clc; clear all;

c=3e8;

f=1.8e9;

lambda=c/f;

d=lambda/2;

k= 2\*pi/lambda;

dx=lambda/2; %distance between elements (X)

dy=lambda/2;%distance between elements (Y)

dz=lambda/2;

theta=-2\*pi:0.01:2\*pi; phi=0;

thetak=pi/18;phik=0;

U=sin(theta).\*cos(phi)

V=sin(theta).\*sin(phi);

W=cos(theta);

% i=0;

% for ny=1:2

% for nz=1:2

% ak(ny) =exp(-i\*k\*(ny-1)\*(dy).\*V).\* exp(-i\*k\*(nz-1)\*(dz).\*W);

% end

% end

Uk=sin(thetak).\*cos(phik);

Vk=sin(thetak).\*sin(phik);

Wk=cos(thetak);

AF\_Field\_1=0;AF\_Field\_2=0;

for n=1:4

for m=1:4

AF\_Field\_1 = exp(j\*2\*pi\*(n-1)/lambda\*dx\*(V)).\*exp(j\*2\*pi\*(m-1)/lambda\*dy\*(W)) + AF\_Field\_1;

AF\_Field\_2 = exp(j\*2\*pi\*(n-1)/lambda\*dx\*(Vk-V)).\*exp(j\*2\*pi\*(m-1)/lambda\*dy\*(Wk-W)) + AF\_Field\_2;

% AF\_Field\_3 = exp(j\*2\*pi\*(n-1)/lambda\*dx\*(V)).\*exp(-j\*2\*pi\*(n-1)/lambda\*dx\*(Vk)).\*exp(j\*2\*pi\*(m-1)/lambda\*dy\*(W)).\*exp(-j\*2\*pi\*(m-1)/lambda\*dy\*(Wk)) + AF\_Field\_3;

end

end

ff1=abs(AF\_Field\_1);

ff2=abs(AF\_Field\_2);

degree\_theta=theta\*(180/pi);

plot(degree\_theta,ff2,'k');

xlabel('steering angle')

ylabel('Beam rad ')

AF\_Field\_3=0;

for n=1:16

for m=1:16

AF\_Field\_3 = exp(j\*2\*pi\*(n-1)/lambda\*dx\*(Vk-V)).\*exp(j\*2\*pi\*(m-1)/lambda\*dy\*(Wk-W)) + AF\_Field\_3;

end

end

ff3=abs(AF\_Field\_3);

hold on;

plot(degree\_theta,ff3,'m');