LAB 5 – VELOCITY CONTROL OF A DC BRUSHED MOTOR

University of New Hampshire

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***VELOCITY CONTROL OF A BRUSHED DC MOTOR***

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| **Course Number and Name:**  ME 747 – Senior Lab | |
| **Semester and Year:**  2017 semester 2 | **Name of Lab Instructor:**  **Alireza Ebadi** |
| **Lab Section and Meeting Time:**  2b 14:00 | **Report Type:**  **External Group Report** |
| **Title of Experiment:**  **Velocity Control of a DC Brush Motor** | |
| **Date Experiment Performed:**  14. November 2017 | **Date Report Submitted:**  1 December 2017 |
| **Names of Group Members:**  Jesse Feng Simon Popecki Reilly Webb | **Grader's Comments:** |
| **Grade:** |

# Cover Letter

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Dr. Ebadi,

The following document contains an analysis of control systems for a DC brushed motor. DC motors are generally controlled via pulse width modulation and a microprocessor, however for the purpose of demonstration, we controlled DC motors with power op-amp driven proportion control, integral control, and proportional-integral control.

These control systems were compared against each other in terms of functionality- the motor parameters have been determined through experimentation.

The body of this report comprises of the results of inputs to the system and recorded system response.

Best Regards,

Jesse Feng

Simon Popecki

Reilly Webb

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# Objectives

The objective of this experiment was to compare different methods of control using a power operational amplifier. Proportional, Integral, and Proportional-Integral control systems controlled a motor under load to be measured by a second motor. The parameters of the motor were calculated, and the system response determined from experimental data. The motor back EMF, open-loop, and closed-loop response were analyzed in particular. Quantitative analysis was performed and interpreted. All relevant values are tabulated/listed. Gain values were confirmed by root locus analysis.

# Executive Summary

In this experiment three types of power op-amp control systems were used to control the speed of a DC brushed motor. Proportional control, Integral control, and Proportional-Integral control systems were used. PID control was not used in this experiment. Motors were controlled by voltage, rather than the conventional method of pulse width modulation. The objective of the control systems was to maintain motor speed regardless of the load placed on the motor.

# Theory and Experimental Methods

# Results and Discussion