

```
1 %% Q3.1.
2 clc;
3 close all
4
5 num_of_iterations = 200;
6 mp_max = 0.16;
7 mp_min = 0.14;
8 ts_max = 1.6;
9 ts_min = 1.4;
10 M_p = linspace(mp_min, mp_max*3, num_of_iterations);
11 ts_1p = linspace(ts_min/2, ts_max*3, num_of_iterations);
12
13 c_s = {};
14
15 p = 4*tf([1 8],[1 10])*tf([1 12],[1 1 1.25]);
16 for i = 1:num_of_iterations
17     zeta = (abs(log(M_p(i)))) / sqrt(pi^2 + (abs(log(M_p(
18         i))))^2));
19     omega_n = (log(1/0.01)) / (zeta * ts_1p(i));
20     c = design_PD((p), [complex(-zeta*omega_n,omega_n *
21         sqrt(1-zeta^2)), complex(-zeta*omega_n,-omega_n * sqrt(1-
22         zeta^2))]);
23     c_s{end + 1} = c;
24     sys = c*p / (1+c*p);
25     info = stepinfo(sys,"SettlingTimeThreshold", 0.01);
26     if (info.Overshoot > mp_min*100) && (info.Overshoot <
27         mp_max*100)
28         if (info.SettlingTime > ts_min) && (info.
29             SettlingTime < ts_max)
30             zeta
31             omega_n
32             c
33             info
34             disp("succes");
35             break
```

```
31         end
32     end
33
34     zeta = (abs(log(M_p(num_of_iterations - i + 1)))) / ✓
sqrt(pi^2 + (abs(log(M_p(num_of_iterations - i + 1)))^2));
35     omega_n = (log(1/0.01)) / (zeta * ts_1p(i));
36     c = design_PD(p, [complex(-zeta*omega_n,omega_n * ✓
sqrt(1-zeta^2)), complex(-zeta*omega_n,-omega_n * sqrt(1-✓
zeta^2))]);
37     c_s{end + 1} = c;
38     sys = c*p / (1+c*p);
39     info = stepinfo(sys,"SettlingTimeThreshold", 0.01);
40     if (info.Overshoot > mp_min*100) && (info.Overshoot < ✓
mp_max*100)
41         if (info.SettlingTime > ts_min) && (info. ✓
SettlingTime < ts_max)
42             zeta
43             omega_n
44             c
45             info
46             disp("succes");
47             break
48         end
49     end
50     i
51 end
52 fig1 = figure(1);
53 step(sys);
54 % stepinfo(sys,"SettlingTimeThreshold", 0.01)
55 %exportgraphics(fig1, '3.1grap1.png','Resolution',1200);
```