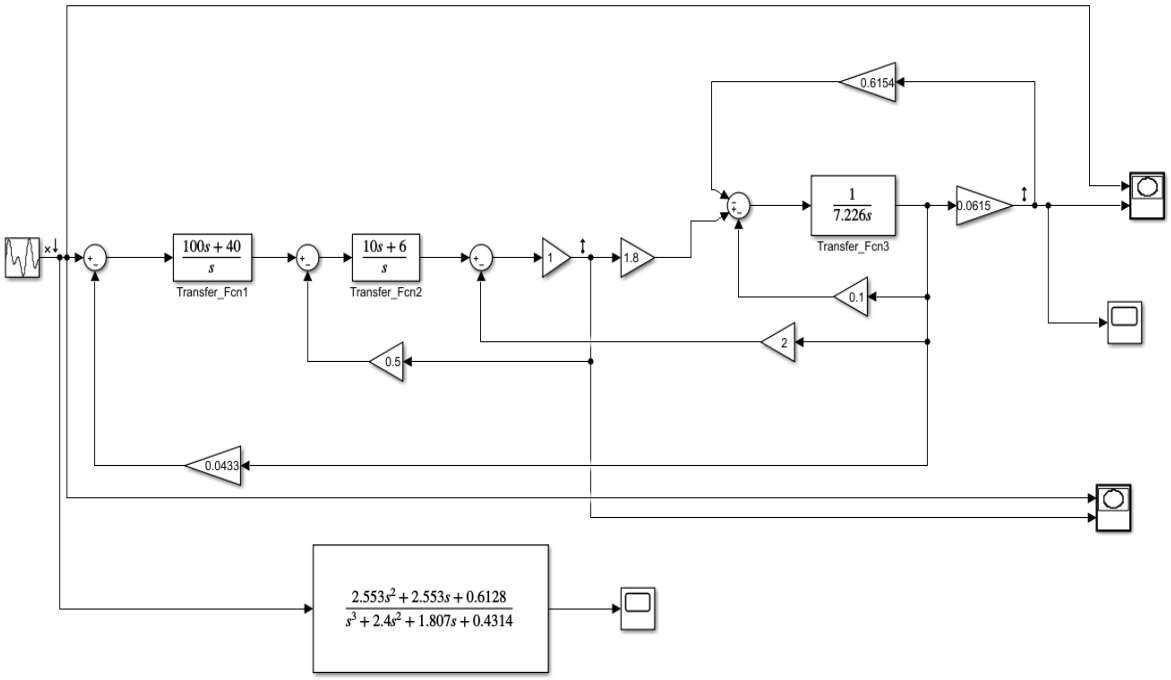
CONTROL

Lab 1

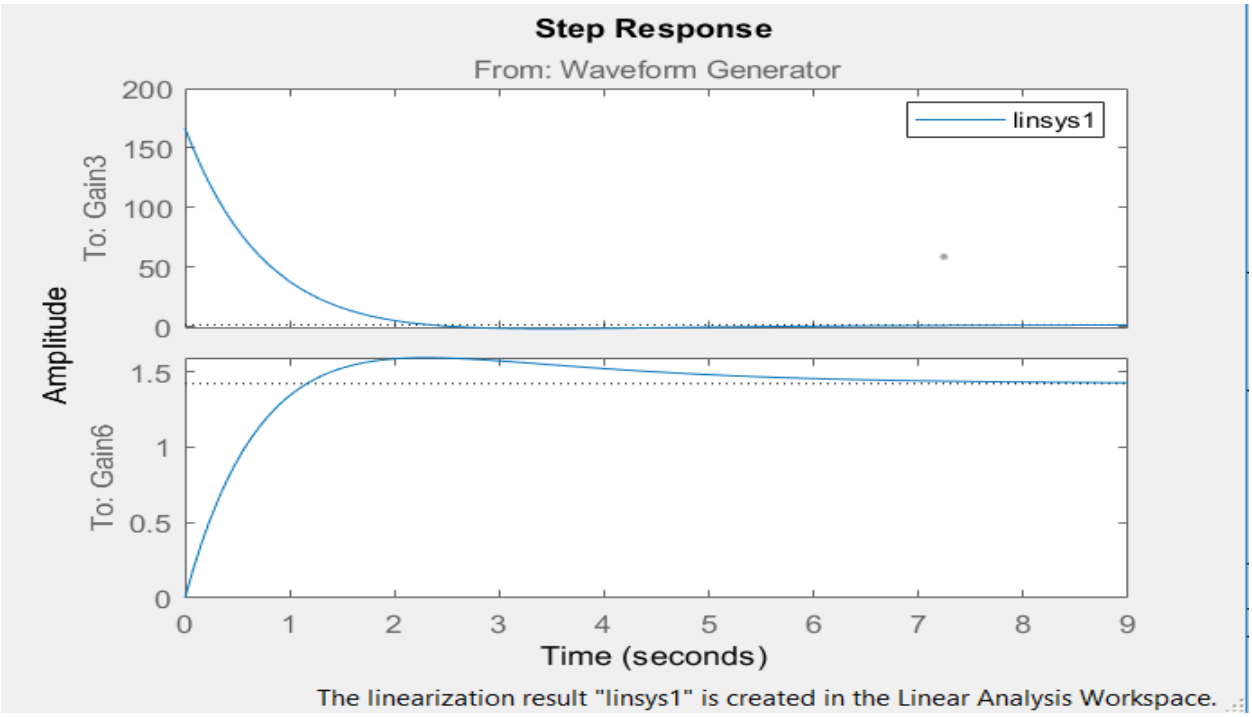
احمد محمود محمد الدقماق

18010248

➔ Diagram of the system :

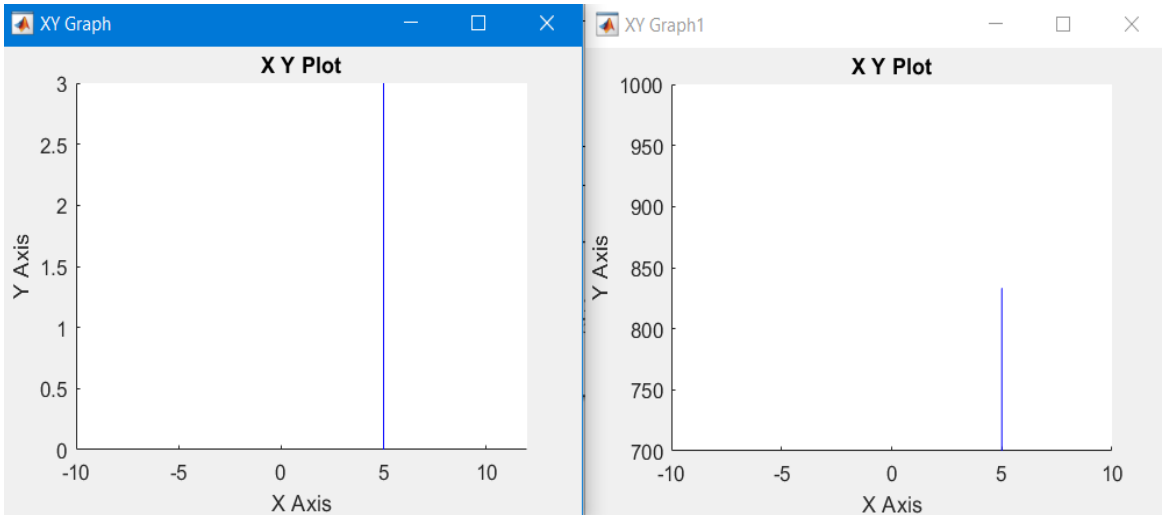


➔ Step response

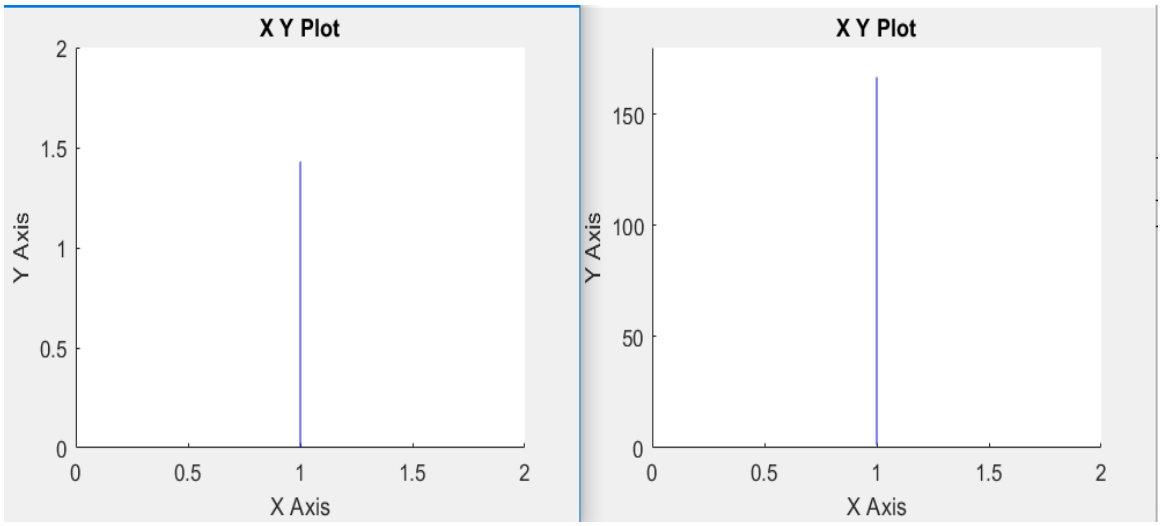


➔ XY graph

- Square('Amplitude',5,'Frequency',5,'Phase',0,'DutyCycle',80) (id : 8)
- Range (x➔ -10:12, y➔ 0:3, sample time 8)
- Range (x➔ -10:10, y➔ 700:1000, sample time 8)



- step('StepTime',0,'InitialValue',0,'FinalValue',1)
- Range (x➔ 0:2, y➔ 0:2, sample time 8)
- Range (x➔ 0:2, y➔ 0:180, sample time 8)



➔ Transfer Function

```
>> tf(sys)

ans =

  From input "Waveform Generator" to output...
           166.7 s^3 + 169.8 s^2 + 43.18 s + 0.7631
   Gain3:  ---------------------------------------
               s^3 + 2.4 s^2 + 1.807 s + 0.4314

             2.553 s^2 + 2.553 s + 0.6128
   Gain6:  --------------------------------
           s^3 + 2.4 s^2 + 1.807 s + 0.4314
```

➔ Code using linear analysis

```
1   %
2   % This MATLAB script is the command line equivalent of the exact
3   % linearization tab in linear analysis tool with current settings.
4   % It produces the exact same linearization results as hitting the Linearize button.
5
6   % MATLAB(R) file generated by MATLAB(R) 9.4 and Simulink Control Design (TM) 5.1.
7   %
8   % Generated on: 29-Oct-2022 17:53:38
9
10  %% Specify the model name
11  model = 'Lab1';
12
13  %% Specify the analysis I/Os
14  % Get the analysis I/Os from the model
15  io = getlinio(model);
16
17  %% Specify the operating point
18  % Use the model initial condition
19  op = operpoint(model);
20
21
22  %% Linearize the model
23  sys = linearize(model,io,op);
24
25  %% Plot the resulting linearization
26  step(sys)
27  tf(sys)
```

➔ Code using tf function

```
Gsc = tf([100 40],[1 0]);
Gtc = tf([10 6],[1 0]);
Jtot =tf(1,[7.226 0]);
Kcs=0.5;
Kss=0.0433;
Ra=1;
Kf=0.1;
Kb=2;
Avo=0.6154;
nKt=1.8;
r=0.0615;

S1= feedback(Jtot,Avo*r);
S2=feedback(S1,Kf);
S3=series(S2,nKt);
S4=feedback(S3,Kb);
S5=series(S4,Gtc);
S6=feedback(S5,Kcs/S3);
S7=series(S6,Gsc);
S8=feedback(S7,Kss);
S9=series(S8,r);
minreal(S9)
```

➔ Output of the scope