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RIS LAB 2

(Task 1.24)

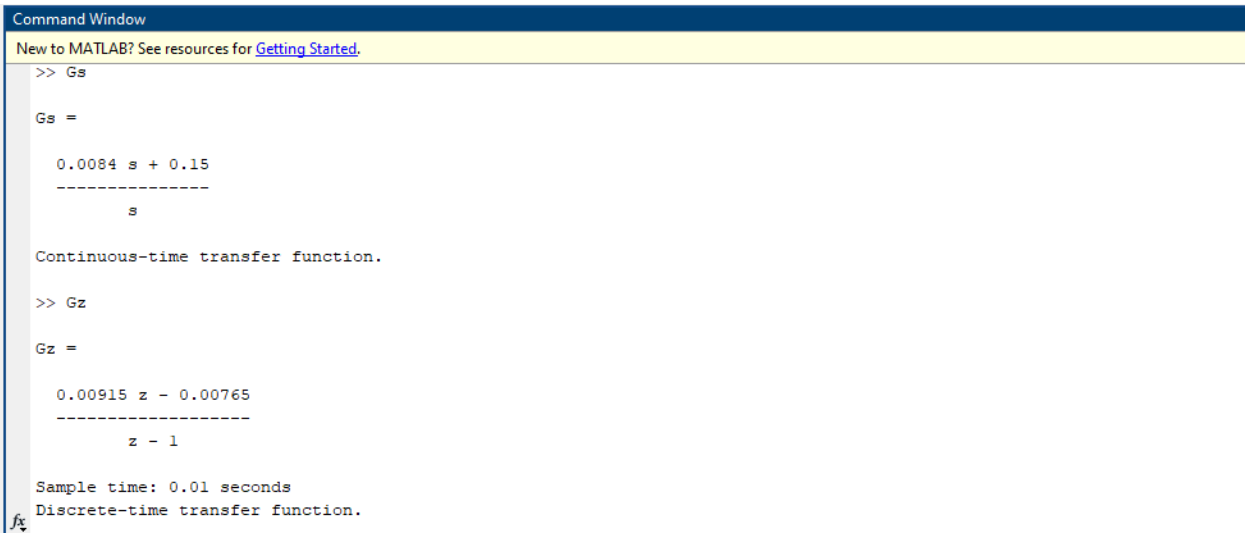
Date of execution: 30/04/2021

DISCRETIZATION OF THE CONTROLLER

In this lab task, implementation of the PID controller in discrete time is taking place.
In order to get the transfer question in z transform the following code was ran:

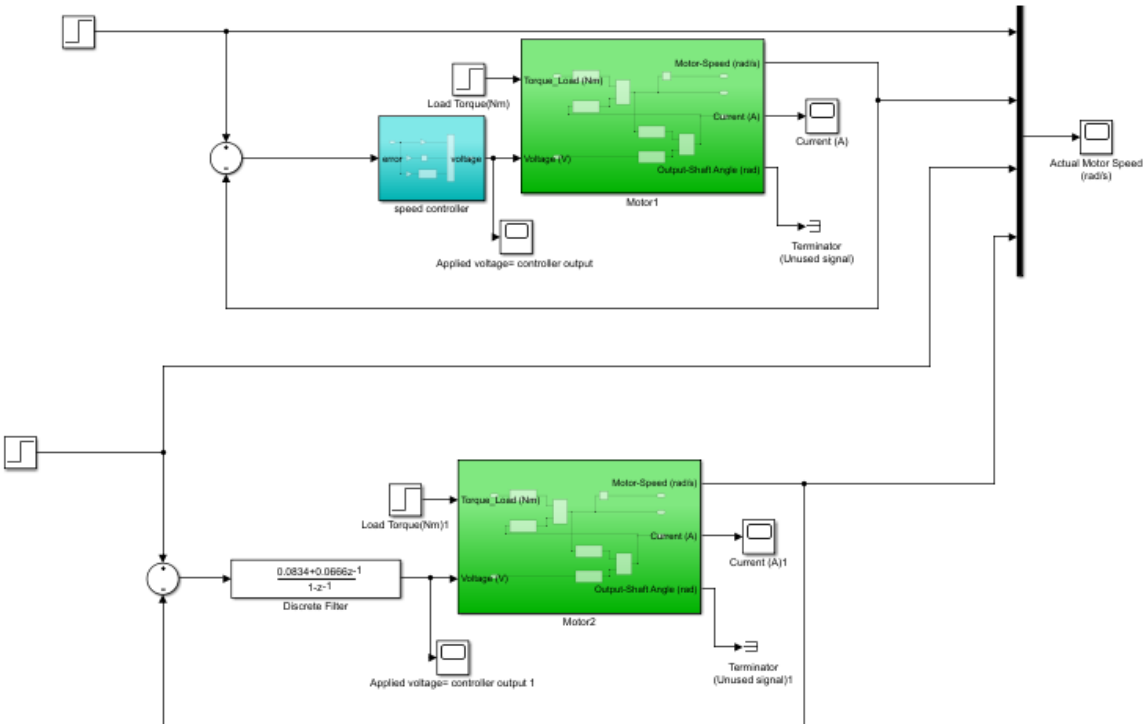
```
s= tf('s');
Tsample = 0.01;.
Gs = Kp +Ki/s
Gz = c2d(Gs, Tsample, 'tustin');
```

This was the output:



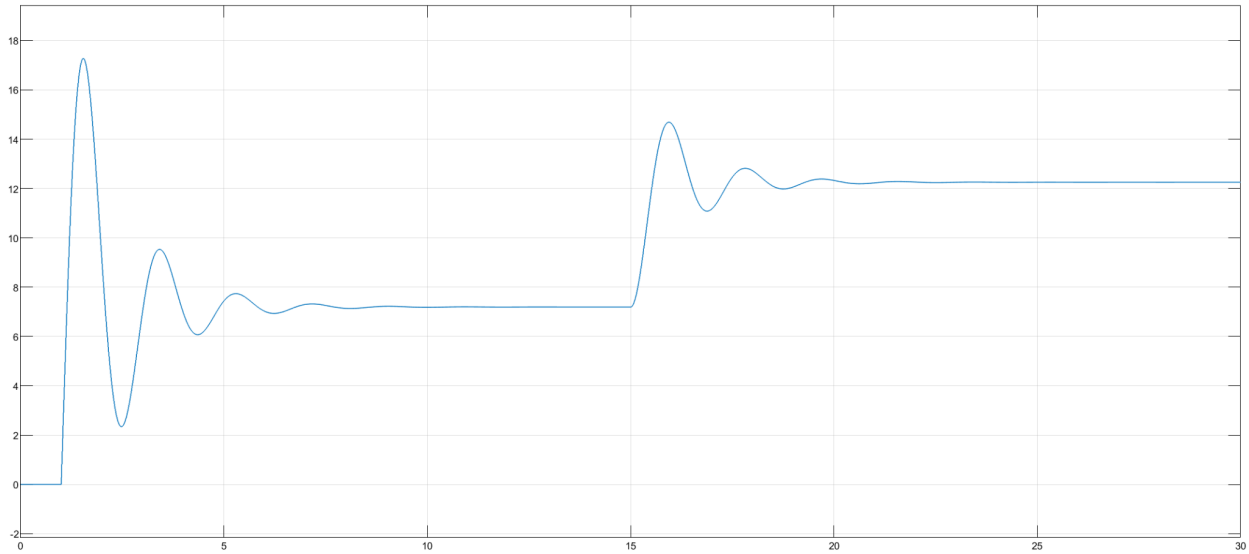
The G(z) got can now be used in the simulink model.

To discretise the controller, two copies of the PID controller were made and one controller was replaced by the discrete transfer function obtained in the matlab code above in the expected format with the numerator as [0.0834 0.0666], the denominator as [1 -1] and the Sample time as Tsample.

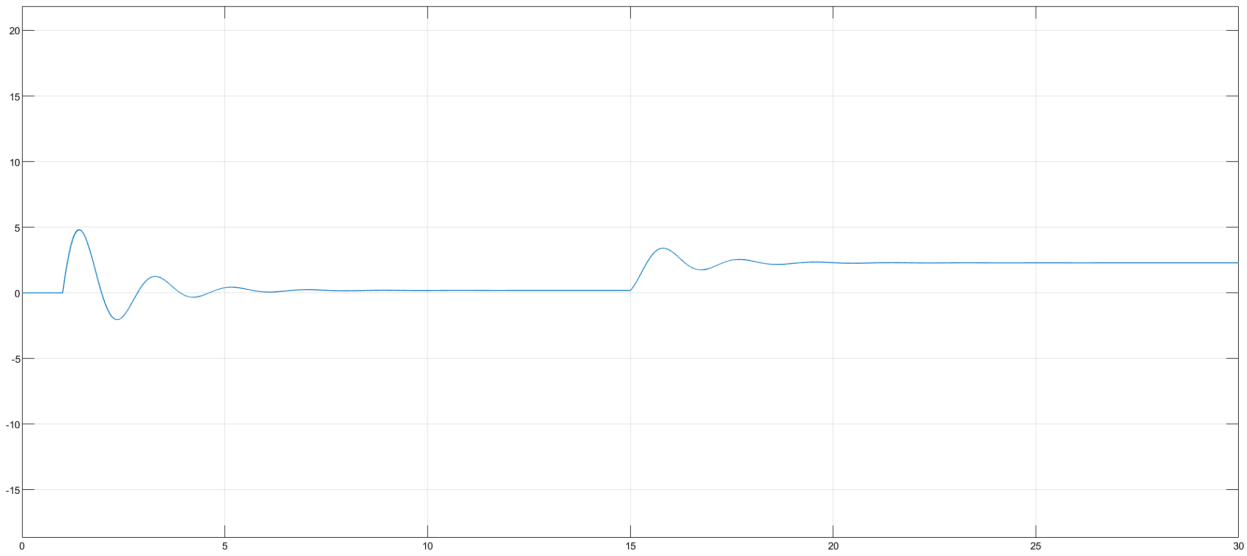


The response of the simulation for step reference speed input was as seen below.
The controller changes the voltage only at discrete intervals.

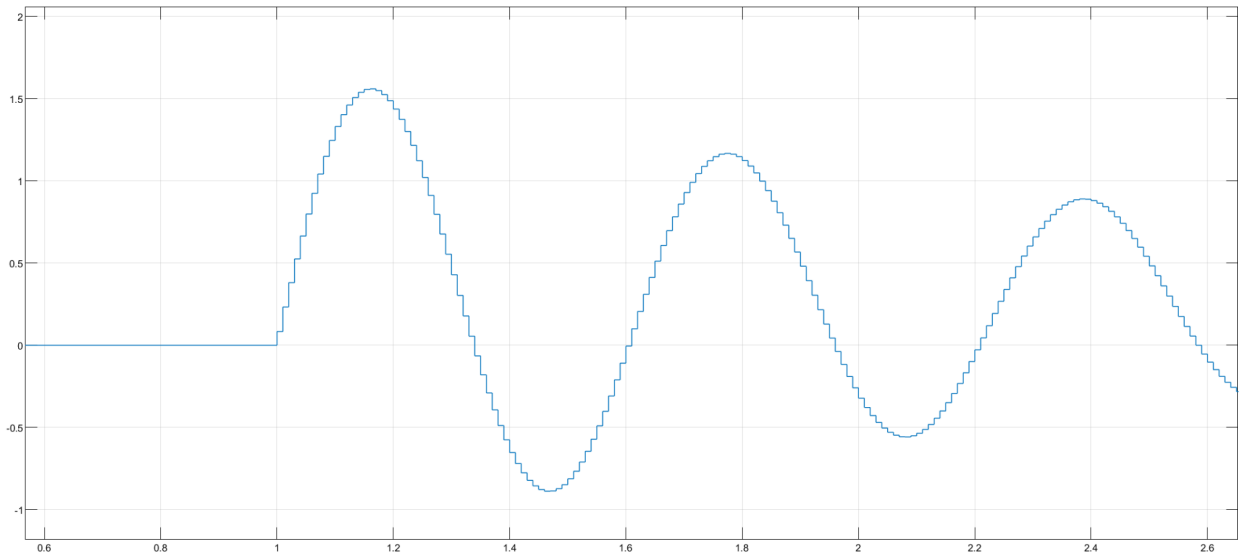
Voltage with 0.01s:



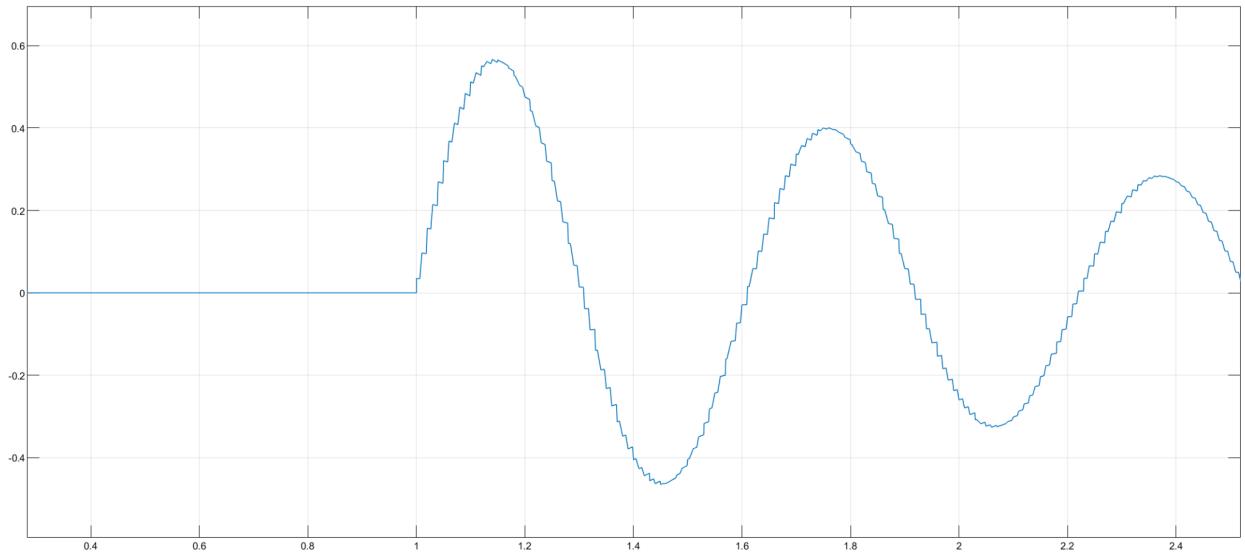
Current with 0.01s:



Voltage with 0.01s:(zoomed in)



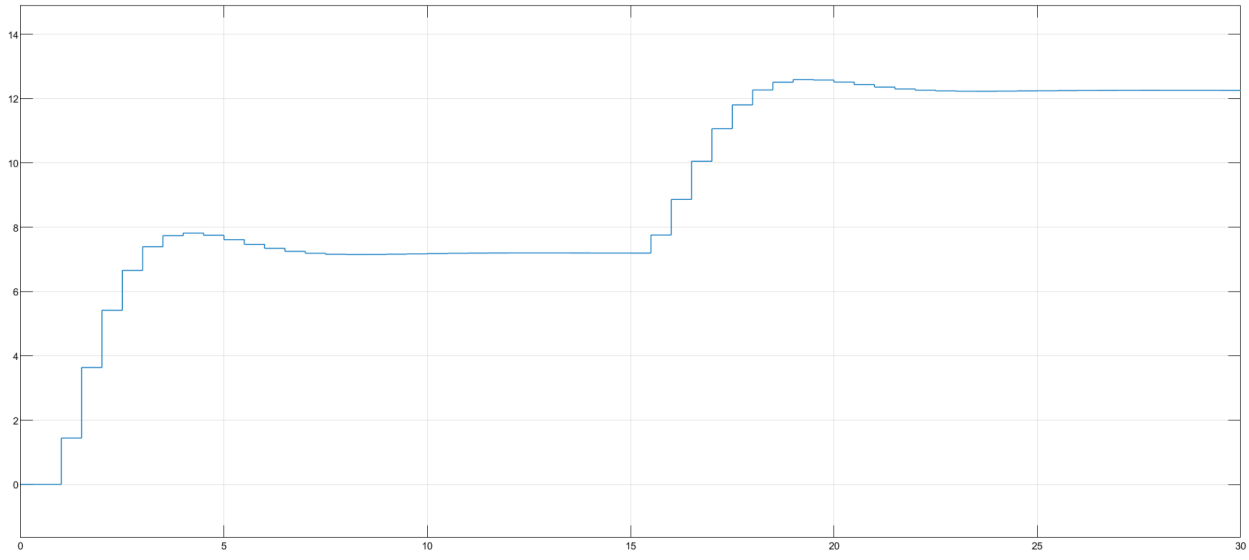
Current with 0.01s:



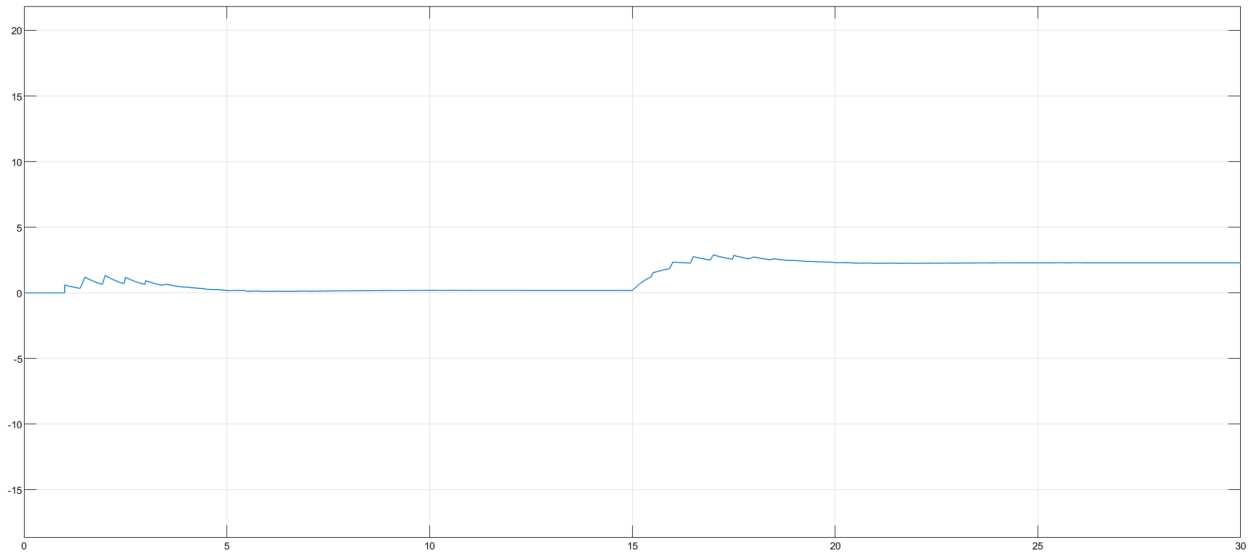
What happens when you increase Tsample to 0.5s or higher?

Increasing the sample time makes the system less accurate.

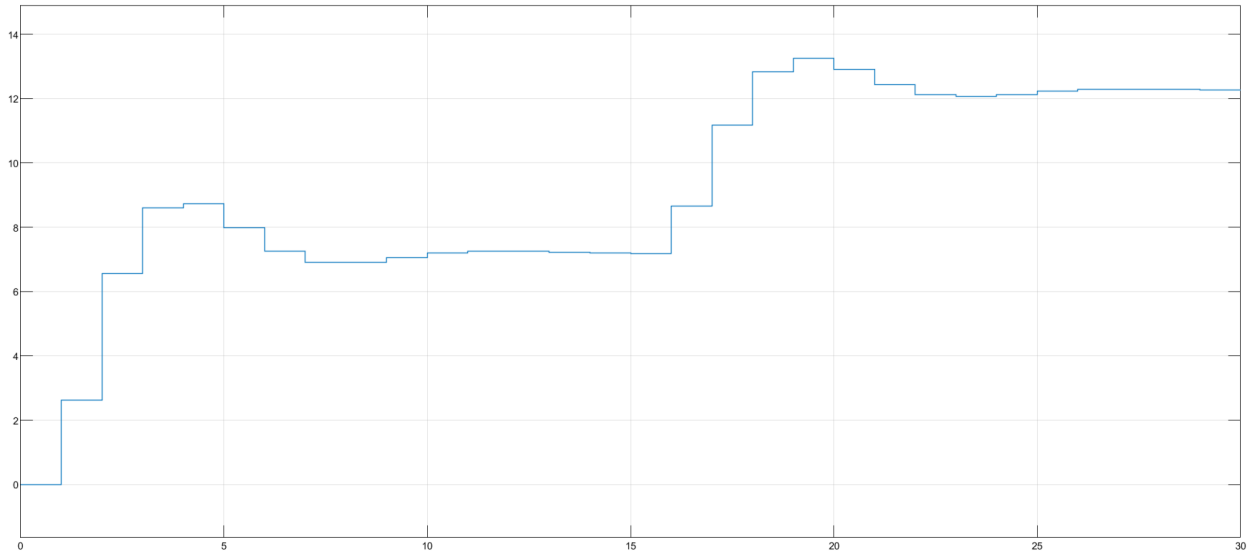
Voltage with 0.5s:



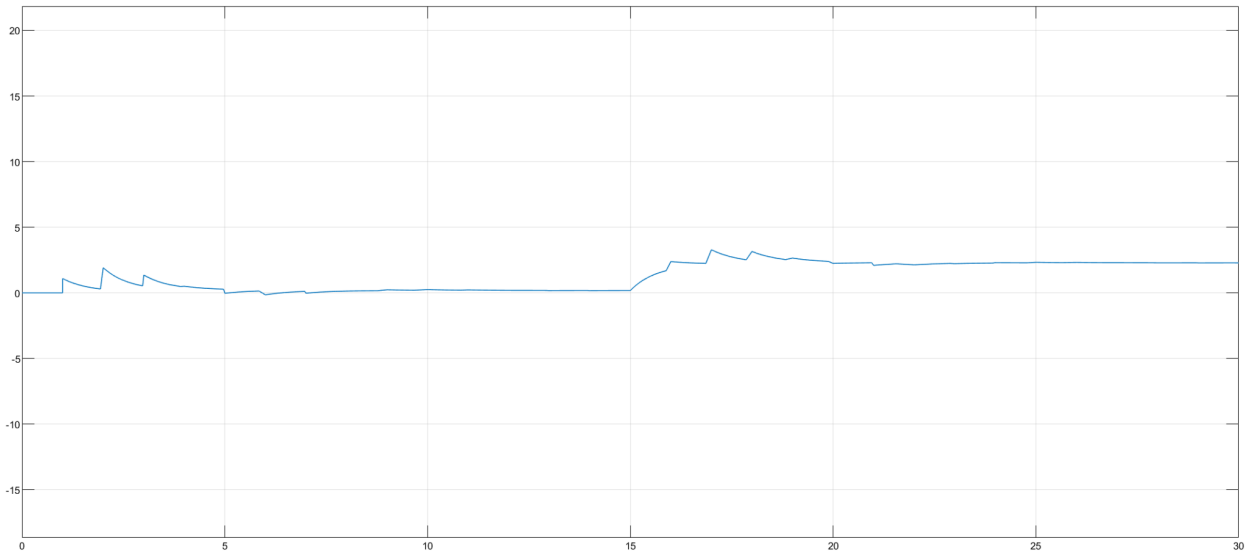
Voltage with 0.5s:



Voltage with 1.0s:



Current scope with 1.0s:


20
15
10
5
0
-5
-10
-15
0
5
10
15
20
25
30