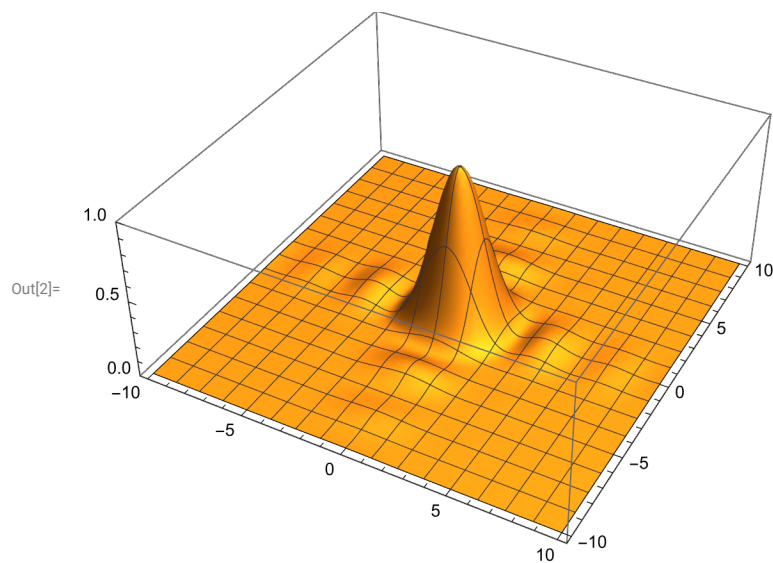


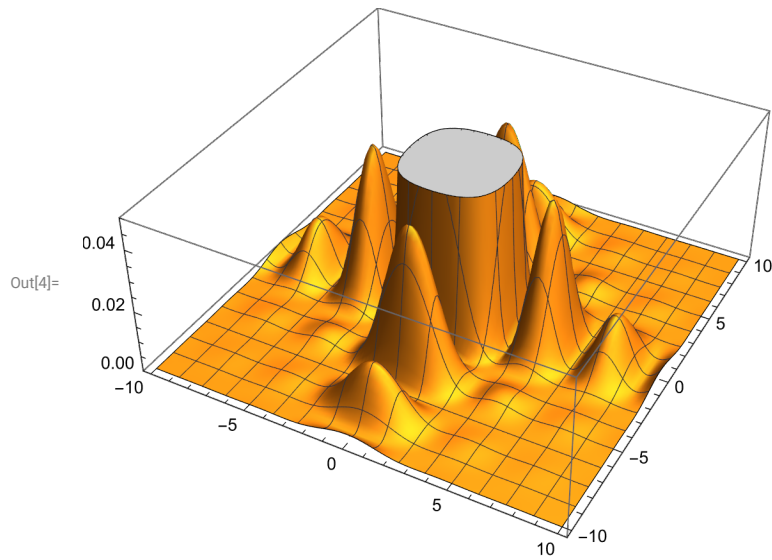
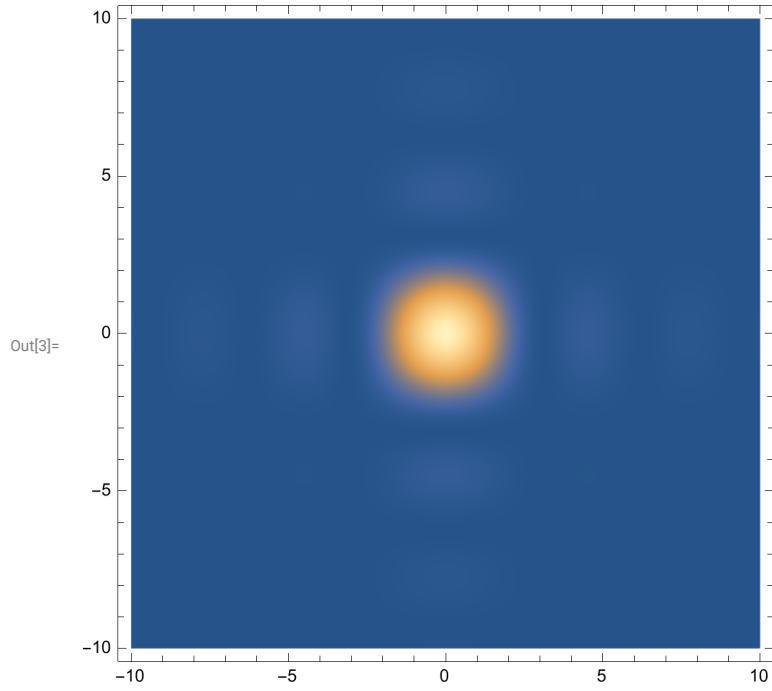
Diffraction from Rectangular Slits

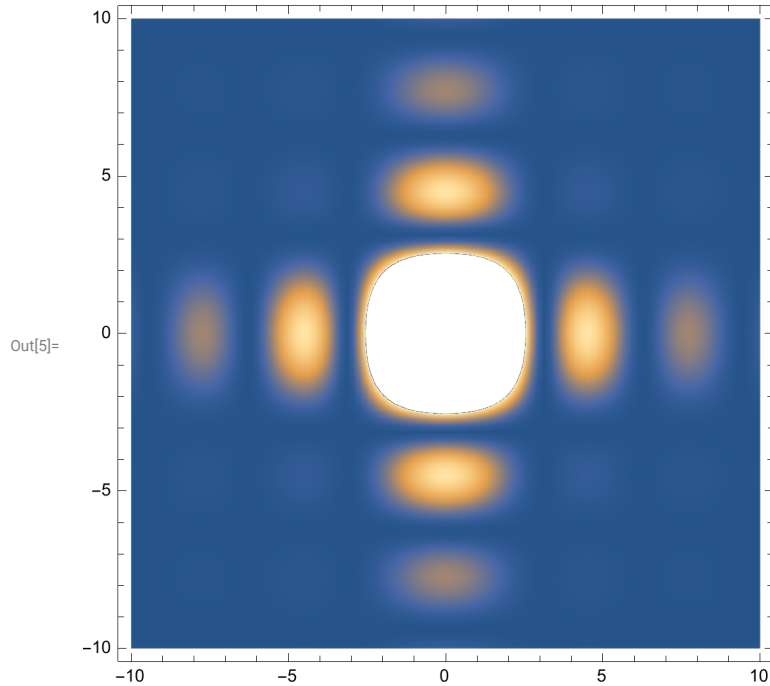
by Dr. Colton, Physics 471 (last updated: Winter 2024)

```
In[1]:= (*intensity formula for 2D rectangular aperture*)
intensity[x_, y_, a_, b_] = Sinc[a x]^2 Sinc[b y]^2;

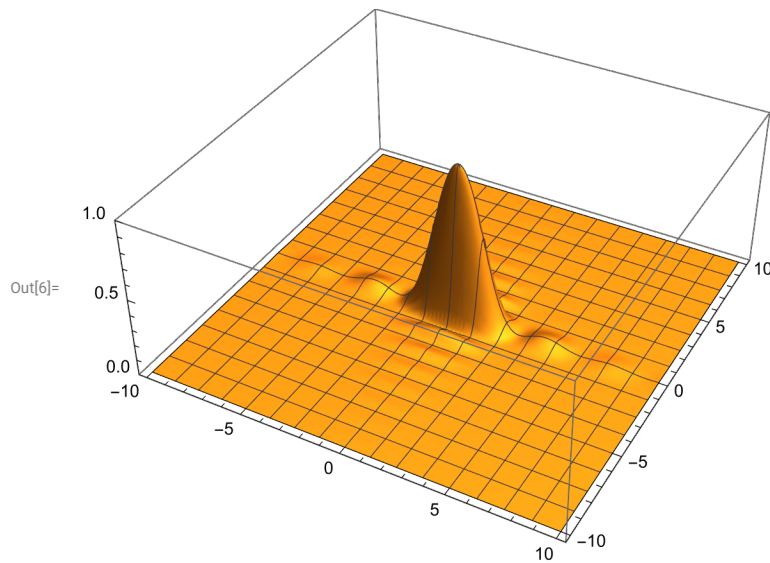
(*square aperture, a=b=1*)
Plot3D[intensity[x, y, 1, 1], {x, -10, 10},
  {y, -10, 10}, PlotRange -> {0, 1}, PlotPoints -> 100]
DensityPlot[intensity[x, y, 1, 1], {x, -10, 10},
  {y, -10, 10}, PlotRange -> {0, 1}, PlotPoints -> 100]
Plot3D[intensity[x, y, 1, 1], {x, -10, 10},
  {y, -10, 10}, PlotRange -> {0, 0.05}, PlotPoints -> 100]
DensityPlot[intensity[x, y, 1, 1], {x, -10, 10},
  {y, -10, 10}, PlotRange -> {0, 0.05}, PlotPoints -> 100]
```

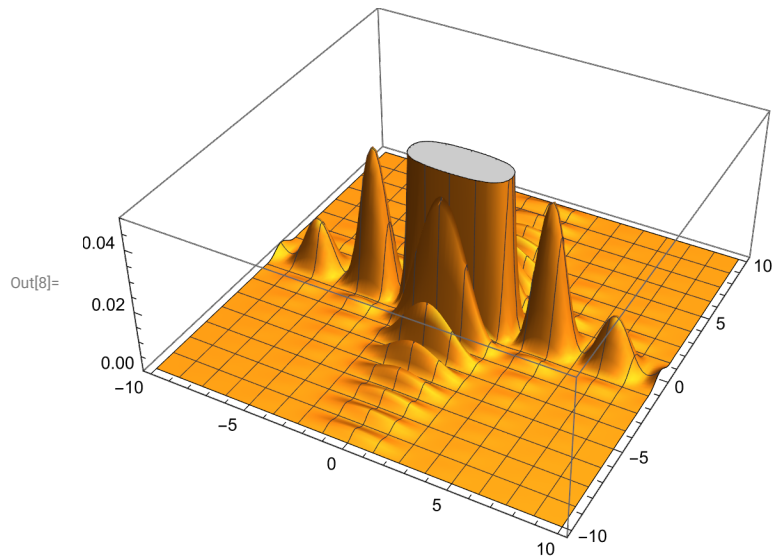
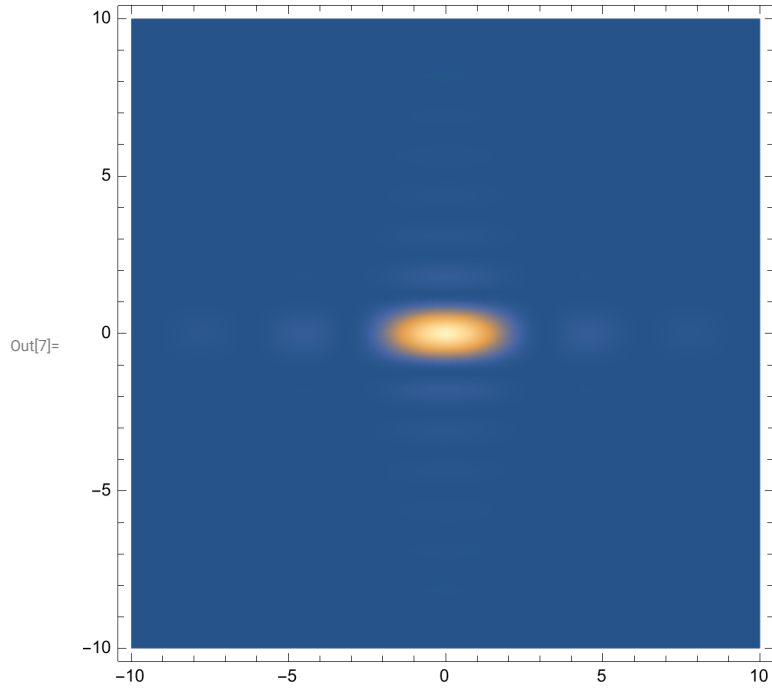


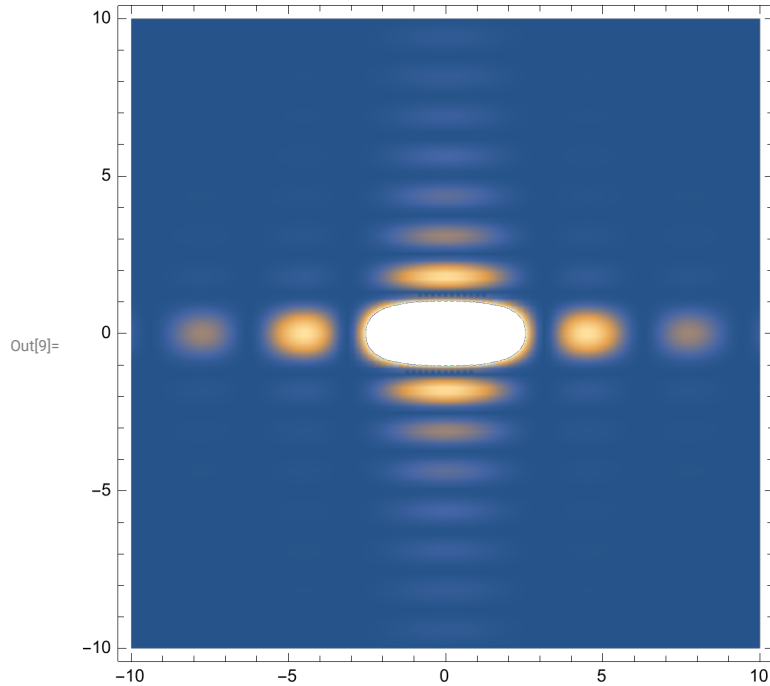




```
In[6]:= (*rectangular aperture, a=1; b=2.5*)
Plot3D[intensity[x, y, 1, 2.5], {x, -10, 10},
  {y, -10, 10}, PlotRange -> {0, 1}, PlotPoints -> 100]
DensityPlot[intensity[x, y, 1, 2.5], {x, -10, 10},
  {y, -10, 10}, PlotRange -> {0, 1}, PlotPoints -> 100]
Plot3D[intensity[x, y, 1, 2.5], {x, -10, 10},
  {y, -10, 10}, PlotRange -> {0, 0.05}, PlotPoints -> 100]
DensityPlot[intensity[x, y, 1, 2.5], {x, -10, 10},
  {y, -10, 10}, PlotRange -> {0, 0.05}, PlotPoints -> 100]
```

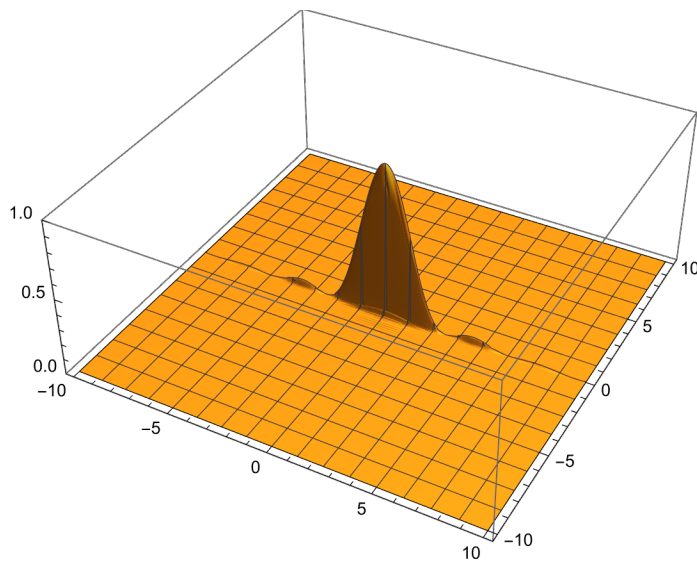




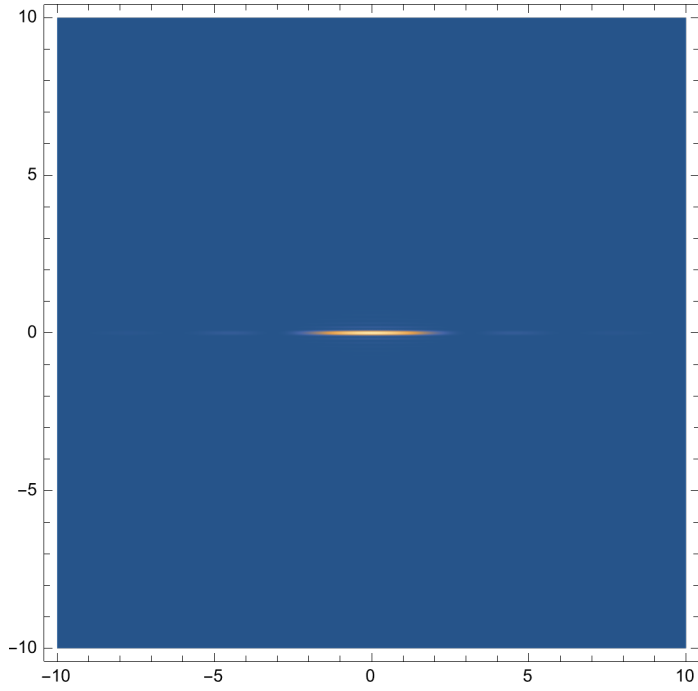


```
In[10]:= (*rectangular aperture, a=1; b=25*)
Plot3D[intensity[x, y, 1, 25], {x, -10, 10},
  {y, -10, 10}, PlotRange -> {0, 1}, PlotPoints -> 300]
DensityPlot[intensity[x, y, 1, 25], {x, -10, 10},
  {y, -10, 10}, PlotRange -> {0, 1}, PlotPoints -> 300]
Plot3D[intensity[x, y, 1, 25], {x, -10, 10},
  {y, -10, 10}, PlotRange -> {0, 0.05}, PlotPoints -> 300]
DensityPlot[intensity[x, y, 1, 25], {x, -10, 10},
  {y, -10, 10}, PlotRange -> {0, 0.05}, PlotPoints -> 300]
```

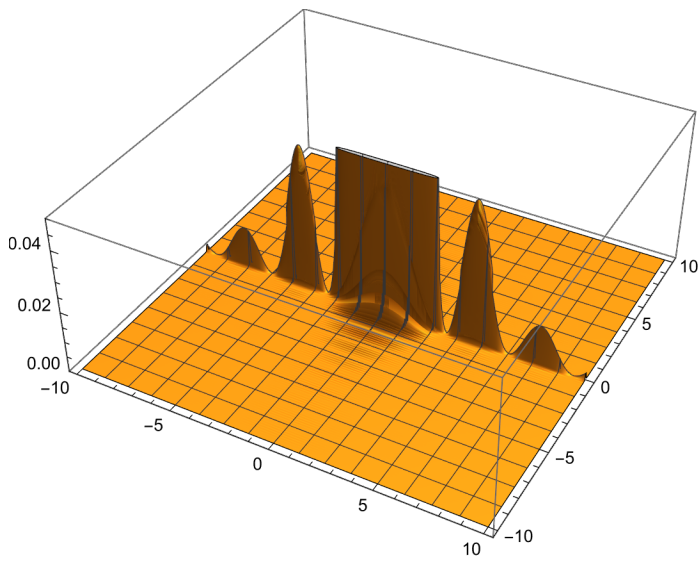
Out[10]=



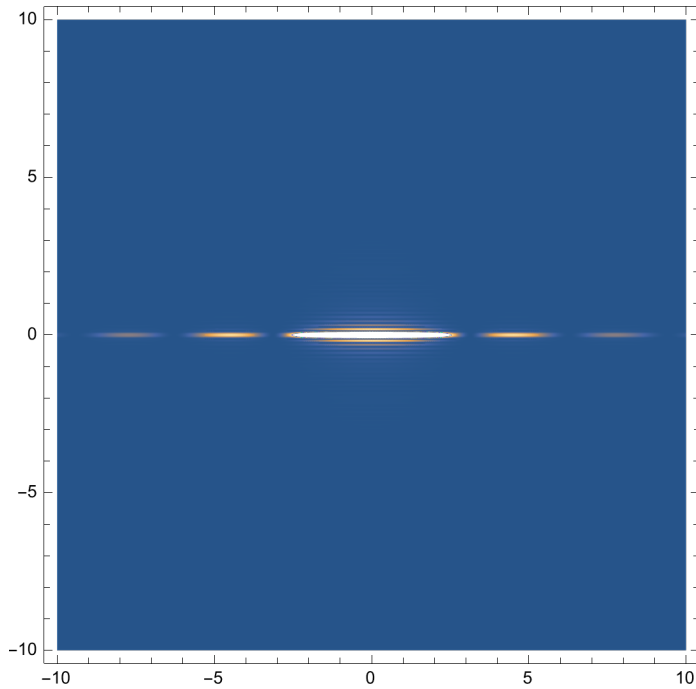
Out[11]=



Out[12]=



Out[13]=



In[14]=

(*intensity formula for double slit in x, single wide slit in y*)

(*x dimensions: slit width a = 1, slit separation d = 4*)

(*y dimensions: slit width b=25*)

```
intensity2[x_, y_] = Sinc[x]^2 Cos[4 x]^2 Sinc[25 y]^2;
```

```
Plot3D[intensity2[x, y], {x, -10, 10}, {y, -10, 10}, PlotRange -> {0, 1}, PlotPoints -> 300]
```

```
DensityPlot[intensity2[x, y], {x, -10, 10},
```

```
{y, -10, 10}, PlotRange -> {0, 1}, PlotPoints -> 300]
```

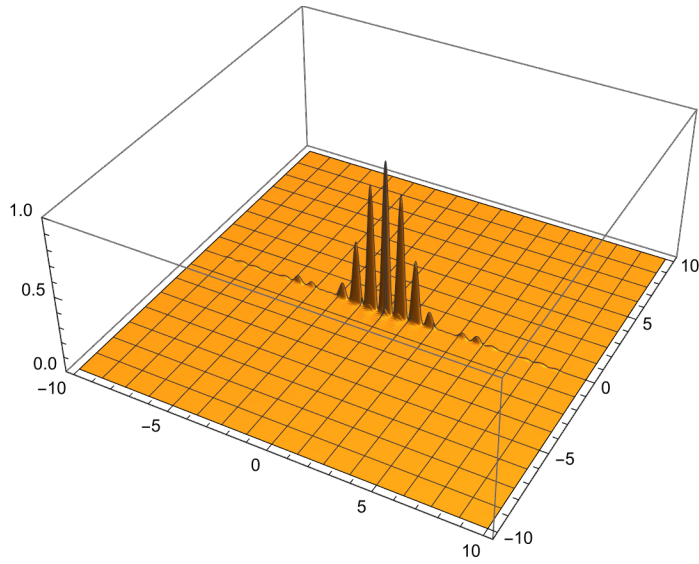
```
Plot3D[intensity2[x, y], {x, -10, 10},
```

```
{y, -10, 10}, PlotRange -> {0, 0.05}, PlotPoints -> 300]
```

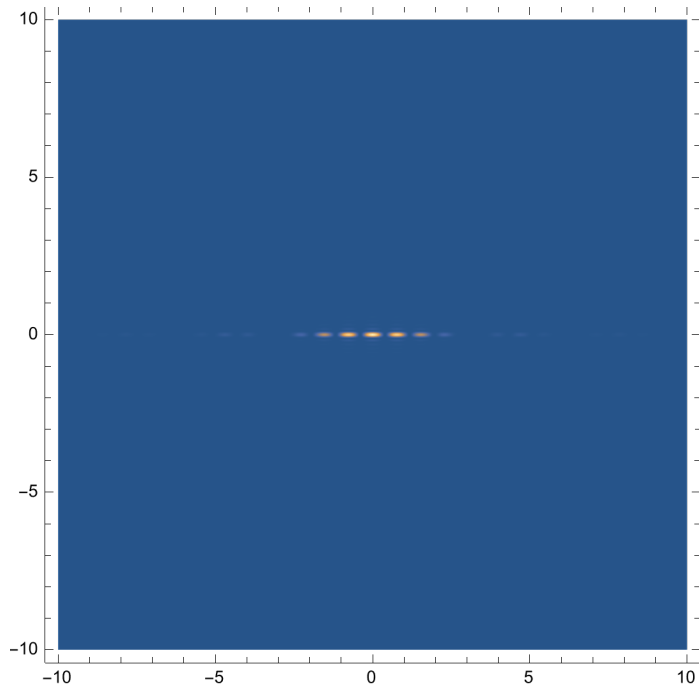
```
DensityPlot[intensity2[x, y], {x, -10, 10},
```

```
{y, -10, 10}, PlotRange -> {0, 0.05}, PlotPoints -> 300]
```

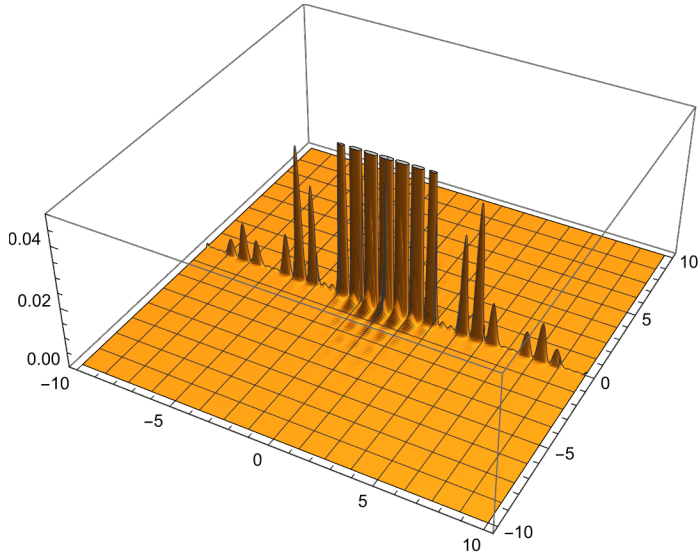
Out[15]=



Out[16]=



Out[17]=



Out[18]=

