Control System Laboratory Report

Name and ID no. of the Student:

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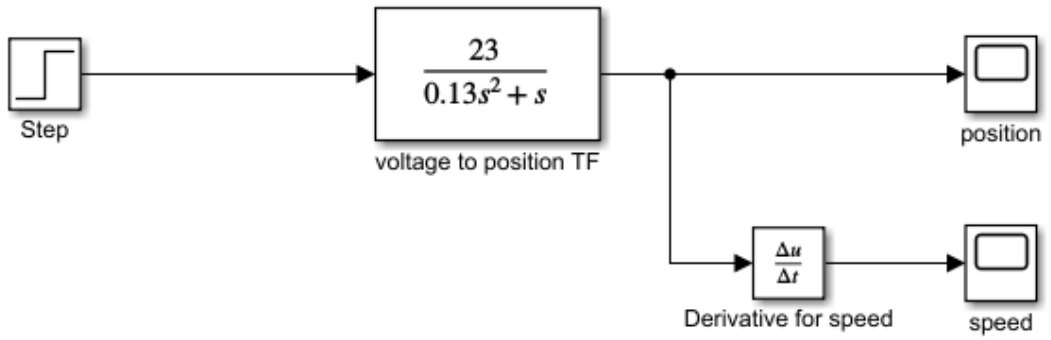
Title of the Experiment:

MATLAB Simulink model and stability analysis in a simulation environment

Model/Simulation:

1. Linearized 1st Order Dynamic Model of DC Servo and Pendulum:



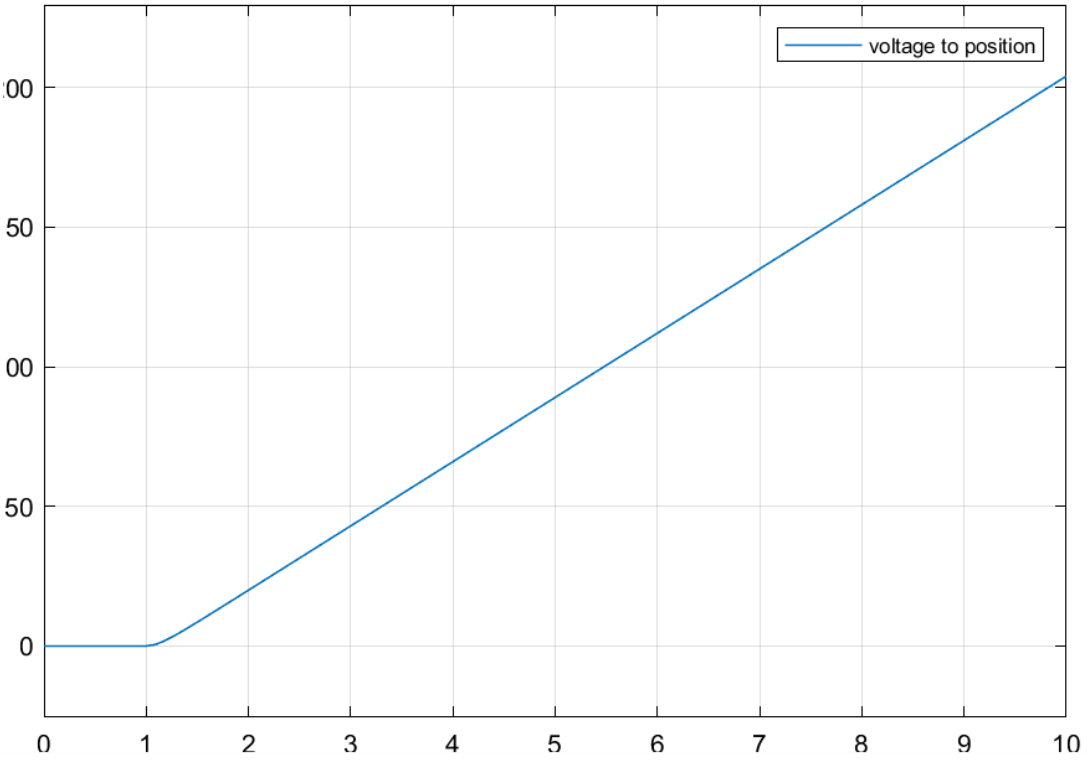
2.STABILITY ANALYSIS:

MATLAB code:

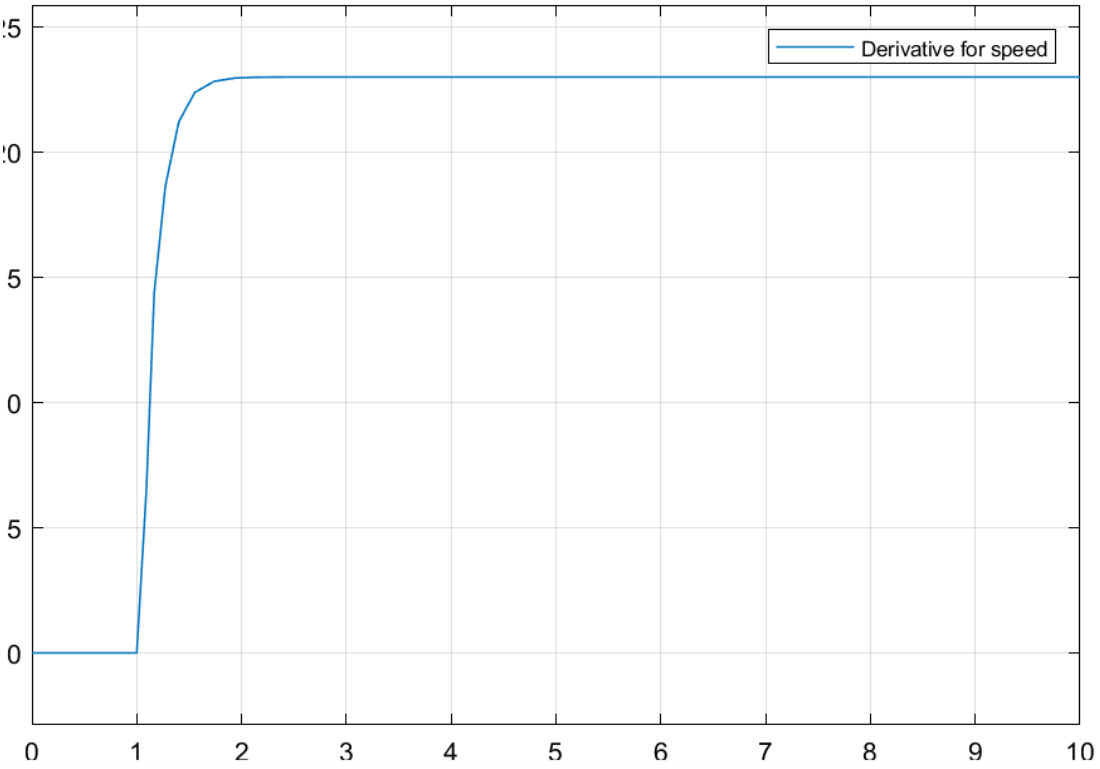
```
sys = tf ([23], [0.13 1 0])
pole(sys)
pzmap(sys)
```

Results:

1. Linearized 1st Order Dynamic Model of DC Servo and Pendulum:



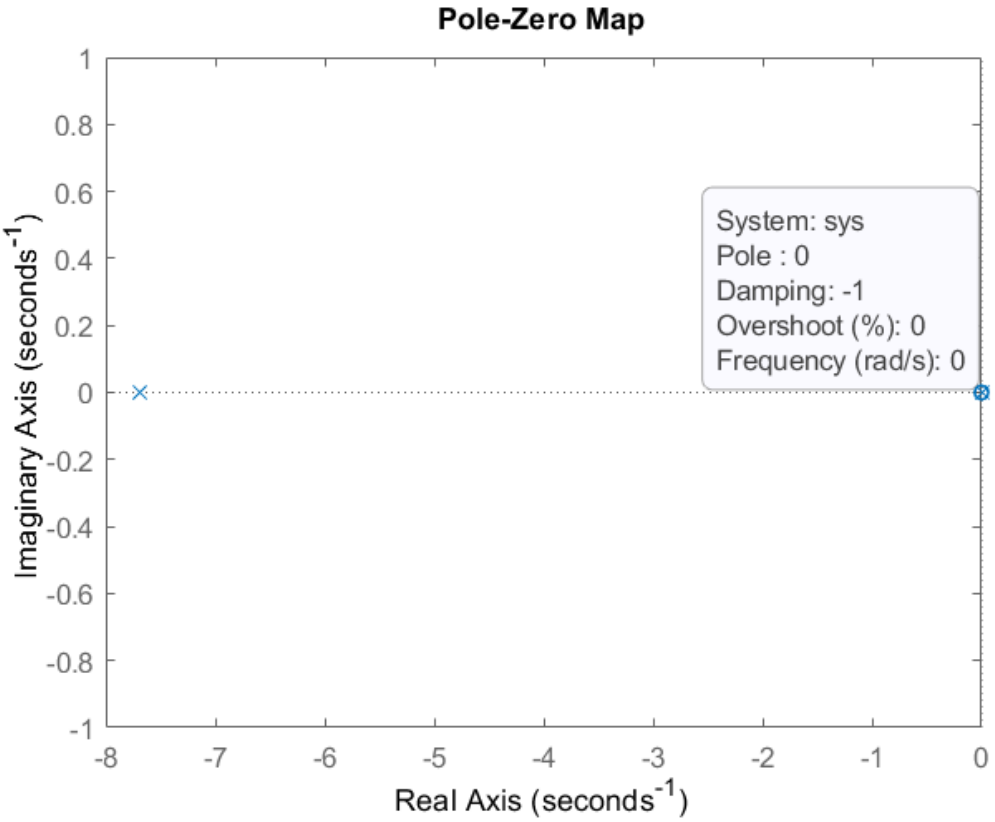
Position of the Pendulum



Speed of the Pendulum

2.STABILITY ANALYSIS:

Poles are at 0,-7.69.



Conclusive remarks:

Using the Linearized 1st order dynamic models of the DC Motor and Pendulum along with Simulink we can get the response of Position and Speed of the System for a Step input.

From the response of the system in the graphs, we can observe that the final speed i.e steady-state value that is equal to the model's steady-state gain (K =23 rad/(V.s)). We can also decipher this from the position graph due to its constant slope. Since slope is the speed of the system and its constant.

Now, the given transfer function has two poles and no zeros. The poles are located on the real axis at -7.69 and 0. As the poles are located on the left side of the imaginary axis and on the origin the system is stable. The system is stable which can be confirmed as there are no pairs of conjugate poles on the imaginary axis and therefore the system wouldn't have any oscillations. The system attains stability as there is a dominant pole.