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Course:B.Sc(H) Physics, Sem 5

Roll No.-081

Source Code:

clc;

clear;

clf;

e=3.795; m=0.511\*10^6; h=1973

n=input("Enter n: ")

A=eye(n,n)

A=A\*(-2)

for i=1:n-1

A(i+1,i)=1

A(i,i+1)=1

end

r=linspace(0.0000001,60,n)

V=zeros(n,n)

for i=1:n

V(i,i)=(-(e^2)/r(i))

end

k=(60-(0.0000001))/n

disp(k)

B=(-(h^2)/(2\*m\*k^2))\*A+V

[u,E]=spec(B)

disp(E(2,2),"Ground state energy:")

disp(E(3,3),"1st Excited state energy:")

a=gca()

a.x\_location="origin"

a.y\_location="origin"

subplot(121)

plot(r',u(:,2),'linewidth','3')

subplot(122)

a=gca()

a.x\_location="origin"

a.y\_location="origin"

plot(r',u(:,3),'linewidth','3')

xlabel('r','fontsize',3)

ylabel('u(r)','fontsize',3)

Output:

Enter n: 3000

0.02

Ground state energy:

-13.599874

1st Excited state energy:

-3.4008959

