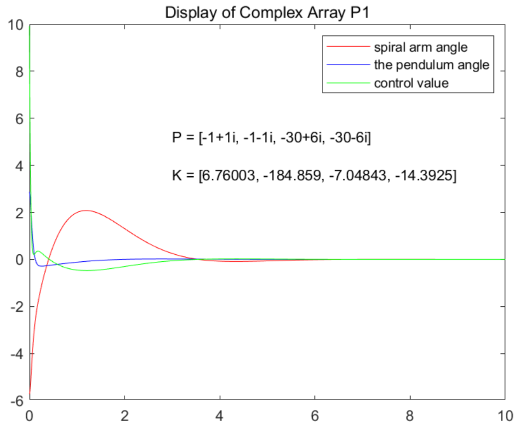
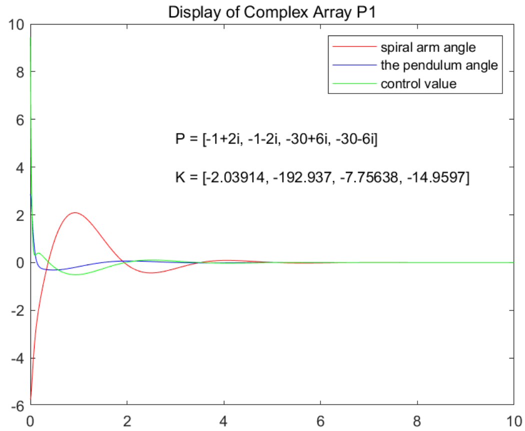
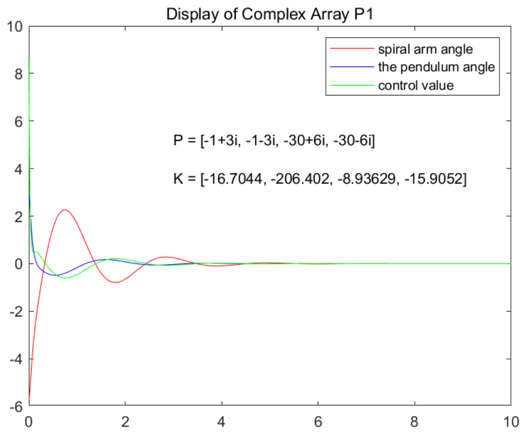
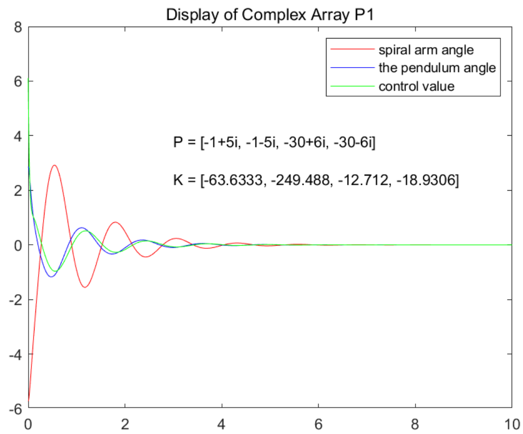
改变主导极点虚部

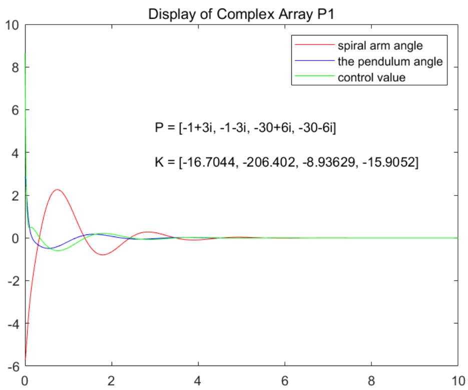


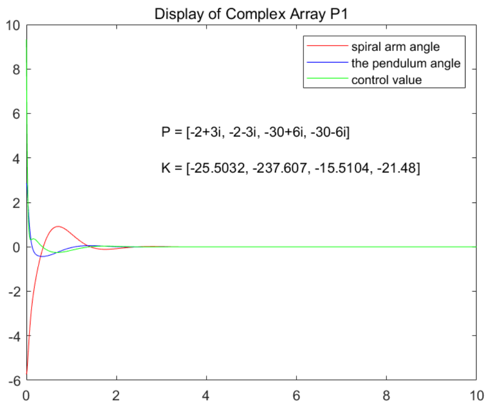


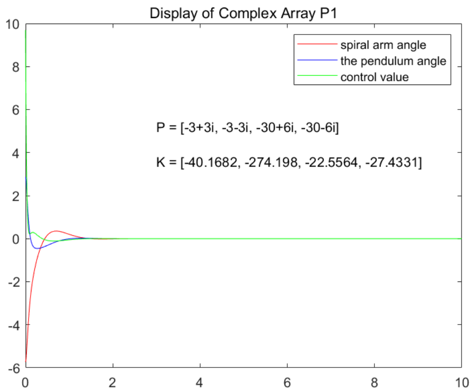


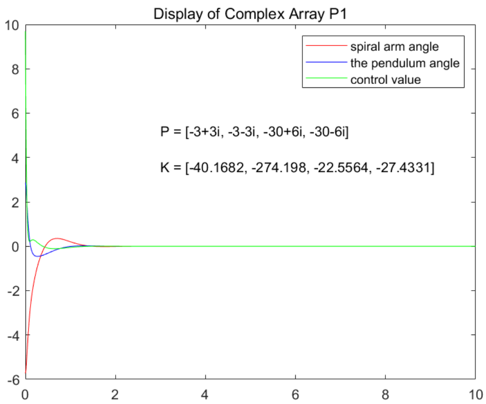


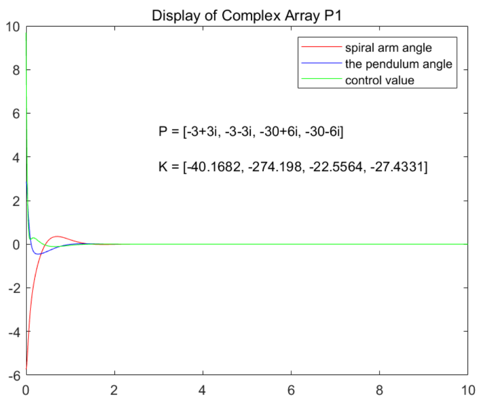
改变主导极点实部

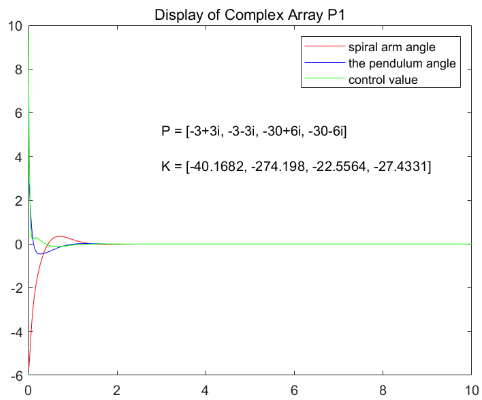


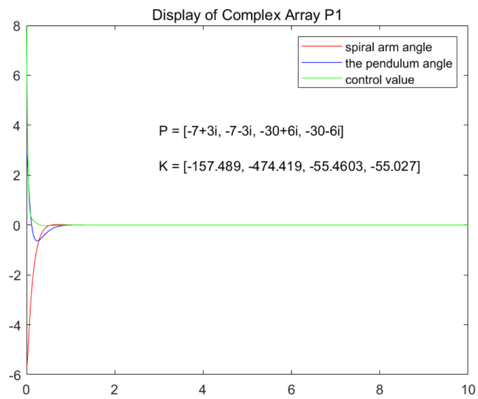


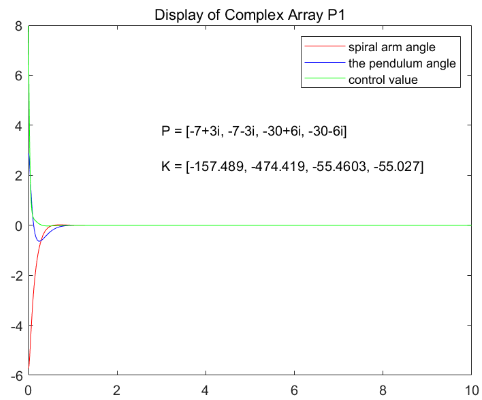


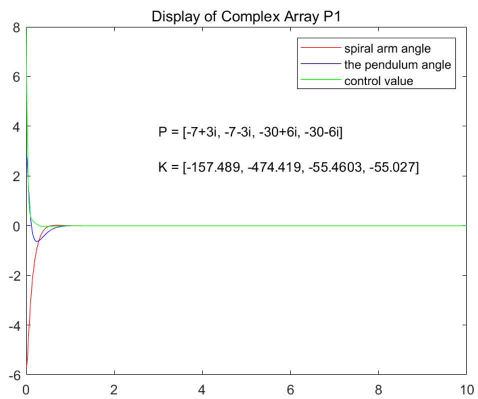


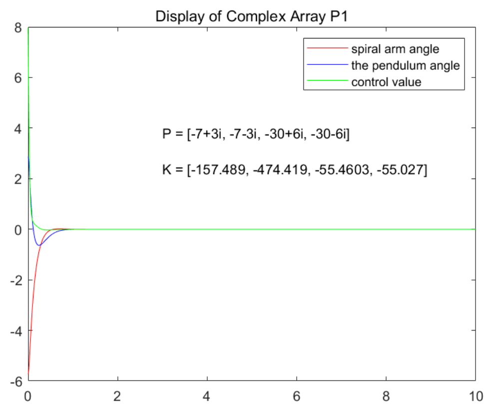

Display of Complex Array P1
spiral arm angle
the pendulum angle
control value
P = [-3+3i, -3-3i, -30+6i, -30-6i]
K = [-40.1682, -274.198, -22.5564, -27.4331]


Display of Complex Array P1
spiral arm angle
the pendulum angle
control value
P = [-3+3i, -3-3i, -30+6i, -30-6i]
K = [-40.1682, -274.198, -22.5564, -27.4331]

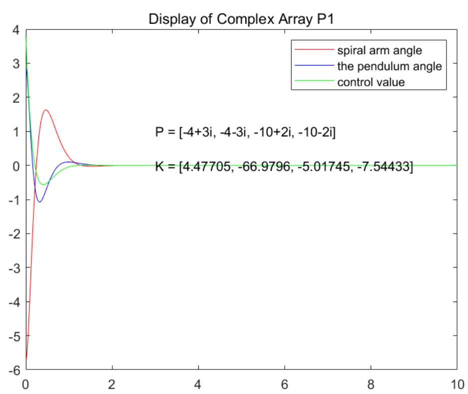

Display of Complex Array P1
spiral arm angle
the pendulum angle
control value
P = [-7+3i, -7-3i, -30+6i, -30-6i]
K = [-157.489, -474.419, -55.4603, -55.027]

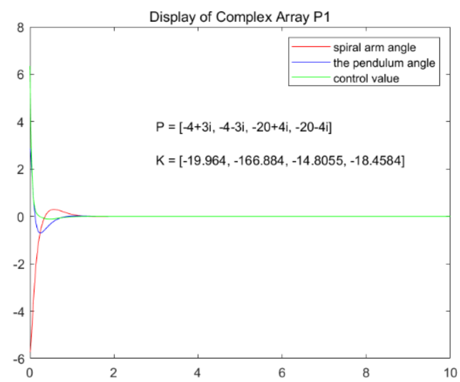

Display of Complex Array P1
spiral arm angle
the pendulum angle
control value
P = [-7+3i, -7-3i, -30+6i, -30-6i]
K = [-157.489, -474.419, -55.4603, -55.027]

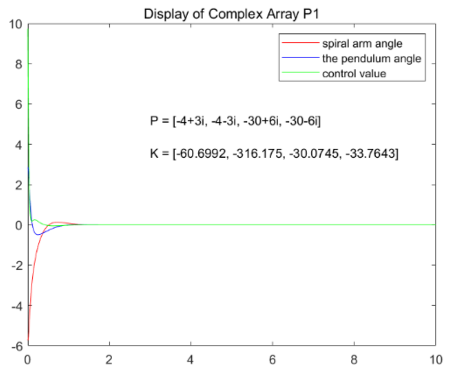

Display of Complex Array P1
spiral arm angle
the pendulum angle
control value
P = [-7+3i, -7-3i, -30+6i, -30-6i]
K = [-157.489, -474.419, -55.4603, -55.027]

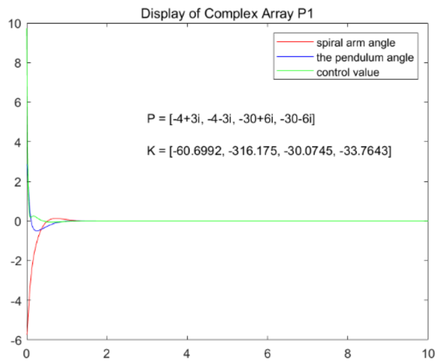

Display of Complex Array P1
spiral arm angle
the pendulum angle
control value
P = [-7+3i, -7-3i, -30+6i, -30-6i]
K = [-157.489, -474.419, -55.4603, -55.027]

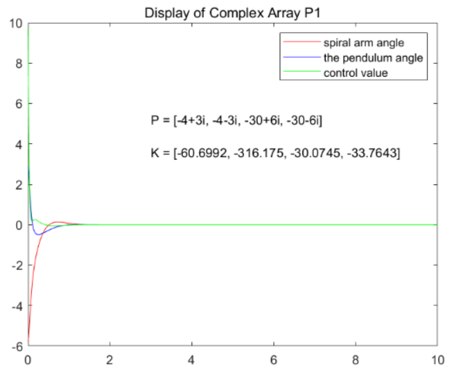
改变实部虚部


Display of Complex Array P1
spiral arm angle
the pendulum angle
control value
P = [-4+3i, -4-3i, -10+2i, -10-2i]
K = [4.47705, -66.9796, -5.01745, -7.54433]


Display of Complex Array P1
spiral arm angle
the pendulum angle
control value
P = [-4+3i, -4-3i, -20+4i, -20-4i]
K = [-19.964, -166.884, -14.8055, -18.4584]

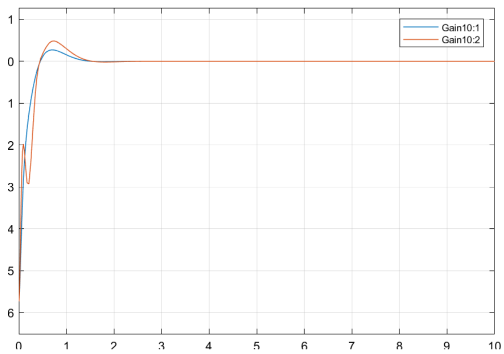


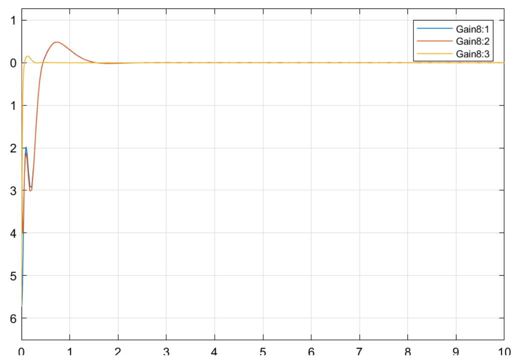




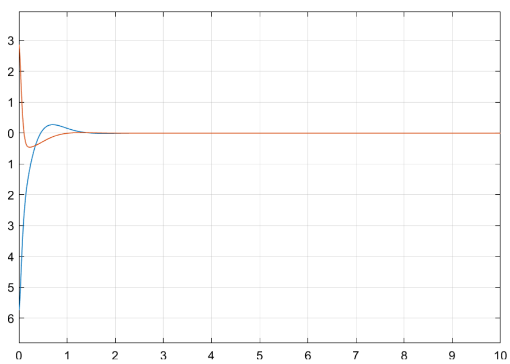
Simulink 仿真

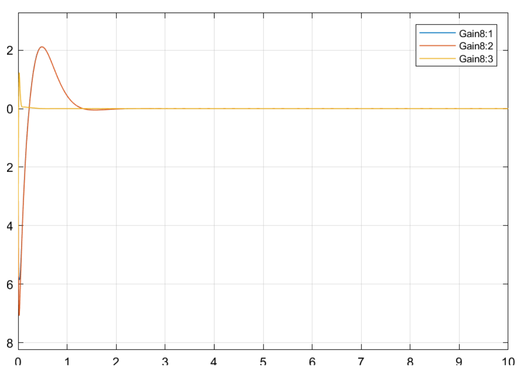
改变实部：P1=[-20+3i,-20-3i,-80-1i,-80+1i];



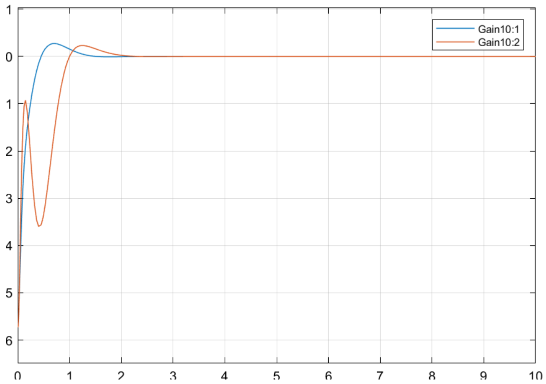


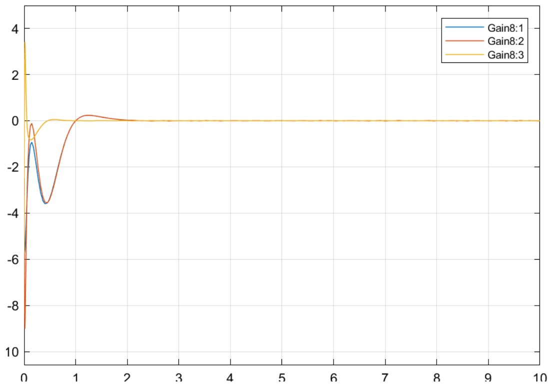
P1= [-10+3i,-10-3i,-80-1i,-80+1i]





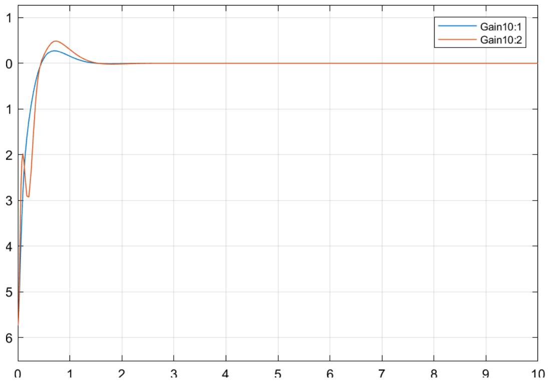
P1=[-5+3i,-5-3i,-80-1i,-80+1i];

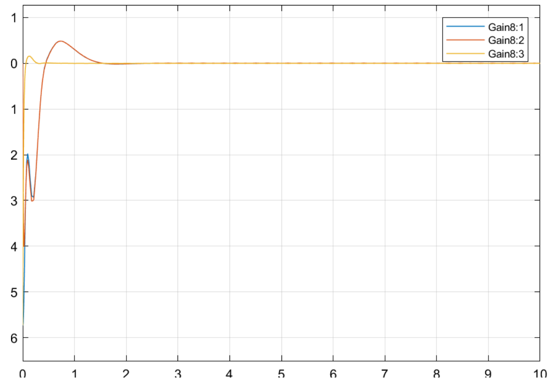




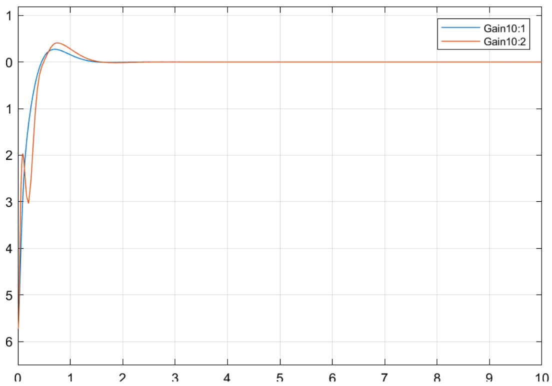
改变虚部:

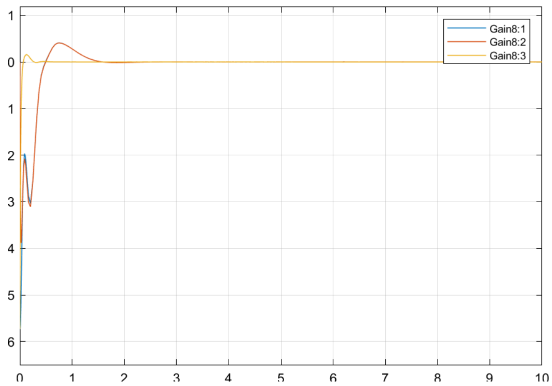
P1=[-20+3i,-20-3i,-80-1i,-80+1i];



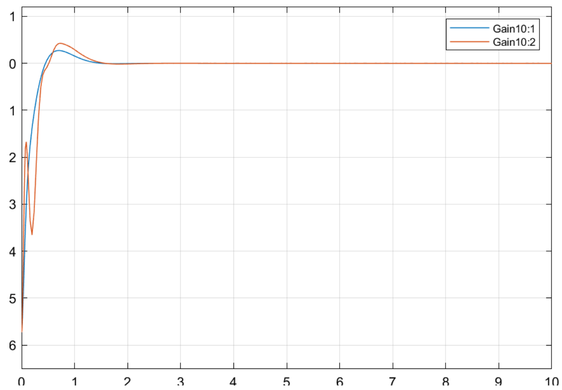


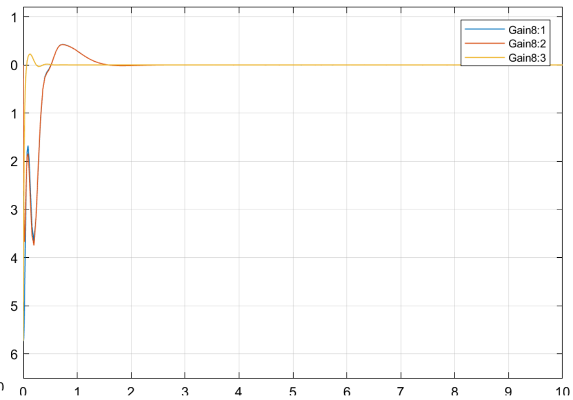
P1=[-20+5i,-20-5i,-80-1i,-80+1i];

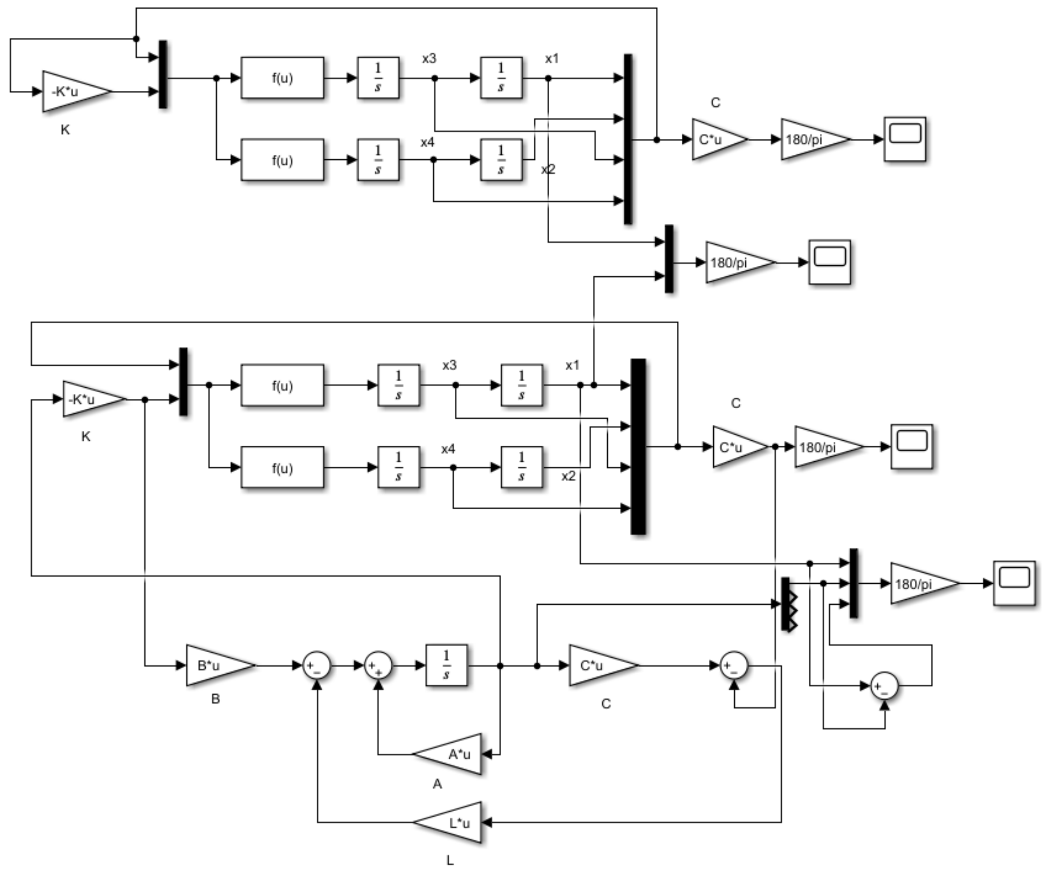




P1=[-20+10i,-20-10i,-80-1i,-80+1i];






-K*u
K
f(u)
f(u)
1/s
1/s
x3
x4
1/s
1/s
x1
x2
C
C*u
180/pi
180/pi
-K*u
K
f(u)
f(u)
1/s
1/s
x3
x4
1/s
1/s
x1
x2
C
C*u
180/pi
180/pi
B*u
B
1/s
C*u
C
A*u
A
L*u
L

```
P=[-4+3i,-4-3i,-30+6i,-30-6i];
P1=[-20+3i,-20-3i,-80-1i,-80+1i];


imag(P(2)), real(P(3)), imag(P(3)), real(P(4)), imag(P(4)));
str_p = sprintf('P_1 = [%g+%gi, %g%+gi, %g%+gi, %g%+gi]', real(P1(1)), imag(P1(1)), real(P1(2)), imag(P1(2)), real(P1(3)), imag(P1(3)), real(P1(4)), imag(P1(4)));
tf=10;
r=[-0.1;0.05;0;0];
A=[    0       0        1        0
       0       0        0        1
    65.8751  -16.8751    -3.7062     0.2760
   -82.2122   82.2122    4.6254     -1.3444] ; % System matrix
B=[0;0;5.2184;-6.5125]; % Control Matrix
C=[1,0,0,0;0,1,0,0]; % output matrix
disp(['r(Qc)=',num2str(rank (ctrb (A, B)))]);
disp(['r(Qo)=',num2str(rank (obsv (A, C)))]);
disp('¦Ë=');
disp(num2str(eig (A))); % stability
[K,L,t,x]=dlb(r,P,P1,tf,A,B,C);
disp(['K=',num2str(K)]);
str_k = sprintf('K = [%g, %g, %g, %g]', K(1), K(2), K(3), K(4));
str_l = sprintf('L = [%g, %g, %g, %g, %g, %g, %g, %g]', L(1,1), L(1,2),L(2,1), L(2,2), L(3,1), L(3,2), L(4,1), L(4,2));
disp('L=');
disp(num2str(L));
figure;
plot(t,x(:,1)*180/pi,'r',t,x(:,2)*180/pi,'b',t,x(:,5),'g')
text(0.3, 0.7, str_p, 'Units', 'normalized');
% text(0.3, 0.6, str_k, 'Units', 'normalized');
text(0.3, 0.6, str_l, 'Units', 'normalized');

title('Display of Complex Array P1');
%text(1,1,str(P1))
legend('spiral arm angle','the pendulum angle','control value');

function [K,L,t,x]=dlb(r,P,P1,tf,A,B,C)
global K;
K=place(A,B,P); % state feedback gain matrix
L=place(A',C',P1)';
t0=0;
u0=-K*r;
x0=[r;u0];%initial value
[t,x]=ode45(@dlfun,[t0,tf],x0);% solve differential equations
```

```
function xdot=dlfun(~,x)
m1=0.200; m2=0.052; L1=0.10; L2=0.12; r1=0.20; km=0.0236; ke=0.2865;
g=9.8; J1=0.004; J2=0.001; f1=0.01; f2=0.001; % value of parameter
a=J1+m2*r1*r1; b=m2*r1*L2; c=J2; d=f1+km*ke; e=(m1*L1+m2*r1)*g;  f=f2;  h=m2*L2*g;
x(1)=x(1,:);
x(2)=x(2,:);
x(3)=x(3,:);
x(4)=x(4,:);
x(5)=x(5,:);
u=-K*[x(1);x(2);x(3);x(4)]; % control variable
xdot=zeros(5,1); %derivative of x
xdot(1)=x(3);
xdot(2)=x(4);
xdot(3)=((-d*c).*x(3)+(f*b*cos(x(2)-x(1))).*x(4)+b*b*sin(x(2)-x(1)).*cos(x(2)-x(1)).*x(3).*x(3)-
b*c*sin(x(1)-x(2)).*x(4).*x(4)+e*c*sin(x(1))-h*b*sin(x(2)).*cos(x(2)-x(1))+km*c*u)/(a*c-
b*b.*cos(x(1)-x(2)).*cos(x(2)-x(1)));
xdot(4)=((d*b*cos(x(1)-x(2))).*x(3)-(a*f).*x(4)-a*b*sin(x(2)-x(1)).*x(3).*x(3)+b*b*sin(x(1)-
x(2)).*cos(x(1)-x(2)).*x(4).*x(4)-e*b*sin(x(1)).*cos(x(1)-x(2))+a*h*sin(x(2))-b*cos(x(1)-
x(2))*km*u)/(a*c-b*b.*cos(x(1)-x(2)).*cos(x(2)-x(1))); % differential equations to describe the
nonlinear model
xdot(5)=-K*[xdot(1);xdot(2);xdot(3);xdot(4)]; % derivative of control variable
end
end
```