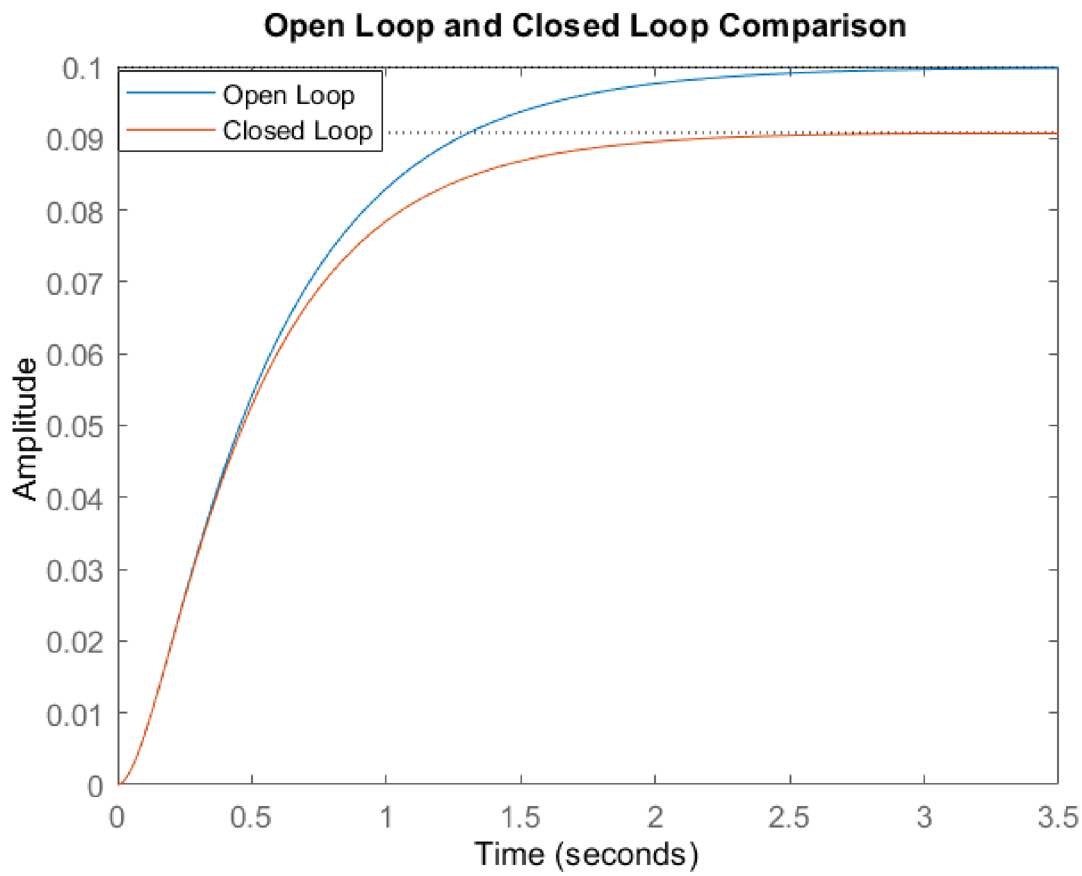

Figure 1 – Script Open Loop Versus Closed Loop

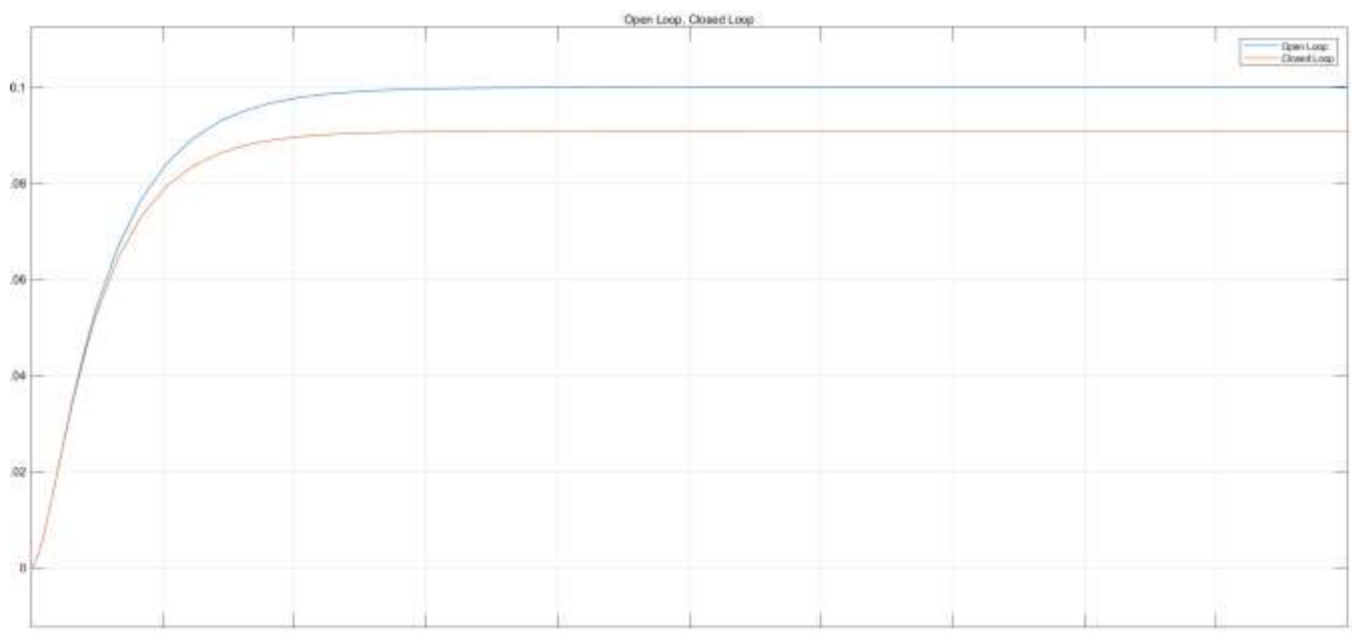

Figure 2 – Simulink Open Loop Versus Closed Loop

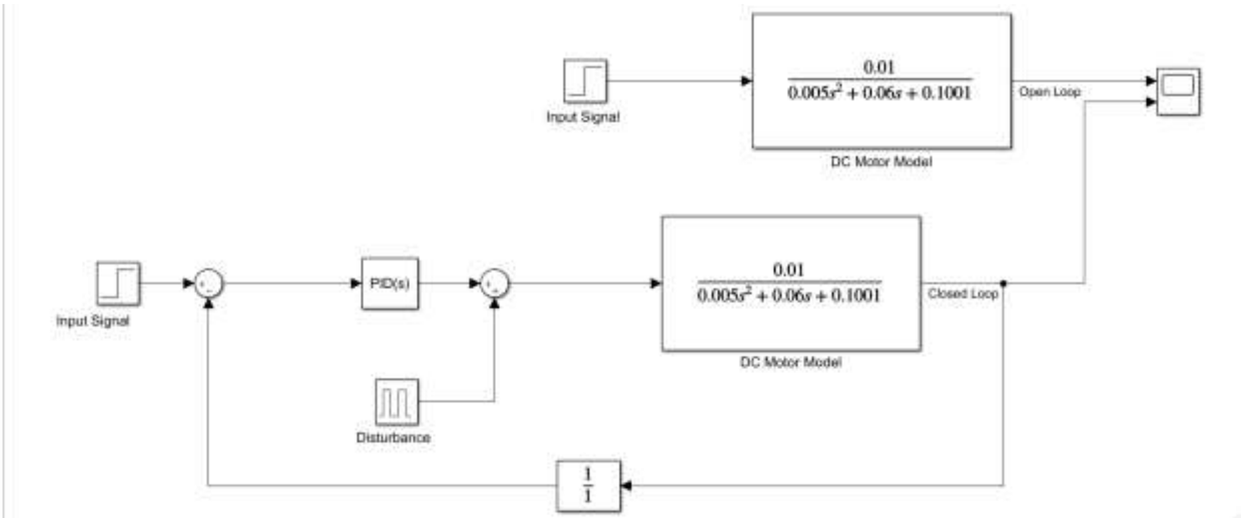

Figure 3 – Simulink Model of Open and Versus Closed Loop

```
clc; clear; close all;
J = 0.01;    % J is derived from Newton's 2nd Law equation,
moment of interia
b = 0.1;     % b is derived from Newton's 2nd Law equation,
motor friction
K = 0.01;    % J is derived from Newton's 2nd Law equation,
electromotive force constant
%link is:
%%https://ctms.engin.umich.edu/CTMS/index.php?example=Motor
Speed&section=SystemModeling#:~:text=From%20the%20figure%20
above%2C%20we%20can%20derive%20the%20following%20governing%
20equations%20based%20on%20Newton%27s%202nd%20law%20and%20K
irchhoff%27s%20voltage%20law.

R = 1;                       %derived from Kirchoff
(Resistor)
L = 0.5;                     %derived from Kirchoff
(Inductor)

num = [.01];                 % Coeffecients of Transfer
Function
denom =[0.005 0.06 .1001];   %
P_motor = tf(num,denom)      % Open Loop Transfer Function

%x2 = P_motor/(1+P_motor)    % Equation Implementation of
Feedback loop
x2 = feedback(P_motor,1)     % Closed Loop Transfer Function
```

```
step(P_motor,x2)              % Open Loop(P_motor) Overlaid
with Closed Loop (x2)
legend('Open Loop', 'Closed Loop')
title('Open Loop and Closed Loop Comparison')
```

Script 1 – Generating Open and Closed Loop Systems

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~~27/30~~

30/30

3/8/22

Grade: 30/30