SPEED CONTROL OF DC MOTOR UNDER VARIOUS LOADING CONDITIONS

DISSERTATION SUBMITTED IN PARTIAL FULFILLMENT OF
THE REQUIREMENTS FOR THE AWARD OF THE DEGREE
OF

MASTER OF TECHNOLOGY
IN
CONTROL & INSTRUMENTATION

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2016

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CERTIFICATE

I, **Ujjwal Kumar**, Roll No. 2K12/C&I/27 student of **M. Tech. (Control & Instrumentation)**, hereby declare that the dissertation titled "Speed Control of DC Motor Under Various Loading Condition's" under the supervision of Prof. Narendra Kumar Professor of Electrical Engineering Department Delhi Technological University in partial fulfillment of the requirement for the award of the degree of Master of Technology has not been submitted elsewhere for the award of any Degree.

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ACKNOWLEDGEMENT

I feel honored in expressing my profound sense of gratitude and indebtedness to **Prof. Narendra Kumar**, for his guidance, meticulous efforts, constructive criticism, inspiring encouragement and invaluable co-operation which enabled me to enrich my knowledge and reproduce it in the present form.

I would like to extend my gratefulness to **Prof. Madhusudan Singh**, Head of Electrical Engineering Department and Dr. Dheeraj Joshi, Associate Professor, Electrical Engineering Department, Delhi Technological University, Delhi for his perpetual encouragement, generous help and inspiring guidance.

I am also very thankful to the entire faculty and staff members of Electrical Engineering Department for their direct or indirect help, cooperation, love and affection, which made my stay at Delhi Technological University memorable.

I humbly extend my grateful appreciation to my friends Mr. Robin and Mr. Mohit for their time to time suggestions and cooperation without which I would not have been able to complete my work.

I would like to thanks**,** who has always guided me to work on the right path of the life, and greatest thanks to my family and my classmates who bestowed ability and strength in me to complete this work.

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DEDICATED TO

MY FATHER

ABSTRACT

Brush-less DC motor have been widely used as motor motion recently, because Brush-less DC motor has advantages than other motors, such as the efficiency is better 13% than induction motor, the volume is smaller 40% than conventional DC motor[19]. The other advantages, caused no brush so they require little or no maintenance, they generate less acoustic and electrical noise than conventional DC motor, they can be used in hazardous operation environments (with flammable products)[20]. Fuzzy logic and Neural Network based controller is recently getting increasing emphasis in process control applications for their ease of adaptation to new control parameters.

This desertion presents the performance comparison of PID Controller and Adaptive Neuro-Fuzzy Logic controller to control speed of a DC motor and Brush-less DC motor when subjected to various loading condition as well as parameter change which happens over a time. To control high-speed motor, a high control frequency is required and also it is difficult to achieve high performance with a conventional controller. The fuzzy control is used to linearize the Torque-speed characteristics of Motor at various loading pattern as well as parameter variation and Neural Network gives easy adaptation to new control parameters. A MATLAB/SIMULINK model of DC motor and BLDC motor speed control using PID and Adaptive Neuro-Fuzzy technique is compared.

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BLDC	:	Brushless DC motor
FLC	:	Fuzzy Logic Controller
PMDC	:	Permanent Magnet DC motor
FIU	:	Fuzzy Inference Unit
MLP	:	Multiple Layer Perceptron
θ	:	Rotor Position
U_d	:	DC bus voltage
e_A	:	Phase back emf
r_a	:	Line resistance of winding, =2R.
L_a	:	Equivalent line inductance of winding, =2(L-M).
J	:	Rotor moment of inertia.
T_L	:	Load torque.
i	:	Line current.
ω	:	Rotor speed.
B_v	:	Viscous friction coefficient.
K_e	:	Coefficient of line back emf.
K_T	:	Coefficient of line torque constant.
M	:	Mutual linkage, (assume M=0).