PI_CONT_SCRIPT.m

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This script runs a simulation of a motor with bearing friction and plots the results

required file: PI_Cont.slx

Define motor parameters

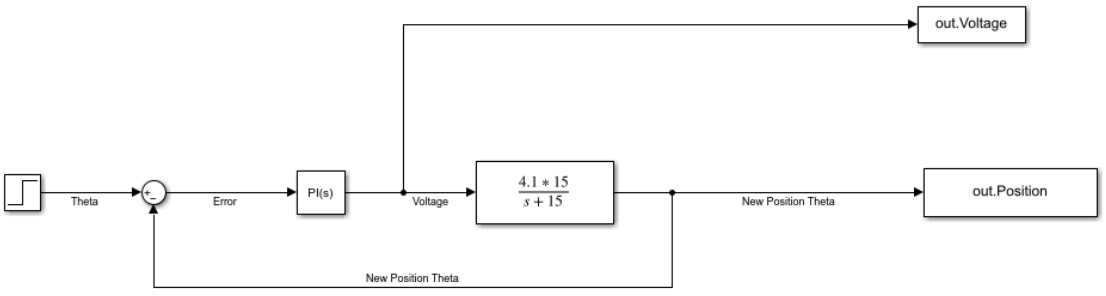
```
Ra=1; % armaature resistance [Ohms]
Kt=.5; % motor torque constant [Nm/A]
Ke=.5; % back emf constant [Vs/rad]
J=.05; % Load inertia [Nm^2]
b=.5; % damping [Nm/s]
```

Run a Simulation

This simulation takes the previously tuned transfer function and applies a PI controller to it in order to acheive the fastest rise time possible with a maximum overshoot of 12% when used with a motor.

open the block diagram so it appears in the documentation when published. Make sure the block diagram is closed before running the publish function

```
open_system('PI_MINIPROH')
%
% run the simulation
%
out=sim('PI_MINIPROH');
```



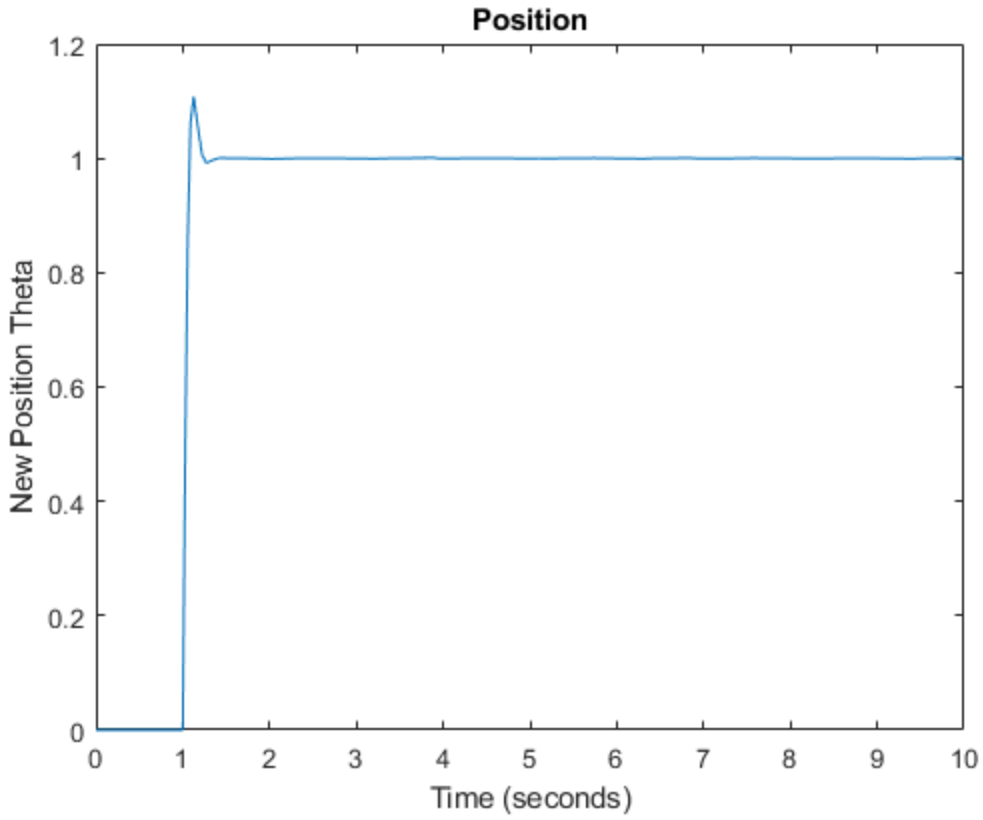
A Plot of the results

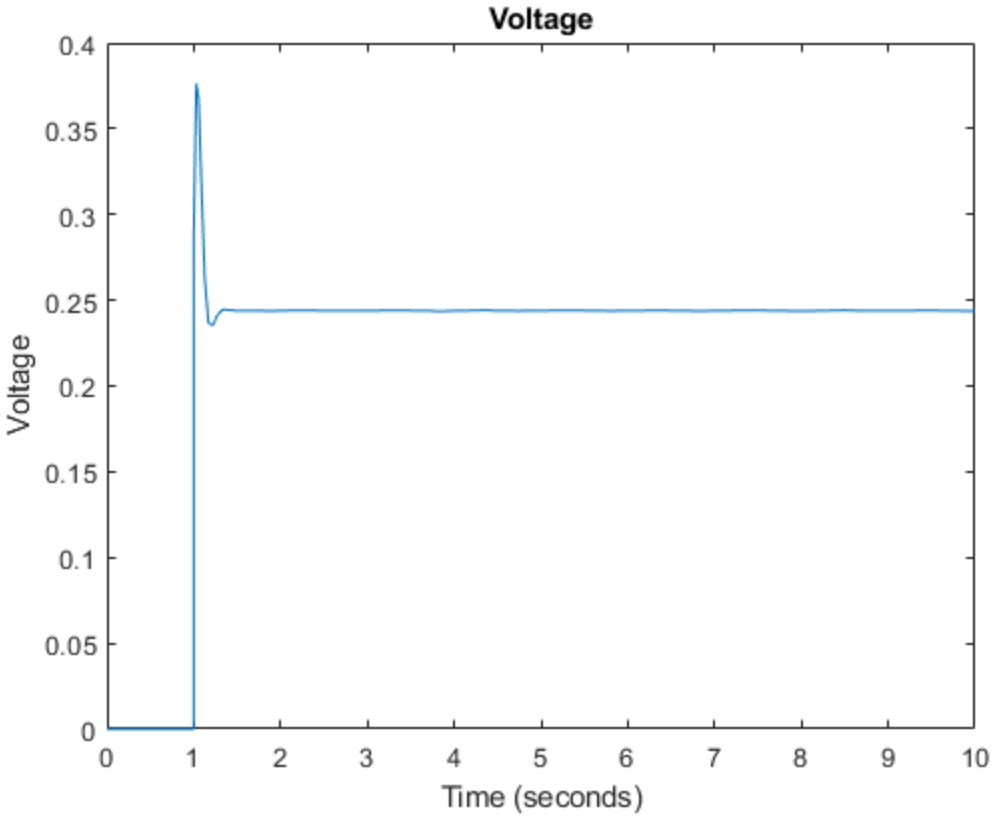
We see that rise time is fast and that the overshoot is under 10%. According to the tuning feature in simulink the rise time couldn't be faster without setting the overshoot over 10%.

```
% This graphs both the position of the motor as well as the input
 voltage
% for the demonstration.


figure
plot(out.Position)
title('Position')
%legend('DC','PWM')

figure
plot(out.Voltage)
title('Voltage')
%legend('DC','PWM')
```





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