```
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% DC Motor Lab
```
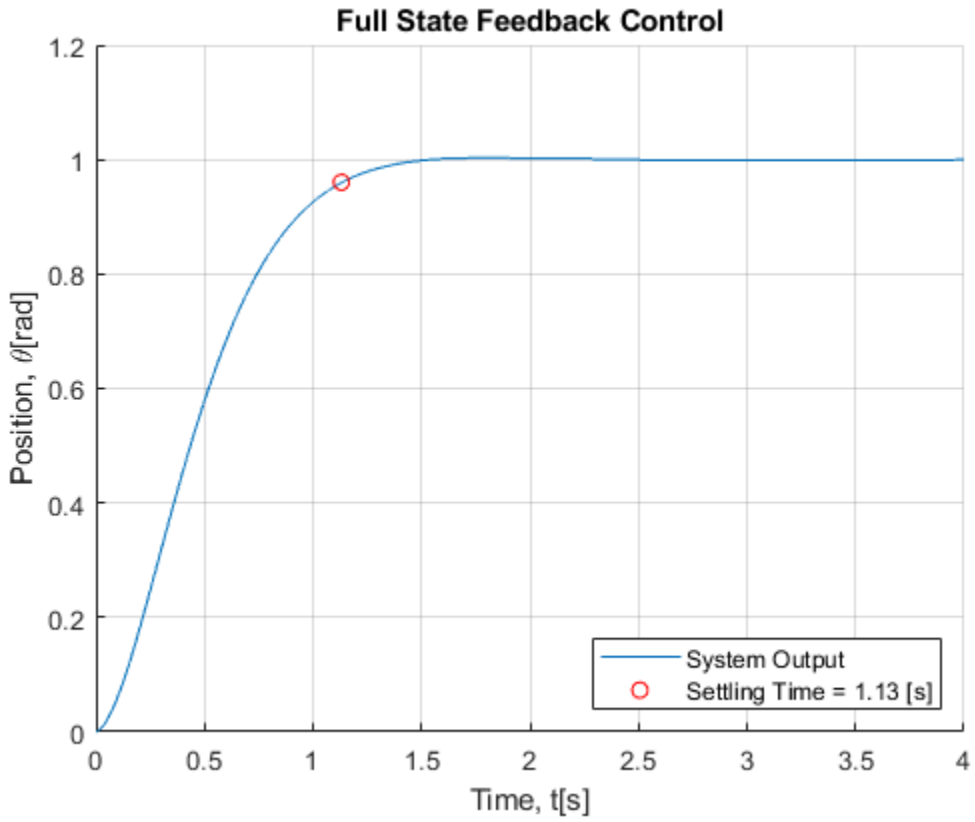

part 2

```
clc; clear; close all;

%load system
load('mathModel.mat');

%verify controlability
isControllable = (rank(ctrb(A,B)) == length(A));

% design feedback controller
Ts_des = 1; %[s]
tau_des = Ts_des/4;

%find poles
p = -1/tau_des;

%find K
K_fsf = place(A, B, [p p+.00001]);

%find kff
dcGain_cl = C*inv(-(A-B*K_fsf))*B + D;
kff = 1/dcGain_cl;

%convert conts of enc to rad
encGain = 2*pi / 4096;

%model
fsf = sim('part2model.slx');

Ts = findSettlingTime(fsf.tout, fsf.pos)

RMSE = findRMSE(fsf.tout, fsf.pos, 1)


%plot
figure();
hold on;
plot(fsf.tout, fsf.pos, 'DisplayName', 'System Output');
plot(Ts, fsf.pos(find(fsf.tout == Ts)), 'ro', 'DisplayName', 'Settling
 Time = 1.13 [s]');
title('Full State Feedback Control');
xlabel('Time, t[s]');
ylabel('Position, \theta[rad]');
grid();
legend('Location', 'southeast');
```

```
Ts =

    1.1310


RMSE =

    0.0072
```



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