
Motor Control Mini Project Documentation

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Open Loop Step Response

Graphs the experimental step response and the estimated transfer function step response.

```
%experimental
[V,T,VT] = xlsread('StepResponse.xlsx');
t = V(:,5);
y = V(:,4);

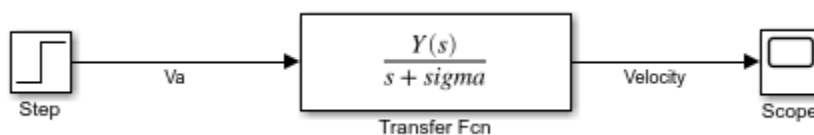
plot(t,y)

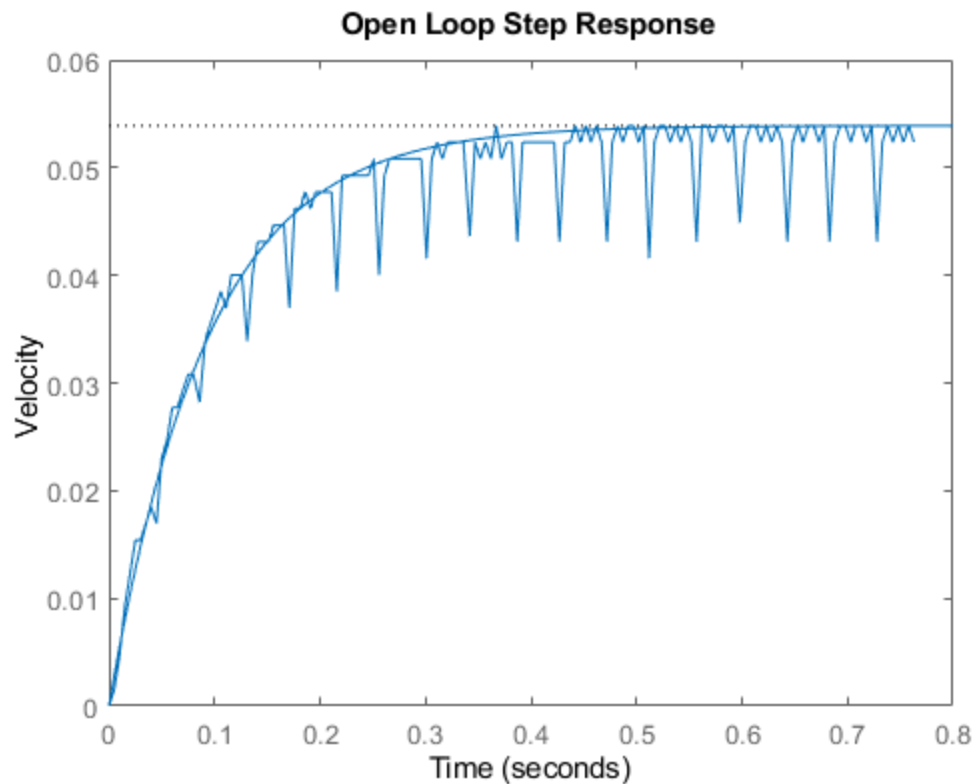
%transfer function
K = 0.0539;
sigma = 10.75;
sys = tf(K*sigma, [1 sigma]);

hold on
step(sys)
xlim([0 0.8])
xlabel('Time')
ylabel('Velocity')
title('Open Loop Step Response')
hold off

open_system('openLoop')

% The step response of the estimated transfer function traces the
% general shape of the experimental data so should be accurate
% when tuning the PI controller.
```





Closed Loop Step Response

Graphs the experimental step response and the estimated transfer function with a PI controller step response.

```
%experimental
[W,R,WR] = xlsread('StepResponse.xlsx');
x = (W(:,21) + 1);
v = W(:,18);

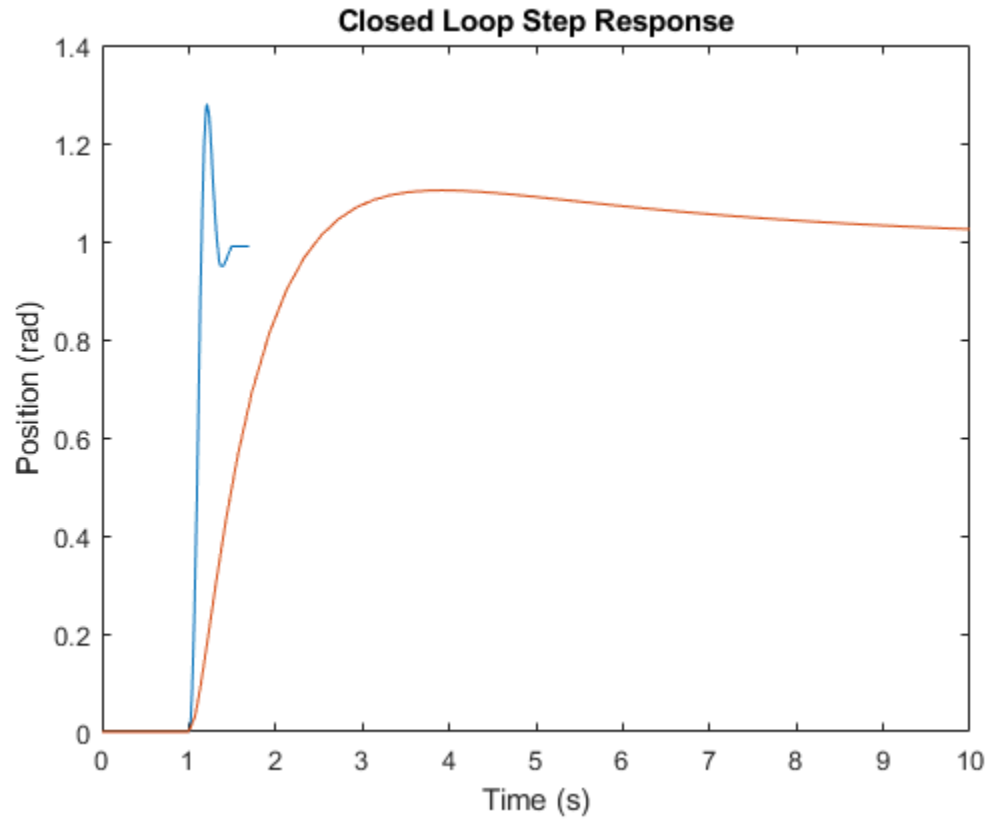
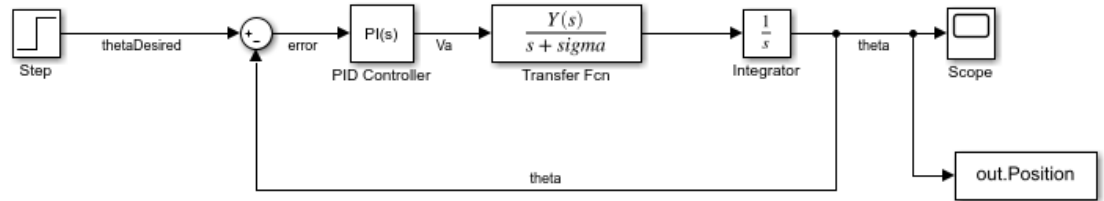
plot(x,v)
xlabel('Time (s)')
ylabel('Position (rad)')
title('Closed Loop Step Response')

%transfer function
out = sim('PIcontrol');
hold on
plot(out.Position)
hold off

open_system('PIcontrol')

% The experimental step response is much quicker than the simulated
% response, which causes additional overshoot and a quicker rise time.
% This is most likely due to the voltage of the battery being lower
```

% when we collected data on the open loop step response. The steady
% state error is not affected and is approximately 0.



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