3.Matlab Program to radiation intensity U (Θ, Ø):

Matlab code:

```
% E-plane horn antenna matlab program using f(x)=cos^2(x/2)
clc;
clear all;
close all;
E0=1;
a=2.286;
b1=12.859;
rho=30.316;
f=11*10^9;
c=3*10^8;
k=2*pi*f/c;
x=1;
e=((E0*a*sqrt(k*rho/pi))/16);
for theta=0.1117:0.1117:2*pi
y=1;
for phi=0.1117:0.1117:2*pi
s1=1+(k*a*sin(theta)*cos(phi)/2);
s2=-1+(k*a*sin(theta)*cos(phi)/2);
s3=k*a*sin(theta)*cos(phi)/2;
t1=(sqrt(k/(rho*pi))) *((-b1/2)-(rho*sin(theta)*sin(phi)));
t2=(sqrt(k/(rho*pi))) *((b1/2)-(rho*sin(theta)*sin(phi)));
fd=(sinc(s1) +(sinc(s2)) +2*(sinc(s3)));
F1=(fresnelc(t2)-fresnelc(t1));
F2=(fresnels(t2)-fresnels(t1));
Etheta=(e^2) *((sin(phi)*(1+cos(theta))) ^2) *(fd^2) *(F1^2+F2^2);
Ephi=(e^2) *((cos(phi)*(1+cos(theta))) ^2) *(fd^2) *(F1^2+F2^2);
U (x, y) =(1/(2*120*pi)) *(Etheta+Ephi);
y=y+1;
end
x=x+1;
end
theta0=(0.1117:0.1117:2*pi);
phi0=(0.1117:0.1117:2*pi);
[theta, phi] =meshgrid(theta0,phi0);
[X, Y, Z] =sph2cart (theta, phi, U');
mesh (X, Y, Z);
```

Matlab plot: