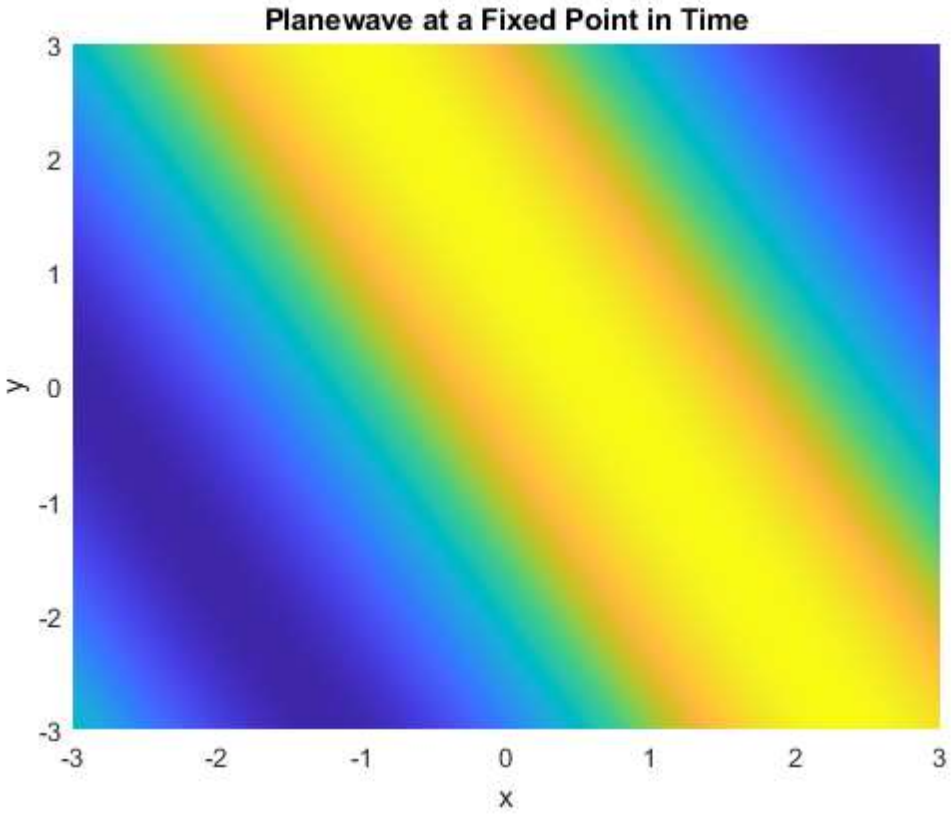
Contents


```
close all
clear
clc
```

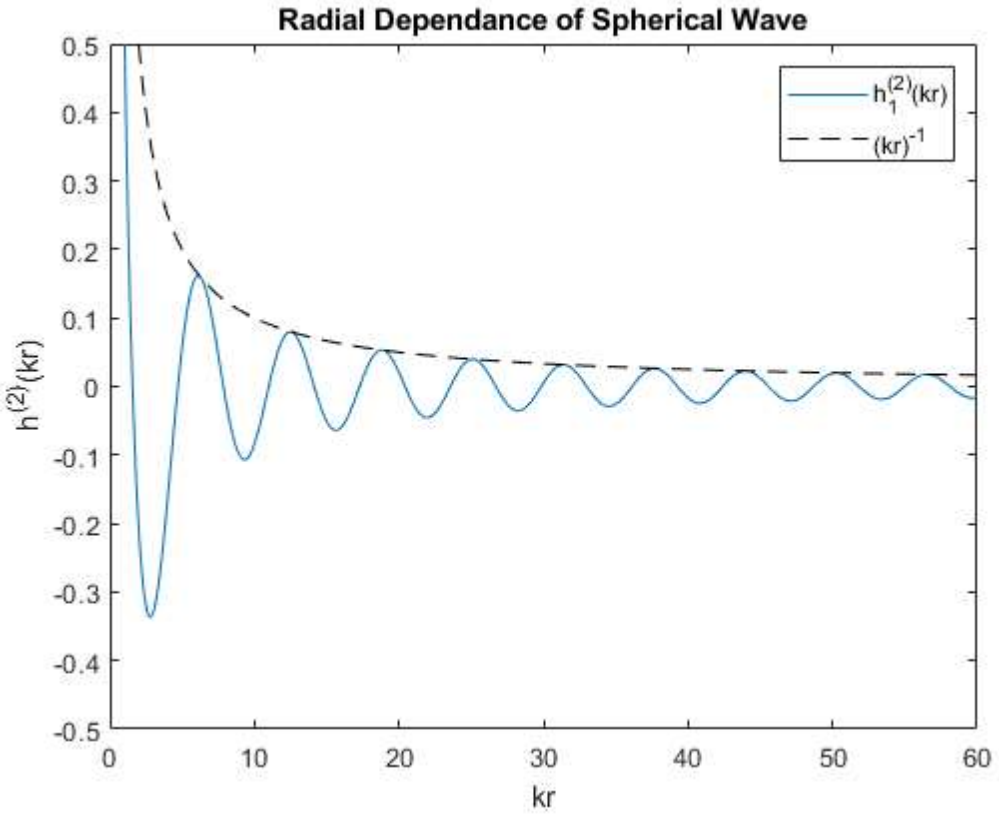
Plane Waves

```
x = linspace(-3, 3, 100);
y = linspace(-3, 3, 100);
t = linspace(0, 20, 1001);

[X, Y] = meshgrid(x, y);

phi = pi/6;
f_xy  = exp((-1j).*(cos(phi).* X + sin(phi).*Y));
f_xyt =0;

for t_ = t
    figure(1)
    f_xyt = real((f_xy).*exp(1j*t_)) + f_xyt;
    drawnow limitrate nocallbacks
    pcolor(X, Y, f_xyt)
    shading interp
    xlabel('x')
    ylabel('y')
end
title('Planewave at a Fixed Point in Time')
```

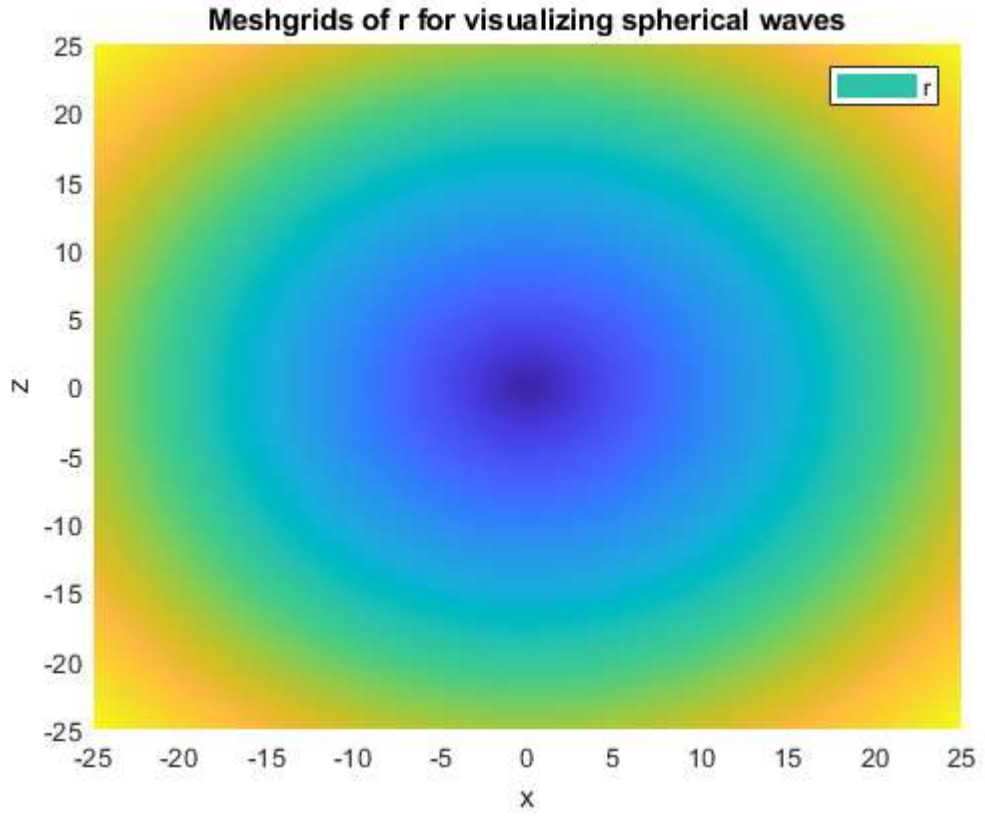


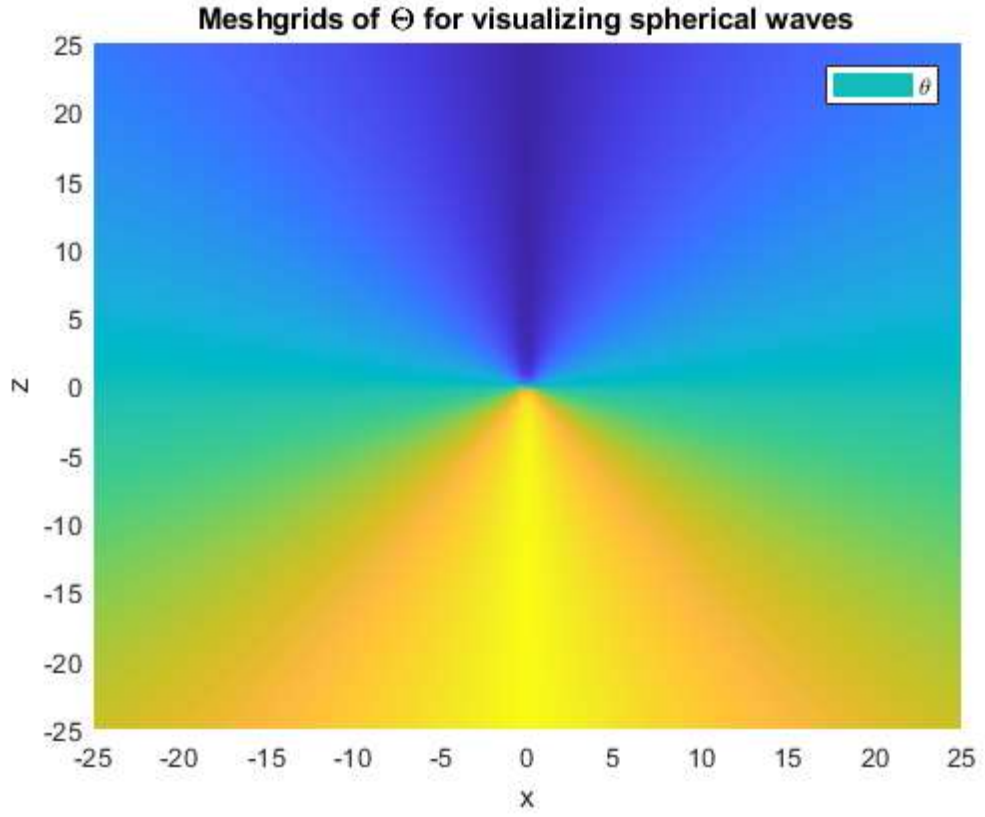
Spherical Waves

```
kr   = linspace(0.001, 60, 1000);
Hkr = real(exp(-1j.*kr)./kr);

d = 1./kr;

figure(2)
plot(kr, Hkr)
hold on
plot(kr, d, '--k')

xlabel('kr')
ylabel('h^{(2)}(kr)')
ylim([-0.5, 0.5])
legend('h^{(2)}_{1}(kr)','(kr)^{-1}')
title('Radial Dependance of Spherical Wave')
hold off
```



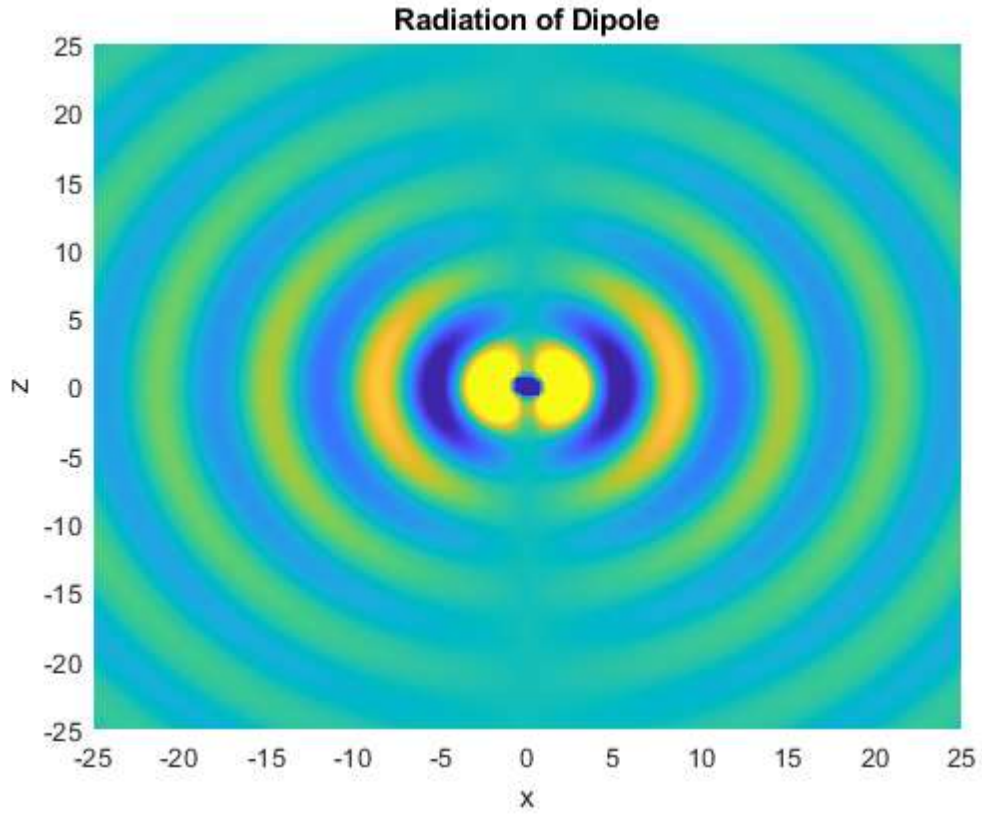

```
x = linspace(-25, 25, 100);
z = linspace(-25, 25, 100);
[X, Z] = meshgrid(x, z);

r  = sqrt(X.^2 + Z.^2);
th = atan2(abs(X), Z);

figure(3)
pcolor(X, Z, r)
legend('r')
xlabel('x')
ylabel('z')
shading interp
title('Meshgrids of r for visualizing spherical waves')

figure(4)
pcolor(X, Z, th)
legend('\theta')
xlabel('x')
ylabel('z')
shading interp
title('Meshgrids of \Theta for visualizing spherical waves')
```

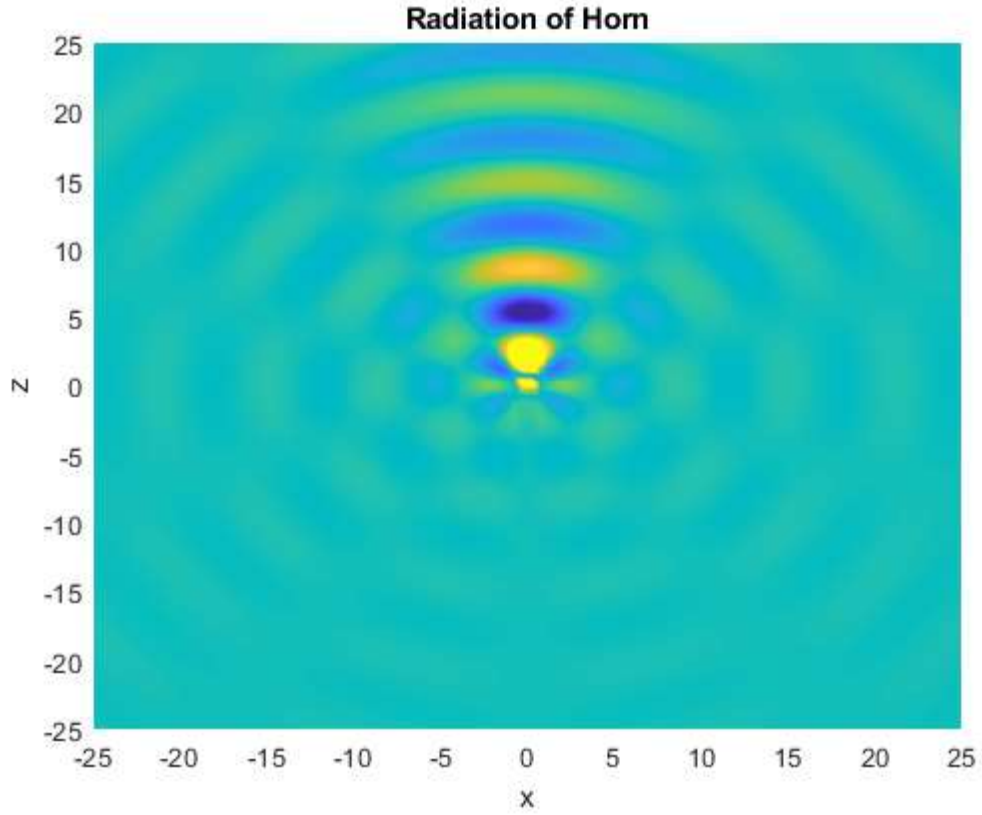





```
x = linspace(-25, 25, 100);
z = linspace(-25, 25, 100);
t = linspace(0, 15, 100);
ti = t;
[X, Z] = meshgrid(x, z);
```

```
a   = 5;
r   = sqrt(X.^2 + Z.^2);
th  = atan2(abs(X), Z);

gd  = sin(th);
gh  = sin(a.*th)./(a.*th);
Hr  = exp(-1j.*r)./r;

f_rtp   = gd.*Hr;
f_rtp_h = gh.*Hr;

for t_ = t
    Ft = f_rtp.*exp(1j*t_);
    figure(5)
    pcolor(X, Z, real(Ft))
    drawnow limitrate nocallbacks
    shading interp
    caxis([-0.15, 0.15])
    xlabel('x')
    ylabel('z')
end
title('Radiation of Dipole')

for ti_ = ti
    Fti = f_rtp_h.*exp(1j*ti_);
    figure(6)
    pcolor(X, Z, real(Fti))
    drawnow limitrate nocallbacks
    shading interp
    caxis([-0.15, 0.15])
    xlabel('x')
    ylabel('z')
end
title('Radiation of Horn')
```





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