

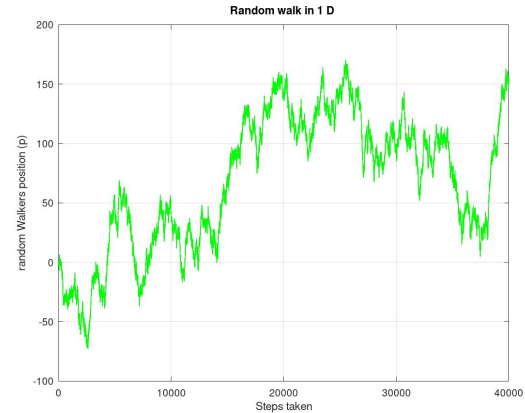
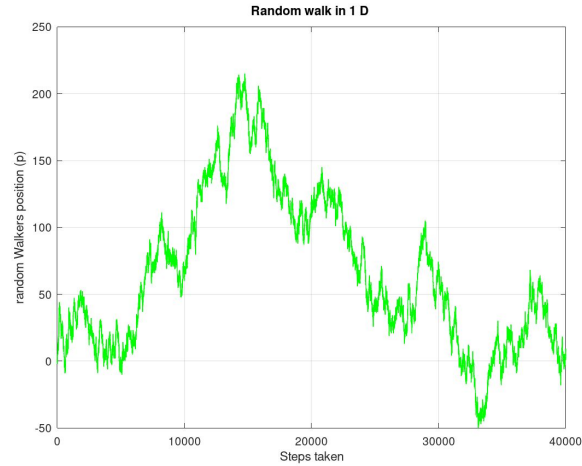


Random Walk and Diffraction due to N slits in Matlab

By Prathamesh Deshmukh

Random Walk in 1-D

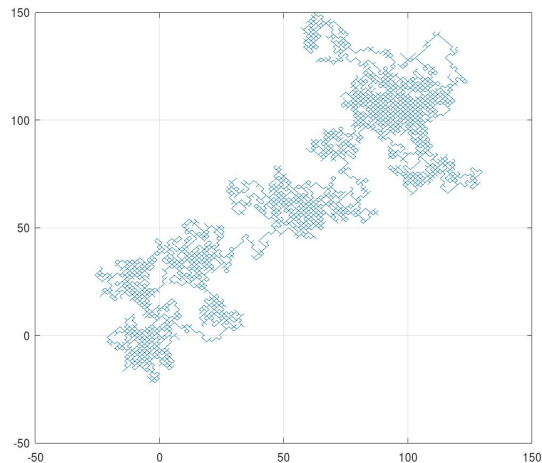
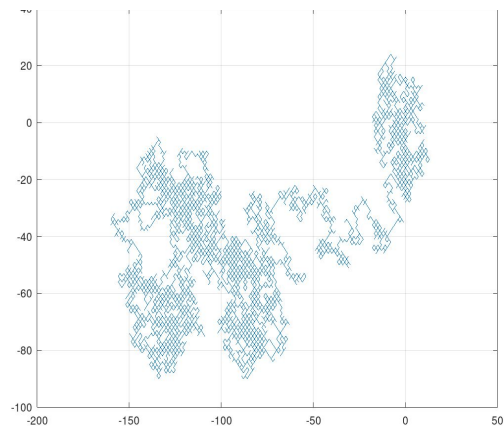
```
randomwalk1d.m x
1 close all;
2 clear all;
3
4 step=40000
5
6
7 p(1)=0;
8 for i = 1:step-1
9
10     if rand(1)>0.5
11         p(i+1)=p(i)+1;
12     else
13         p(i+1)=p(i)-1;
14
15     end
16
17 end
18
19 plot(p,'g','LineWidth',1)
20
21 xlabel('Steps taken')
22
23 ylabel('random Walkers position (p)')
24
25 grid on
26
27 title('Random walk in 1 D ')
```



Random Walk 2D

randomwalk1d.m ✖ randomwalk2d.m ✖

```
1 close all;
2 clear all;
3
4 step = 10000;
5
6 x(1)=0;
7 y(1)=0;
8
9 for i = 1:step
10
11     if rand(1)>0.5
12         x(i+1)=x(i)+1;
13     else
14         x(i+1)=x(i)-1;
15     end
16
17 end
18
19
20
21 for j = 1:step
22
23     if rand(1)>0.5
24         y(j+1)=y(j)+1;
25     else
26         y(j+1)=y(j)-1;
27     end
28
29 end
30
31
32 plot(x,y)
33 grid on
```

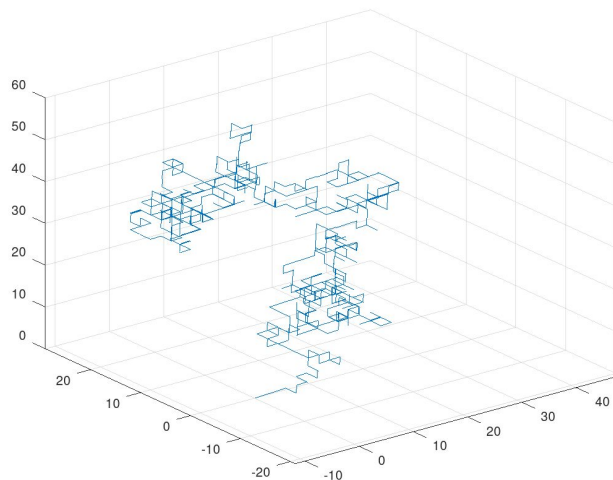


Random Walk 3D

randomwalk1d.m ✕ randomwalk2d.m ✕ * randomwalk3d.m ✕ <unnamed

```
1 close all;
2 clear all;
3
4 step=1000
5 h=step/2
6
7 x(1)=0
8 y(1)=0
9 z(1)=0
10
11 for i = 1:step
12
13     if rand(1)>0.5
14         k1=-1;
15     else
16         k1=+1;
17     end
18
19     x(i+1)=x(i)+k1;
20 end
21
22 for j = 1:step
23
24     if rand(1)>0.5
25         k2=-1;
26     else
27         k2=+1;
28     end
29
30     y(j+1)=y(j)+k2;
31 end
32
33
34 end
```

```
35
36 for k = 1:step
37
38     if rand(1)>0.5
39         k3=-1;
40     else
41         k3=+1;
42     end
43
44     z(k+1)=z(k)+k3;
45 end
46
47
48
49
50 plot3(x,y,z)
```



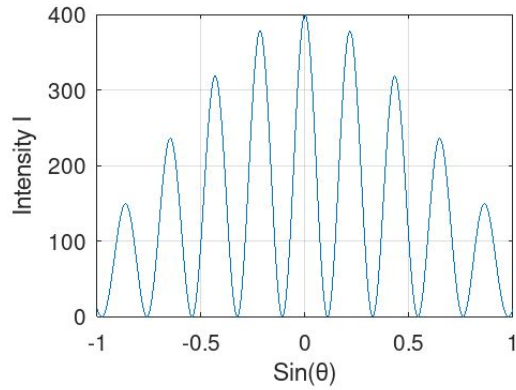
Diffraction due to N slits

randomwalk1d.m ✕ randomwalk2d.m ✕ randomwalk3d.m ✕ diffraction.m ✕

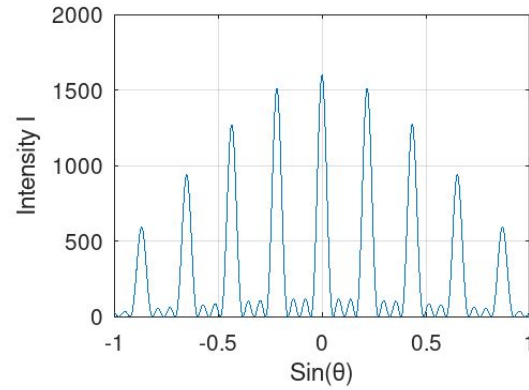
```
1 close all;
2 clear all;
3
4 e=3
5 d=20
6
7 % 'A' is alpha ,B beta , l lambda , theta t
8 % 'n' is the number of slits ,
9 % 'e' is width of slit,
10 % 'd' is width of opaque space/area
11
12 l=5
13
14 Amp=10;
15
16 t1=linspace(1,2*pi,10000);
17
18 for N=[2 4 6 8]
19
20     for ind=1:10000;
21
22         t=t1(ind);
23
24         A1(ind)=(pi*e*sin(t))/(l);
25
26
27         B1(ind)=(pi)*(e+d)*sin(t)/(l);
28
29
30         A=A1(ind);
31         B=B1(ind);
32         R(ind)=(Amp*sin(A)*sin(N*B))/(A*sin(B));
33         I(ind)=R(ind)*R(ind);
34
```

```
35     end
36
37
38 subplot (2,2,N/2)
39
40 plot(sin(t1),I)
41
42 xlabel('Sin(\theta)')
43 ylabel('Intensity I')
44 grid on
45
46 end
47
48 subplot (2,2,1)
49 title('2 Slit diffraction')
50
51
52 subplot (2,2,2)
53 title('4 Slit diffraction')
54
55
56 subplot (2,2,3)
57 title('6 Slit diffraction')
58
59
60 subplot (2,2,4)
61 title('8 Slit diffraction')
62
```

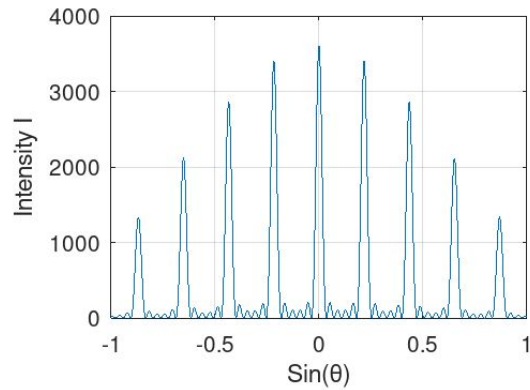
2 Slit diffraction



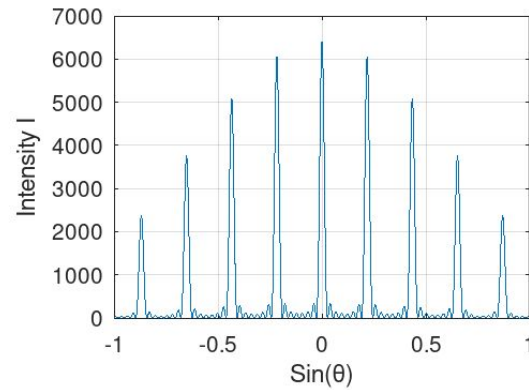
4 Slit diffraction



6 Slit diffraction



8 Slit diffraction



Thank You