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```

part 6

```
clc;
clear;
close all;

%load data
load('mathModel.mat');
load('robust.mat');
load('lqrPoles.mat');

%find obsv gains
p = real(max(CLP));
p_des = [p p+.0001];
L_clo = place(A.', C.', p_des).';

cloSim = sim('part6model.slx');

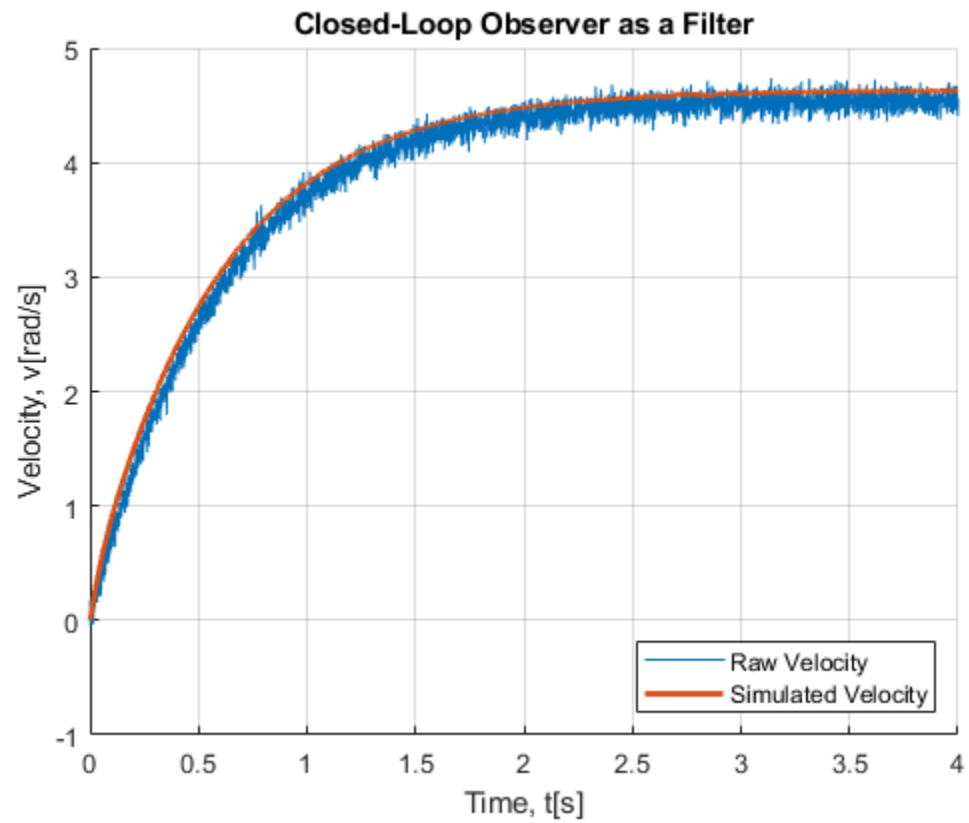
%plot
figure();
hold on;
plot(cloSim.tout, cloSim.tachometer, 'DisplayName', 'Raw Velocity');
plot(cloSim.tout, cloSim.simStates(:,1), 'LineWidth',
     2, 'DisplayName', 'Simulated Velocity');
title('Closed-Loop Observer as a Filter');
xlabel('Time, t[s]');
ylabel('Velocity, v[rad/s]');
grid();
legend('Location', 'southeast');

% commentary
comments = ['The estimated state is always slightly higher than the
actual '...
'sensor output (by visual inspection). We believe the tachometer
is actually' ...
' closer to the true velocity of the system. Unfortunately, it is
noisy,' ...
' therefore, if we were to use one of these as a state feedback,
we would '...
'use the estimated velocity because it is relatively less
noisy.'];

fprintf(comments);
```

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noisy, therefore, if we were to use one of these as a state feedback, we would use the estimated velocity because it is relatively less noisy.



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