Chart

Description automatically generated

**Figure 1 – Script Open Loop Versus Closed Loop**

Chart

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**Figure 2 – Simulink Open Loop Versus Closed Loop**

**Diagram, schematic

Description automatically generated**

**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=MotorSpeed&section=SystemModeling#:~:text=From%20the%20figure%20above%2C%20we%20can%20derive%20the%20following%20governing%20equations%20based%20on%20Newton%27s%202nd%20law%20and%20Kirchhoff%27s%20voltage%20law.

R = 1; %derived from Kirchoff (Resistor)

L = 0.5; %derived from Kirchoff (Inductor)

num = [.01]; % Coefficents 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**