```
syms  x1 x2 x3 x4 y1 y2 y3 y4 y x t;
c=4900;k=75000;m=1200;
N1=0;N2=5;N3=3;
w1=2*pi;w2=4*pi;w3=8*pi;
wn=sqrt(k/m);r=c/(2*sqrt(m*k));
r1=w1/wn;r2=w2/wn;r3=w3/wn;
y1(t)=k*N1*sin(w1*t)+c*N1*w1*cos(w1*t);
y2(t)=k*N2*sin(w2*t+pi/2)+c*N2*w2*cos(w2*t+pi/2);
y3(t)=k*N3*sin(w3*t+pi/3)+c*N3*w3*cos(w3*t+pi/3);
x1(t)=wei(N1*k,k,r1,r)*sin(w1*t+xiang(r,r1))+wei(c*N1*w1,k,r1,r)*cos(w1*t+xiang(
r,r1));
x2(t)=wei(N2*k,k,r2,r)*sin(w2*t+pi/2+xiang(r,r2))+wei(c*N2*w2,k,r2,r)*cos(w2*t+p
i/2+xiang(r,r2));
x3(t)=wei(N3*k,k,r3,r)*sin(w3*t+pi/3+xiang(r,r3))+wei(c*N3*w3,k,r3,r)*cos(w3*t+p
i/3+xiang(r,r3));
y(t)=N1*sin(w1*t)+N2*sin(w2*t+pi/2)+N3*sin(w3*t+pi/3);
x(t)=x1+x2+x3;
x4(t)=diff(x,2);                                  的函数
y4(t)=diff(y,2);
t=0:0.01:2;
x4=x4(t);y4=y4(t);
y=y(t);x=x(t);
figure(1)
plot(t,y,'-',t,x,'--')
hold on
xlabel('t/s');
ylabel('x-y/10^{-3} m');
title('激励y(t)与响应x(t)的时间历程图像');
legend('y(t)','x(t)')
figure(2)
plot(t,x4,'-',t,y4,'--')
title('激励与响应的加速度图')
xlabel('t/s')
ylabel('加速度/10^{-3}(m/s^2)')
legend('激励','响应')
w=0:0.01:10*pi;
p=k/m;
L= (sqrt((c.* w ).^2 + k^2)) ./...
    (sqrt((k-m.*w.^2).^2 + (c .* w).^2));
figure(3)
plot(w,L)
grid on
hold on
title('幅频特性曲线')
xlabel('w/(rad/s)')
ylabel('|H_{y,x}(w)|')
n= -180+(atan((c*w)./k))*180/pi+90+...
(((atan(c*w)./k)-(atan((c*w)./(k-m*(w.*w)))))*180/pi+90).*(w.*w<p)+...
    (((atan(c*w)./k)-(atan((c*w)./(k-m*(w.*w)))))*180/pi-90).*(w.*w>p);
figure (4)
hold on
plot(w,n)
grid on
axis([0 10*pi -180 0]);
title('相频特性曲线')
```

```
xlabel('w/(rad/s)')
ylabel('\theta /（^\circ）')
figure(5)
hold on
for p=[0.2,0.3,0.4,r]
    b=0:0.01:5;
    n1= (sqrt((2*p.*b).^2 + 1)) ./...
         (sqrt((1-b.^2).^2 + (2*p.* b).^2));
    plot(b,n1)
    grid on
    hold on
end
title('幅频特性曲线')
xlabel('频率比')
ylabel('|H_{y,x}(w)|')
legend('0.2','0.3','0.4','0.258')
figure(6)
x6=respondacclerate(4900,75000,1200,N1,N2,N3);
plot(t,x4,'-',t,x6,'--')
grid on
title('k、c改变前后响应的加速度图')
xlabel('t/s')
ylabel('加速度/10^{-3}(m/s^2)')
legend('k、c改前','k、c改后')
figure(7)
L1=respondfupin(4900,75000,1200);
plot(w,L,'-',w,L1,'--')
grid on
hold on
title('k、c改变前后响应的幅频特性曲线')
xlabel('w/(rad/s)')
ylabel('|H_{y,x}(w)|')
legend('k、c改前','k、c改后')
figure(8)
x5=respondzhuhan(4900,75000,1200,N1,N2,N3);
plot(t,x,'-',t,x5,'--')
hold on
xlabel('t/s');
ylabel('x-y/10^{-3} m');
title('k、c前后响应x(t)的时间历程图像');
legend('k、c改前','k、c改后')


function x=xiang(d,r)
if r<1
   x=-atan(2*d*r/(1-r^2));
else
    x=-atan(2*d*r/(1-r^2))-pi;
end

function x=wei(a,k,d,r)
x=a/(k*sqrt((1-d^2)^2+(2*d*r)^2));

a1 = 75*3;
a2 = 4.9*24;
t1 = sqrt(a1^2+a2^2);
t2 = atan(a2/a1);
```

```
b1 = 253.879;
b2 = 3.179;
x  = b1/75000/(sqrt((1-b2^2)^2+(2*0.258*b2)^2));

c1 =3.179;
theta = atan(2*0.258*c1/(1-c1^2))-pi+0.482;

function x5=respondzhuhan(c,k,m,N1,N2,N3)
syms  x1 x2 x3 x4 y1 y2 y3 y4 y x t;
w1=2*pi;w2=4*pi;w3=8*pi;                    %求固有参数
wn=sqrt(k/m);r=c/(2*sqrt(m*k));
r1=w1/wn;r2=w2/wn;r3=w3/wn;                 %计算频率比
y1(t)=k*N1*sin(w1*t)+c*N1*w1*cos(w1*t);    %分解为三个激励
y2(t)=k*N2*sin(w2*t+pi/2)+c*N2*w2*cos(w2*t+pi/2);
y3(t)=k*N3*sin(w3*t+pi/3)+c*N3*w3*cos(w3*t+pi/3);
x1(t)=wei(N1*k,k,r1,r)*sin(w1*t+xiang(r,r1))+wei(c*N1*w1,k,r1,r)*cos(w1*t+xiang(
r,r1));%不同激励下的响应函数
x2(t)=wei(N2*k,k,r2,r)*sin(w2*t+pi/2+xiang(r,r2))+wei(c*N2*w2,k,r2,r)*cos(w2*t+p
i/2+xiang(r,r2));
x3(t)=wei(N3*k,k,r3,r)*sin(w3*t+pi/3+xiang(r,r3))+wei(c*N3*w3,k,r3,r)*cos(w3*t+p
i/3+xiang(r,r3));
y(t)=N1*sin(w1*t)+N2*sin(w2*t+pi/2)+N3*sin(w3*t+pi/3);
x5(t)=x1+x2+x3;                              %响应函数
t=0:0.01:2;
x5=x5(t);

function L1=respondfupin(c,k,m)
w=0:0.01:10*pi;
L1= (sqrt((c.* w ).^2 + k^2)) ./...    %幅频特性曲线函数
    (sqrt((k-m.*w.^2).^2 + (c .* w).^2));

function x4=respondacclerate(c,k,m,N1,N2,N3)
syms  x1 x2 x3 x4 y1 y2 y3 y4 y x t;
w1=2*pi;w2=4*pi;w3=8*pi;                    %求固有参数
wn=sqrt(k/m);r=c/(2*sqrt(m*k));
r1=w1/wn;r2=w2/wn;r3=w3/wn;                 %计算频率比
y1(t)=k*N1*sin(w1*t)+c*N1*w1*cos(w1*t);    %分解为三个激励
y2(t)=k*N2*sin(w2*t+pi/2)+c*N2*w2*cos(w2*t+pi/2);
y3(t)=k*N3*sin(w3*t+pi/3)+c*N3*w3*cos(w3*t+pi/3);
x1(t)=wei(N1*k,k,r1,r)*sin(w1*t+xiang(r,r1))+wei(c*N1*w1,k,r1,r)*cos(w1*t+xiang(
r,r1));%不同激励下的响应函数
x2(t)=wei(N2*k,k,r2,r)*sin(w2*t+pi/2+xiang(r,r2))+wei(c*N2*w2,k,r2,r)*cos(w2*t+p
i/2+xiang(r,r2));
x3(t)=wei(N3*k,k,r3,r)*sin(w3*t+pi/3+xiang(r,r3))+wei(c*N3*w3,k,r3,r)*cos(w3*t+p
i/3+xiang(r,r3));
y(t)=N1*sin(w1*t)+N2*sin(w2*t+pi/2)+N3*sin(w3*t+pi/3);
x(t)=x1+x2+x3;                               %响应函数
x4(t)=diff(x,2);                             %求加速度的函数
t=0:0.01:2;
x4=x4(t);
```