Experiment 1
DC Motor / PID Control

EEM441
SEMESTER I
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Abstract

This experiment covers the basics of DC motor and PID control. The objectives of this experiment are to understand the working principle of a DC motor, to learn how to control the speed and position of a DC motor using PID control, and to implement a PID controller. The experiment involves setting up a DC motor system, tuning the PID controller parameters, and analyzing the performance of the control system.

Keywords: DC motor, PID control

Objectives:

a) To study the Open-Loop Speed Control of a DC Motor.
b) To study the Closed-Loop Speed Control using:
   A) P Controller
   B) PD Controller
   C) PI Controller
   D) PID Controller

Apparatus Required:

1. Controller kit
2. Cathode ray oscilloscope
3. BNC connectors with cords
4. Multimeter

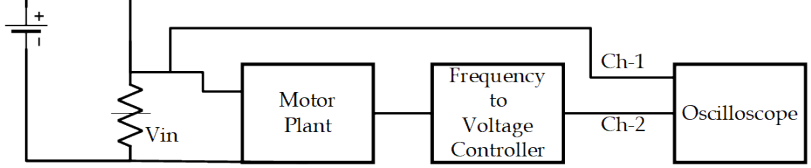
1. Introduction

This experiment focuses on the study of DC motors and the implementation of PID control to regulate their speed and position. A DC motor is an electromechanical device that converts electrical energy into mechanical energy through the interaction of magnetic fields. PID control is a widely used control strategy that combines proportional, integral, and derivative actions to achieve desired system performance. The experiment aims to provide hands-on experience in setting up a DC motor system, tuning PID controller parameters, and analyzing the system's response to various inputs.

2. Methodology

2.1. Open-Loop Speed Control of a DC Motor

1. Switch on supply and measure all constant voltages and calibrate variable voltages in terms of voltages and angles in degrees.
2. Disconnect all cable wires from the hardware module.
3. Make circuitry as shown in Figure **??** for the implementation of open-loop speed control of a DC motor.
4. Connect ***Output A*** of the motor plant to channel 2 of the oscilloscope.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Vin
Motor Plant
Frequency to Voltage Controller
Ch-1
Ch-2
Oscilloscope

A. Appendix