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 = 500;
λ = .000546;
z = x - 6.2;
d = .353;
a = .1;
```

In[12]:=

```
func;
realfunc = 9000 * Re[func];
```

In[14]:=

```
SetDirectory["/Users/danikaluntz-martin/Desktop/Advanced Lab/DoubleSlit-ED"];
counts1 = Import["2014_double_slit_bulb_counts.csv"];
counts1;
```

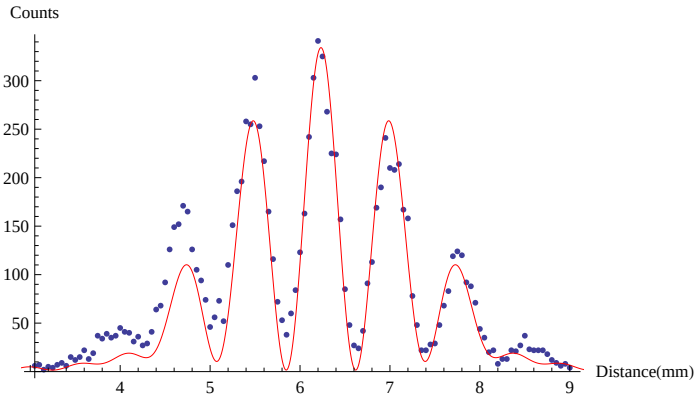
In[17]:=

```
fit1 = NonlinearModelFit[counts1, realfunc, {{w, 0}}, x];
```

In[23]:=

```
plot1 = Plot[fit1[x], {x, 0, 10}, PlotRange → All, PlotStyle → Red];
Show[ListPlot[counts1], plot1, AxesLabel → {Distance [mm], Counts}]
```

Out[24]=



In[20]:=

```
fit1["FitResiduals"];
```

In[21]:=

$$ChiSq = \sum_{j=1}^{120} \left(\frac{fit1["FitResiduals"][[j]]}{2\left(\sqrt{counts1[[j,2]]} - \sqrt{1.68}\right)} \right)^2$$

Out[21]= 374.246

In[22]:=
```
RedChiSq = ChiSq / 7
```

Out[22]=
```
53.4637
```