```
%3D radiation pattern of dipole antenna

%radiation pattern of half wave dipole in three dimension

clear all

clc

while (1)

choice=menu({'Radiation pattern of dipole (select your choice)'},'Three dimensional plot of dipole ','Two dimensional plot E-field','three dimensional Radiation of halfwave','two dim halfwave','exit')

%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%

if choice == 1

theta=[0:0.1:2*pi];

phi=[0:0.1:2*pi];

kl=2*pi;

i0=1;

eta=120*pi;

urad=(eta*(i0^2)*((cos(kl*cos(theta-(pi/2))/2)-cos(kl/2))./sin(theta-(pi/2))).^2)/(8*(pi)^2);

udb=10*log10(urad);


%normalizing in order to make U vector positive

minu=min(udb);

u=udb-minu;


%expanding theta,phi,u to span entire space

u(1,1)=0;

for n=1:length(phi)

   theta(n,:)=theta(1,:);

end

phi=phi';

for m=1:length(phi)
```

```
    phi(:,m)=phi(:,1);
end
for k=1:length(u);
    u(k,:)=u(1,:);
end
[x,y,z]=sph2cart(phi,theta,u);
surf(x,y,z);
title('3D radiation pattern of dipole antenna');
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
elseif choice ==2
    %radiation pattern of dipole in two dimension
n=377;
Io=1;
r=10;
lambda=0.3;
k=(2*pi)/lambda;
L=lambda;

theta=0:0.01:2*pi;
E=j*n*Io*exp(-j*k*r)*(1/(2*pi*r))*((cos(k*L*cos(theta)/2)-cos(k*L/2))./sin(theta));
polar(theta, abs(E))
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
    %radiation pattern of halfwave length dipole in 3 dimension
elseif choice==3
theta=[0:0.1:2*pi];
phi=[0:0.1:2*pi];
kl=1/2;
```

```
i0=1;
eta=120*pi;
urad=(eta*(i0^2)*((cos(pi*cos(theta-(pi/2))/2))./sin(theta-(pi/2))).^2)/(8*(pi)^2);
udb=10*log10(urad);

%normalizing in order to make U vector positive
minu=min(udb);
u=udb-minu;

%expanding theta,phi,u to span entire space
u(1,1)=0;
for n=1:length(phi)
   theta(n,:)=theta(1,:);
end
phi=phi';
for m=1:length(phi)
   phi(:,m)=phi(:,1);
end
for k=1:length(u);
   u(k,:)=u(1,:);
end
[x,y,z]=sph2cart(phi,theta,u);
surf(x,y,z);
title('3D radiation pattern of dipole antenna');
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
% E-field of halfwavelength dipole
elseif choice==4
n=377;
```

```
Io=1;

r=10;

lambda=0.3;

k=(2*pi)/lambda;

L=lambda/2;


theta=0:0.01:2*pi;

E=j*n*Io*exp(-j*k*r)*(1/(2*pi*r))*((cos(pi*cos(theta)/2))./sin(theta));

polar(theta, abs(E))

%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%

elseif choice==5

   break

end

end
```