PD type

clear

close all

s = -1.25+2.1651i;

syms k;

z = -0.038

y = solve((1/(2\*s + 1)\*(s+1)\*(0.5\*s+1))\*k\*(s+z) + 1)

%get z = -0.0835 k=0.721784 it is not the answer

D

clear

close all

tc = 0.8

damp = 0.5

damp2 = damp^2 % s = -1.25 + 2.1651j

S\_first= -(1/tc)

S\_after= (1/tc)\*(((1-damp2)/damp2)^(1/2))

for i = 1:1:10

k=[1 0];

plant = tf(k,conv(conv([2 1],[1 1]),[0.5 1]))

plant\_new = feedback(plant\*i/10,1,-1)

figure(i)

rlocus(plant\_new)

end

%the situation same us PD just can not find when damp = 0.5 and t =0.8

PID

for i = 1:1:10 % a:b:c a->start point b->interval c->final point

syms a w

k=i

A=solve(17.05-5.4127\*k+8.6602\*k\*a==0,a);

S=solve(22.9687+k\*(-3.125)-5\*k\*A+k\*A\*A+k\*w\*w == 0,w);

z1=A+S(1)\*(-1)^(0.5)

z2=A-S(1)\*(-1)^(0.5)

plant = tf([1 2\*eval(A) eval(z1\*z2)],conv(conv(conv([2 1],[1 1]),[0.5 1]),[1 0]))

plant\_new = feedback(plant\*k,1,-1)

figure(1)

hold on

step(plant\_new)

hold off

end

clear

close all

tc = 0.8

damp = 0.5

damp2 = damp^2 % s = -1.25 + 2.1651j

S\_first= -(1/tc)

S\_after= (1/tc)\*(((1-damp2)/damp2)^(1/2))

S=S\_first + i\*S\_after

L = S\*(2\*S+1)\*(S+1)\*(0.5\*S+1)

for i = 1:1:10 % a:b:c a->start point b->interval c->final point

syms a w

k=i

A=solve(17-5.413\*k+8.66\*k\*a==0,a);

S=solve(23+k\*(-3.125)-5\*k\*A+k\*A\*A+k\*w\*w == 0,w);

z1=A+S(1)\*(-1)^(0.5)

z2=A-S(1)\*(-1)^(0.5)

plant = tf([1 2\*eval(A) eval(z1\*z2)],conv(conv(conv([2 1],[1 1]),[0.5 1]),[1 0]))

plant\_new = feedback(plant\*k,1,-1)

figure(1)

hold on

step(plant\_new)

hold off

end

PID finally

clear

close all

tc = 0.8

damp = 0.5

damp2 = damp^2 % s = -1.25 + 2.1651j

S\_first= -(1/tc)

S\_after= (1/tc)\*(((1-damp2)/damp2)^(1/2))

S=S\_first + i\*S\_after

L = S\*(2\*S+1)\*(S+1)\*(0.5\*S+1)

for i = 5.694:0.001:5.694 % a:b:c a->start point b->interval c->final point

syms a w

k=i

A=solve(17-5\*k+8\*k\*a==0,a);

S=solve(23+k\*(-3)-5\*k\*A+k\*A\*A+k\*w\*w == 0,w);

z1=A+S(1)\*(-1)^(0.5)

z2=A-S(1)\*(-1)^(0.5)

plant = tf([1 2\*eval(A) eval(z1\*z2)],conv(conv(conv([2 1],[1 1]),[0.5 1]),[1 0]))

plant\_new = feedback(plant\*k,1,-1)

figure(1)

hold on

step(plant\_new)

hold off

end