Report for Auto Control Lab5

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1 Introduction

This is the second Experiment of Auto Control Lab where TAs taught us some the plot of transfer function, and the plot of zeros and poles.

2 LAB5

2.1 Basic ways to find zeroes and poles for a certain transfer function

Objective:To perform basic operations on transfer functions.

These are the stated Homework problems

Lab5 Homework

1. For transfer functions

G(s)= $\dfrac{6s^2+1}{s^3+3s^2+3s+1}$, H(s)= $\dfrac{(s+1)(s+2)}{(s+2i)(s-2i)(s+3)}$

(a) Find poles and zeros of G(s) and H(s)

(b) Find transfer function of G(s)/H(s), and plot its pole-zero map

2.2 CODES FOR PROBLEM1

In order to perform the tasks, Matlab codes are needed. The following is the code needed for generating the transfer function of problem 1

```
%Transfer function G
n1 = [6 0 1];
d1 = [1 3 3 1];
G = tf(n1 , d1)

%Transfer function H
n2 = [1 1]; n3 = [1 2];
d2 = [1 2*i]; d3 = [1 -2*i]; d4 = [1 3];
num = conv(n2 , n3);
dem = conv(d2 , conv(d3,d4));
H = tf(num,dem)

%a)
disp('Poles and zeroes for G');
pole(G)
zero(G)


disp('Poles and zeroes for H');
pole(H)
zero(H)
%b)
T = tf(G/H)
pzmap(T)
```

2.3 Results OF given transfer functions

The results contains of Poles and zeroes, and also the plot on s-plane

```
G =

        6 s^2 + 1
  ---------------------
  s^3 + 3 s^2 + 3 s + 1

Continuous-time transfer function.


H =

      s^2 + 3 s + 2
  ----------------------
  s^3 + 3 s^2 + 4 s + 12

Continuous-time transfer function.

Poles and zeroes for G

ans =

  -1.0000 + 0.0000i
  -1.0000 - 0.0000i
  -1.0000 + 0.0000i


ans =

   0.0000 + 0.4082i
   0.0000 - 0.4082i

Poles and zeroes for H
```

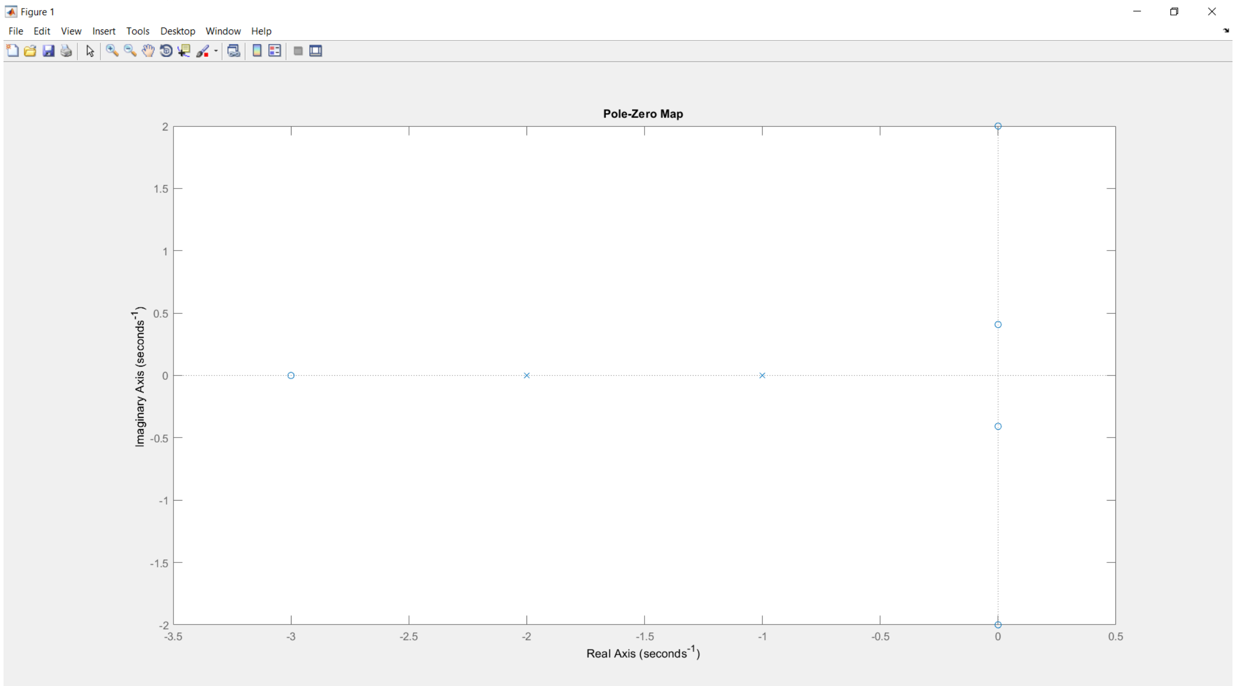
```
%Transfer function G
n1 = [6 0 1];
d1 = [1 3 3 1];
G = tf(n1 , d1)

%Transfer function H
n2 = [1 1]; n3 = [1 2];
d2 = [1 2*i]; d3 = [1 -2*i]; d4 = [1 3];
num = conv(n2 , n3);
dem = conv(d2 , conv(d3,d4));
H = tf(num,dem)

%a)
disp('Poles and zeroes for G');
pole(G)
zero(G)


disp('Poles and zeroes for H');
pole(H)
zero(H)
%b)
T = tf(G/H)
pzmap(T)
```

Plot for pole-zero for the certain transfer function.

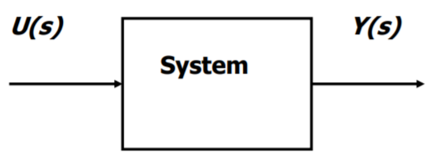


2.4 Problems and codes for PROBLEM2

Lab5 Homework

2. For $G(s) = \dfrac{Y(s)}{U(s)} = \dfrac{k}{2s+3}$

Plot step response for k=10,30,60



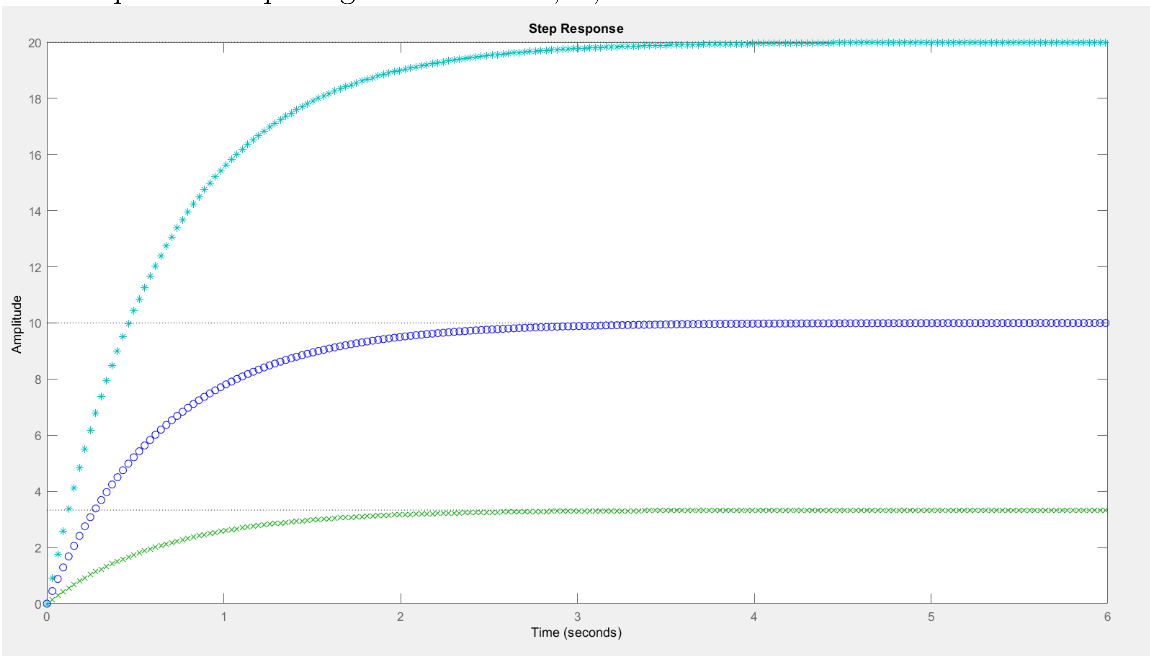

```
k = 10;
G1 = tf(k , [2 3]);

k = 30;
G2 = tf(k , [2 3]);

k = 60;
G3 = tf(k , [2 3]);

step(G1,'xg',G2,'ob',G3,'*c');
```

The plots for 3 plots given as k = 10,30,60



3 Conclusion

Today we learn the function plotting of transfer function and the ways to find poles and zeroes for a certain transfer functions. We are slowly catching up with our basic knowledges for which we learnt in Signal and System and what we learnt in Engineering math. This gives us an even clever view of how transfer functions works. Also, gives us a view in poles and zeroes given in s-plane.

This concludes the third Week of Auto Control LAB