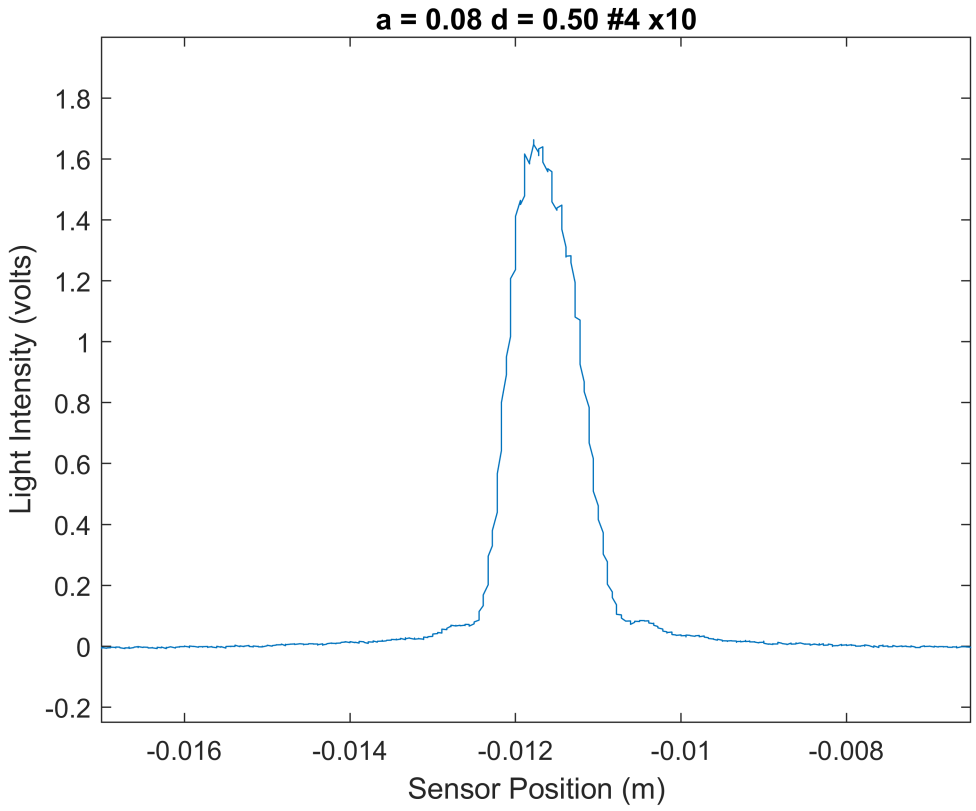
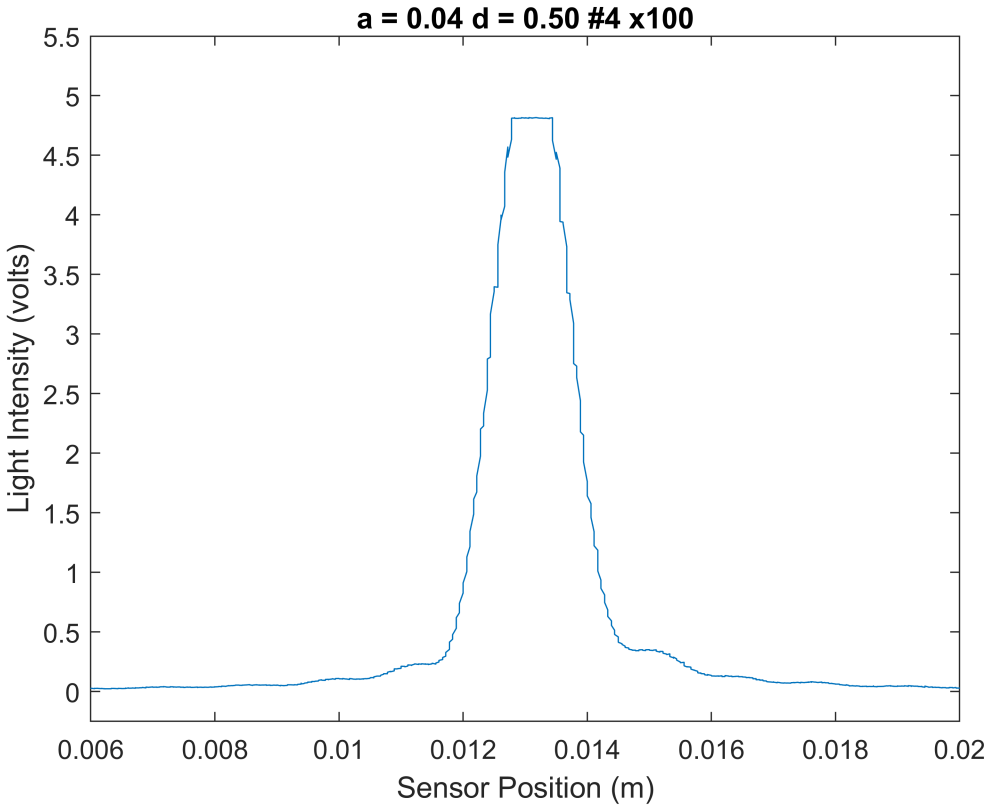
DOUBLE SLIT GRAPHS

```
load("double.mat")
```

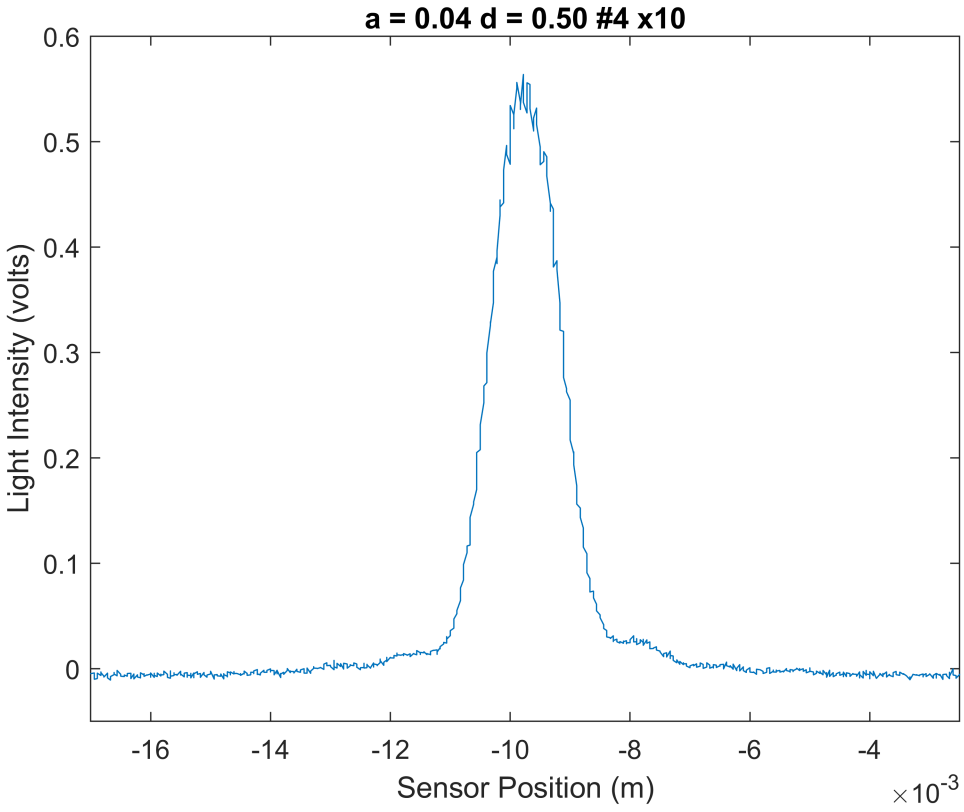
```
plot(d1_sp, d1_li);
xlabel('Sensor Position (m)')
ylabel('Light Intensity (volts)')
title("a = 0.08 d = 0.50 #4 x10")
axis([-0.017 -0.0065 -0.25 2]);
```



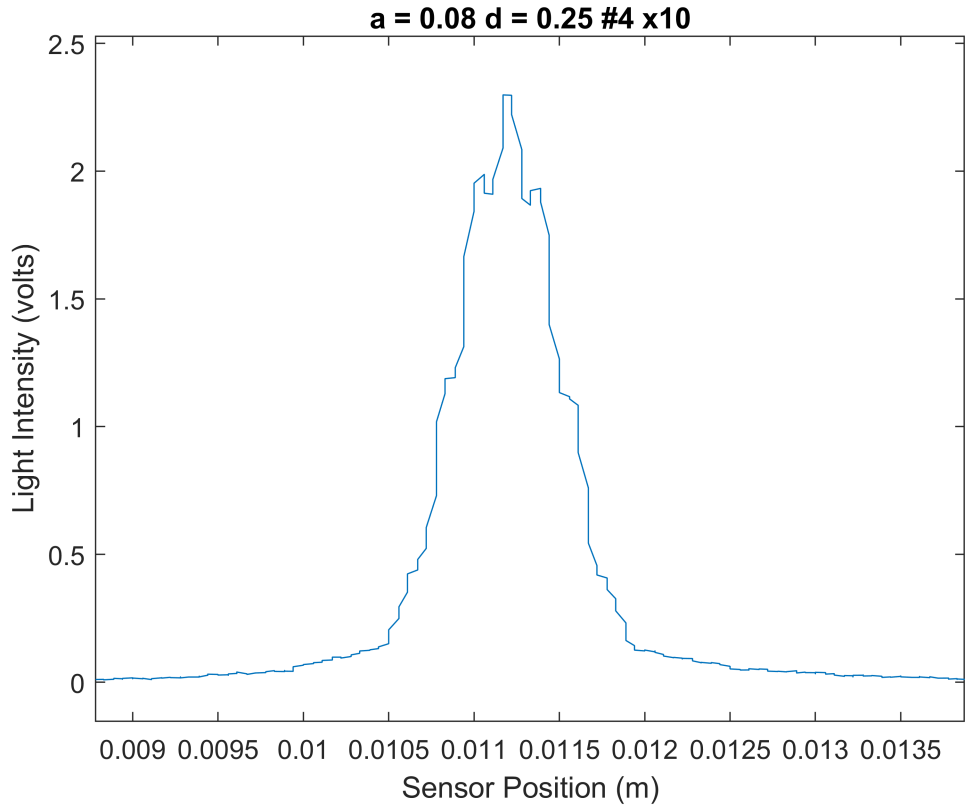

```
plot(d2_sp, d2_li);
xlabel('Sensor Position (m)')
ylabel('Light Intensity (volts)')
title("a = 0.04 d = 0.50 #4 x100")
axis([0.006 0.02 -0.25 5.5]);
```



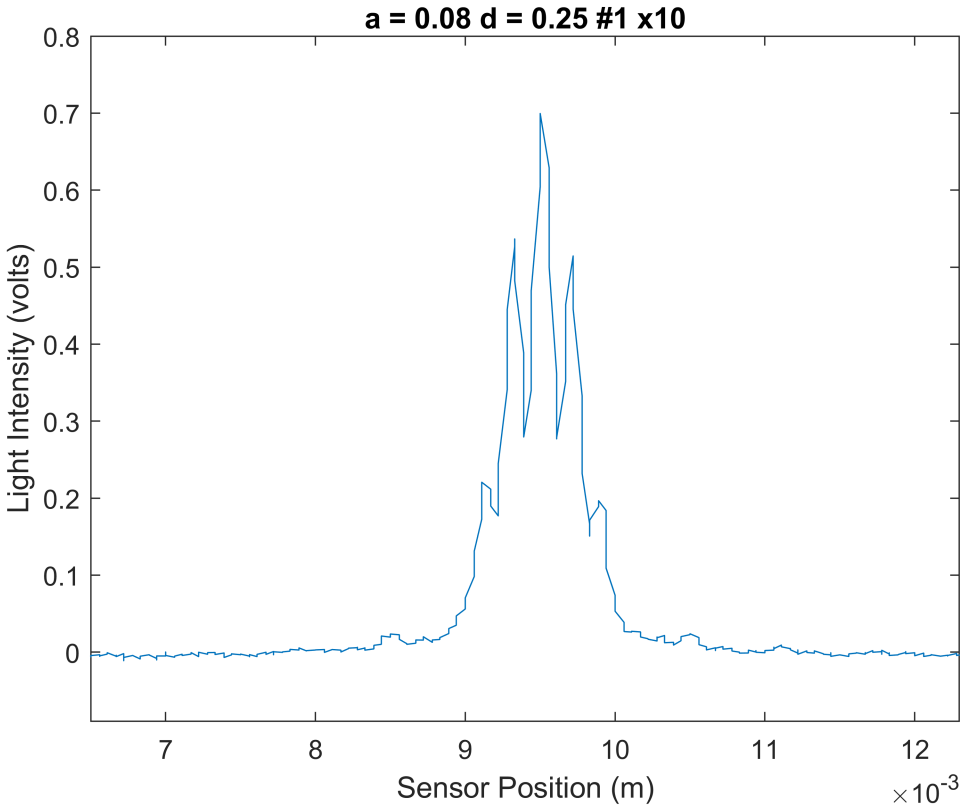

```
plot(d3_sp, d3_li);
xlabel('Sensor Position (m)')
ylabel('Light Intensity (volts)')
title("a = 0.04 d = 0.50 #4 x10")
axis([-0.017 -0.0025 -0.05 0.6]);
```



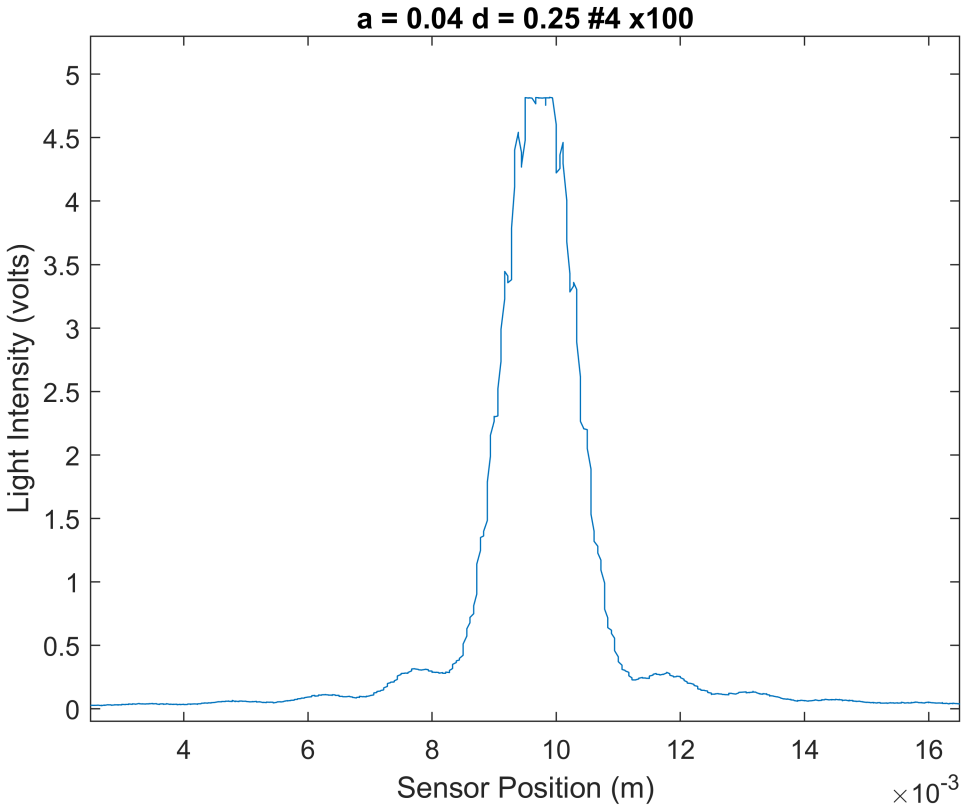

```
plot(d4_sp, d4_li);
xlabel('Sensor Position (m)')
ylabel('Light Intensity (volts)')
title("a = 0.08 d = 0.25 #4 x10")
axis([0.0084 0.014 -0.35 2.6]);
```




```
plot(d5_sp, d5_li);
xlabel('Sensor Position (m)')
ylabel('Light Intensity (volts)')
title("a = 0.08 d = 0.25 #1 x10")
axis([0.0065 0.0123 -0.09 0.8]);
```

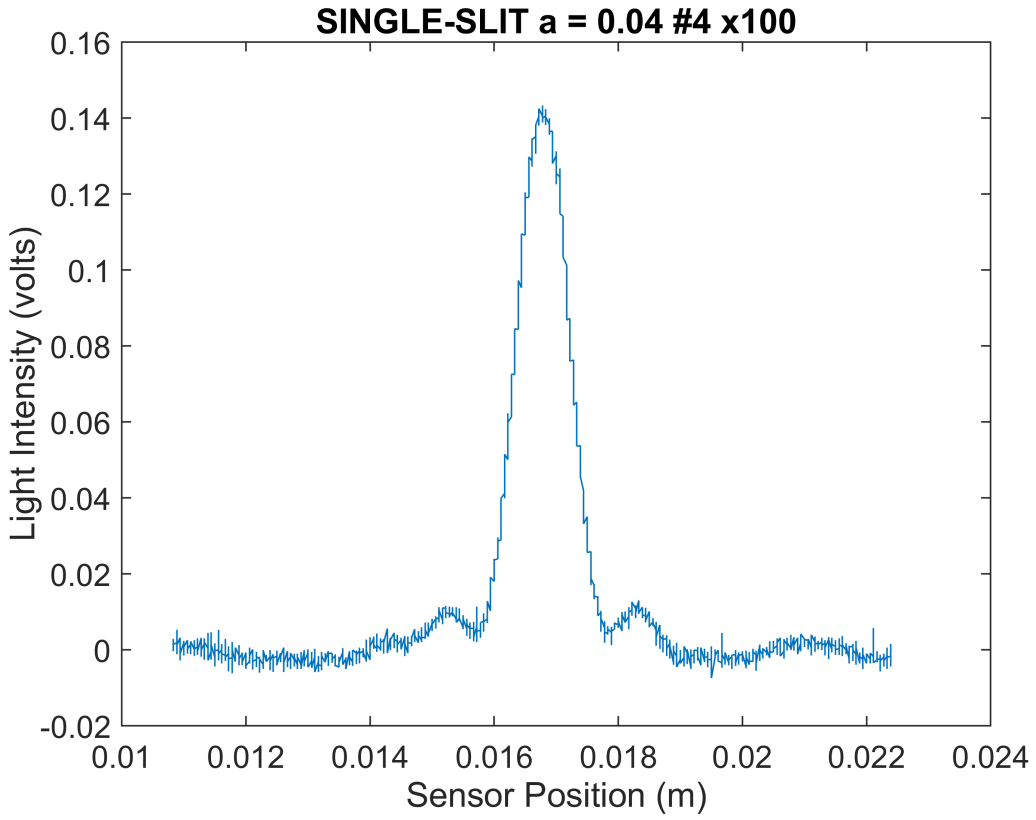



```
plot(d6_sp, d6_li);
xlabel('Sensor Position (m)')
ylabel('Light Intensity (volts)')
title("a = 0.04 d = 0.25 #4 x100")
axis([0.0025 0.0165 -0.1 5.3]);
```

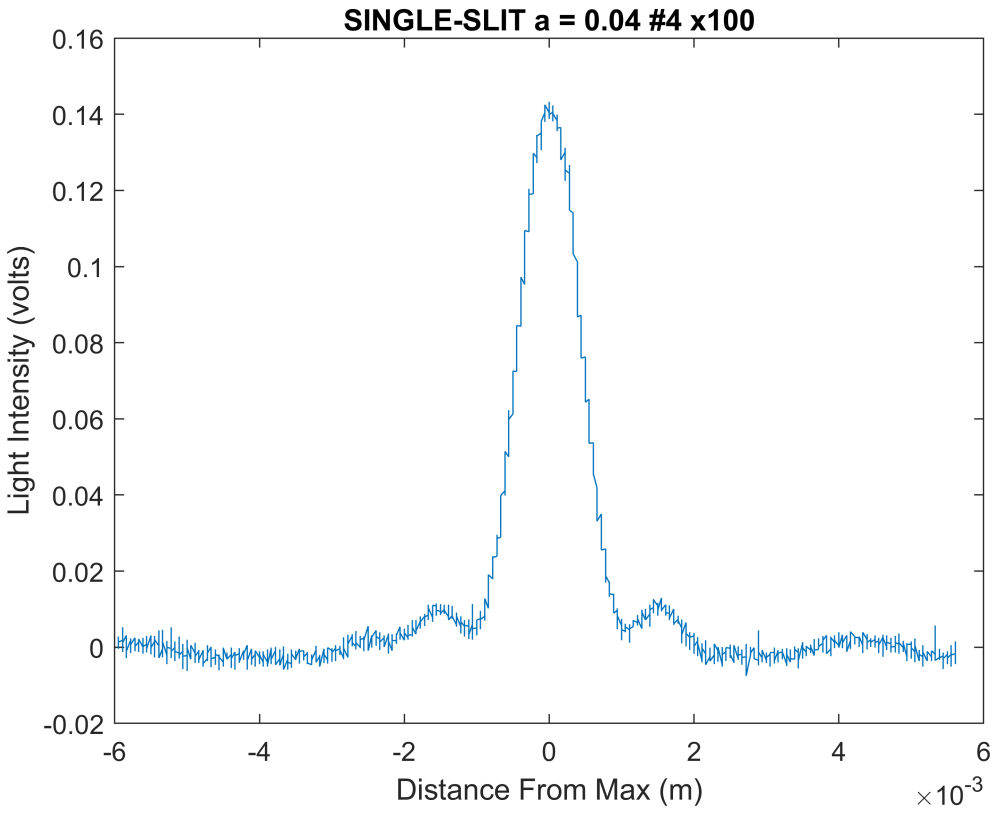


Curve Fitting - Data Processing

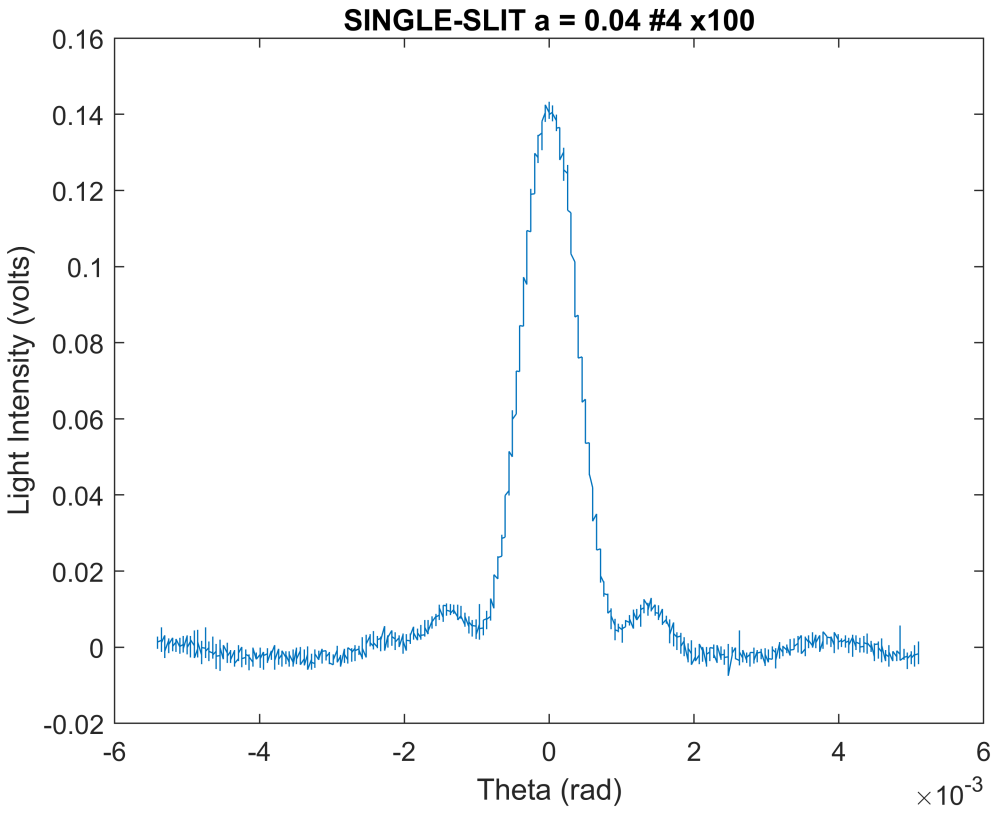
```
SenPos = sp_1m(2076:4152);
LigInt = li_1m(2076:4152);

plot(SenPos, LigInt);
xlabel('Sensor Position (m)')
ylabel('Light Intensity (volts)')
title("SINGLE-SLIT a = 0.04 #4 x100")
```



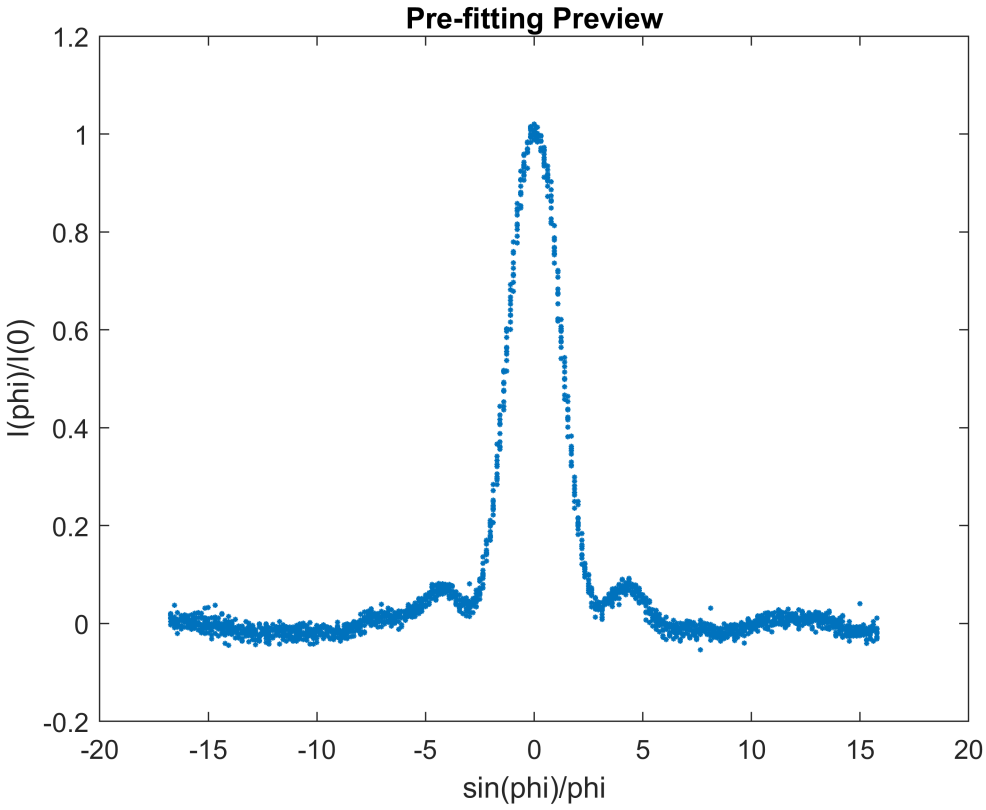

```
x_max_y = 0.01678;
s1_sp_rel = SenPos - x_max_y; %input Sensor Position



plot(s1_sp_rel, LigInt);
xlabel('Distance From Max (m)')
ylabel('Light Intensity (volts)')
title("SINGLE-SLIT a = 0.04 #4 x100")
```

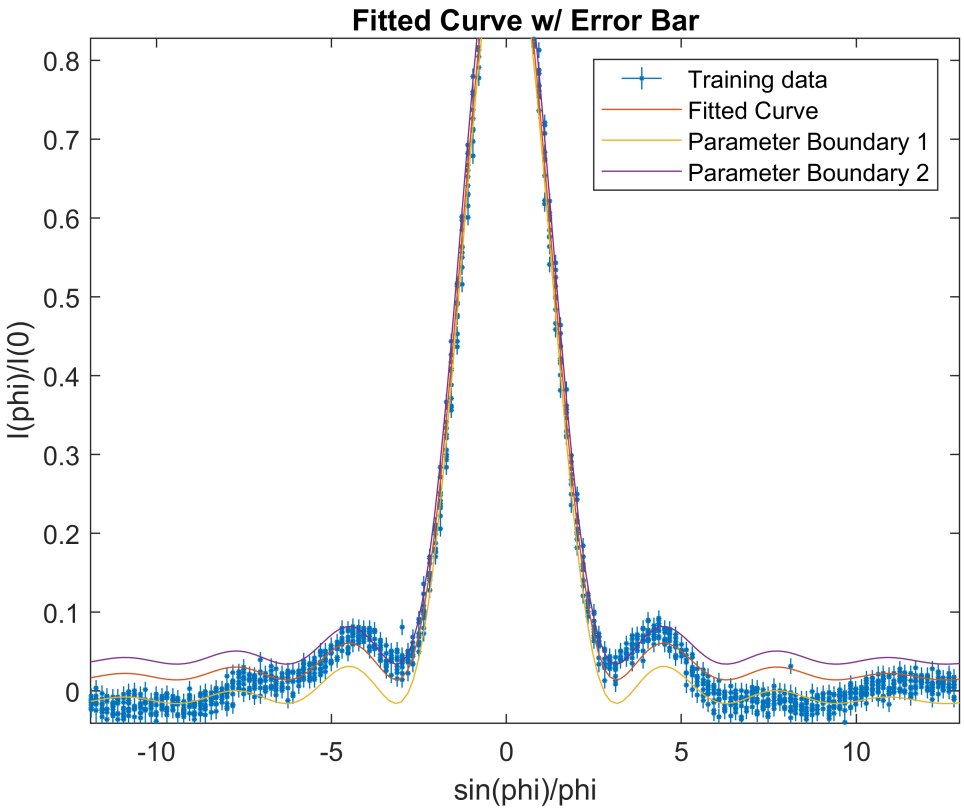


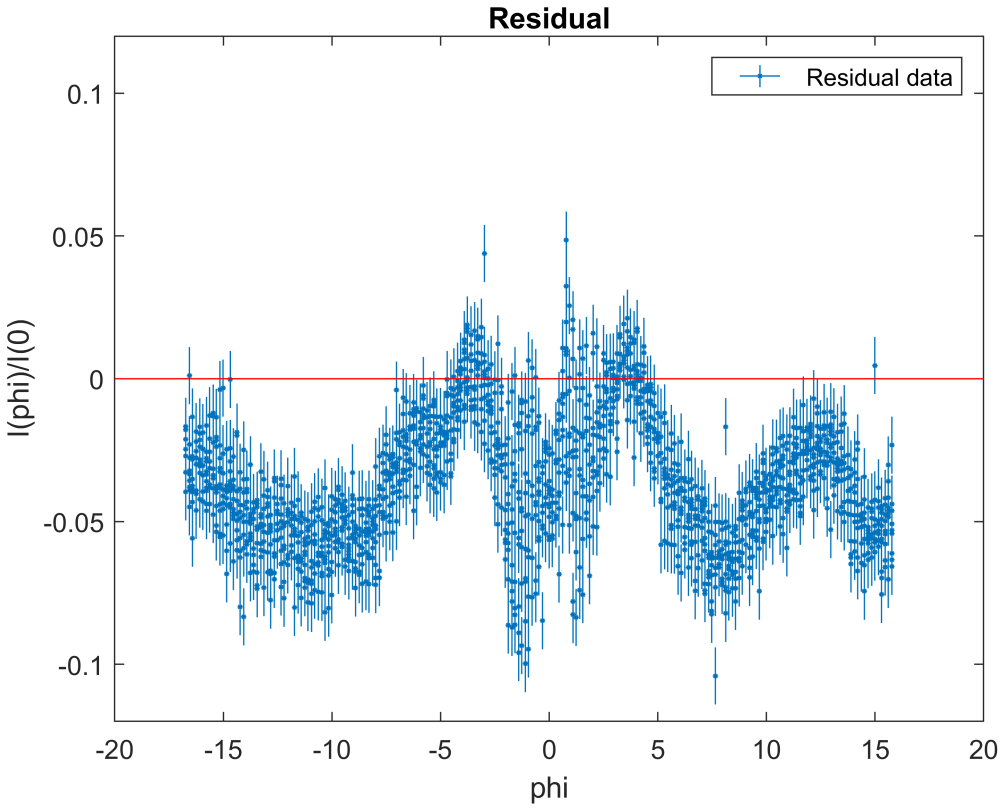

```
a = 0.64/1000; %slit width in m
lambda = 6.5*10^(-7); %wavelength in m 6.5*10^(-7)
dist = 1.1; % Distance between disk and sensor in m
s1_sp_angle = atan(s1_sp_rel./dist); %convert sensor position to angle


plot(s1_sp_angle, LigInt);
xlabel('Theta (rad)')
ylabel('Light Intensity (volts)')
title("SINGLE-SLIT a = 0.04 #4 x100")
```




```
li_ratio = LigInt ./ 0.14039; %input Light Intensity
phi = (pi*a/lambda)*sin(s1_sp_angle);

plot(phi, li_ratio, "*",'MarkerSize', 2);
xlabel('sin(phi)/phi')
ylabel('I(phi)/I(0)')
title("Pre-fitting Preview")
```


Pre-fitting Preview
1.2
1
0.8
0.6
0.4
0.2
0
-0.2
I(phi)/I(0)
-20
-15
-10
-5
0
5
10
15
20
sin(phi)/phi


Fitted Curve w/ Error Bar
Training data
Fitted Curve
Parameter Boundary 1
Parameter Boundary 2
I(phi)/I(0)
sin(phi)/phi
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
-10
-5
0
5
10




```
max_res = max(abs(resi))
```

```
max_res = 0.1041
```

```
min_res = min(abs(resi))
```

```
min_res = 1.1309e-04
```

```
mean_res = sum(abs(resi))/size(resi,1)
```

```
mean_res = 0.0372
```

Reduced Chi-Squared

```
sum(resi.^2/0.01^2)/(size(resi,1))
```

```
ans = 7.8548
```