

```

clc
clear all
close all

J = 0.01;
b = 0.1;
K = 0.01;
R = 1;
L = 0.5;
s = tf('s');
P_motor = K/((J*s+b)*(L*s+R)+K^2);

%Proportional control
Kp = 100;
C = pid(Kp);
sys_cl = feedback(C*P_motor,1);
t = 0:0.01:5;
figure(1)
step(sys_cl,t)
grid
title('Step Response with Proportional Control')

%PID control
Kp = 75;
Ki = 1;
Kd = 1;
C = pid(Kp,Ki,Kd);
sys_cl = feedback(C*P_motor,1);
figure(2)
step(sys_cl,[0:1:200])
title('PID Control with Small Ki and Small Kd')

%Tuning the gains
Kp = 100;
Kp = 100;
Ki = 200;
Kd = 1;
C = pid(Kp,Ki,Kd);
sys_cl = feedback(C*P_motor,1);
figure(3)
step(sys_cl, 0:0.01:4)
grid
title('PID Control with Large Ki and Small Kd')
Kp = 100;
Ki = 200;
Kd = 10;
C = pid(Kp,Ki,Kd);
sys_cl = feedback(C*P_motor,1);
figure(4)
step(sys_cl, 0:0.01:4)
grid
title('PID Control with Large Ki and Large Kd')

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