In[1]:=

$$it = E^{\frac{2\pi * I * D1}{\lambda}} * E^{\frac{2\pi * I * D2}{\lambda}} \int_{d/2-a/2}^{d/2+a/2} E^{\frac{2\pi I (w-y1)^2}{2 * D1 * \lambda}} * E^{\frac{2\pi I (y1-z)^2}{2 * D2 * \lambda}} \, dy1;$$

$$ib = E^{\frac{2\pi * I * D1}{\lambda}} * E^{\frac{2\pi * I * D2}{\lambda}} \int_{-d/2-a/2}^{-d/2+a/2} E^{\frac{2\pi I (w-y2)^2}{2 * D1 * \lambda}} * E^{\frac{2\pi I (y2-z)^2}{2 * D2 * \lambda}} \, dy2;$$

In[3]:=

```
i = (it + ib);
coni = Conjugate[i];
func = i * coni;
```

In[6]:=

```
D1 = 380;
D2 = 700;
λ = .000546;
z = x - 6.3;
d = .353;
a = .1;
```

In[12]:=

```
func;
realfunc = 8500 * Re[func];
```

In[17]:=

```
SetDirectory["/Users/danikaluntz-martin/Desktop/Advanced Lab/DoubleSlit-ED"];
counts2 = Import["20141122_double_slit_bulb_counts2.csv"];
counts2;
```

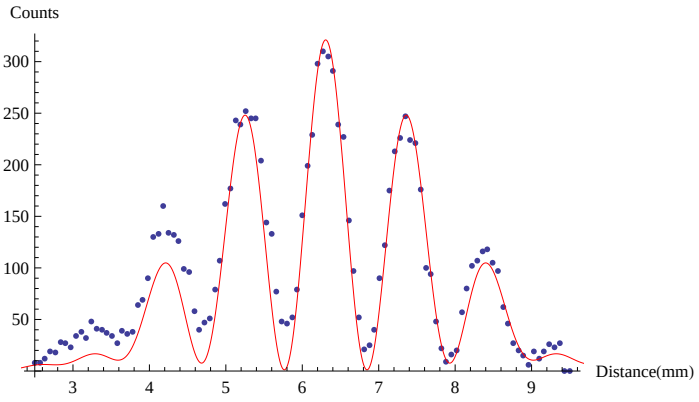
In[20]:=

```
fit2 = NonlinearModelFit[counts2, realfunc, {{w, 0}}, x];
```

In[29]:=

```
plot2 = Plot[fit2[x], {x, 0, 10}, PlotRange → All, PlotStyle → Red];
Show[ListPlot[counts2], plot2,
 AxesLabel → {Distance [mm], Counts}, PlotRange → {{2.5, 9.5}, All}]
```

Out[30]=



In[31]:=
$$\text{ChiSq2} = \sum_{j=1}^{104} \left(\frac{\text{fit2["FitResiduals"][[j]]}}{2\left(\sqrt{\text{counts2[[j, 2]]}} - \sqrt{1.68}\right)} \right)^2$$

```
RedChiSq2 = ChiSq2 / 7
```

Out[31]= 376.446

Out[32]= 53.778