

Solid State Devices Speed Control of DC Motors

1. Basics of DC Motors Speed Control

Since $E_a = V_t - I_a R_a$ and $E_a = K_a \phi \omega_m$. Therefore, $\omega_m = \frac{V_t - I_a R_a}{K_a \phi}$.

Practically, speed control of DC motors can be fulfilled using on of two methods:

- **Field Control:** by varying the field current. This can be achieved by varying the field voltage.
- **Voltage Control:** by varying the armature terminal voltage.

Up to the rated (base) speed (*the speed corresponding to rated operation condition, rated armature voltage, rated armature current, and rated field current*), the armature and the field currents are kept constant to maintain the torque at its rated value. The speed control within this range is carried out by varying the armature voltage. Beyond the base speed, the speed control the achieved by varying the field current. Within this range, the motor power is maintained constant and the torque is reduced with the increase in the rotational speed as shown in Fig. 1. For series motor, the speed control beyond the base speed is carried out using the armature current variation (since the armature and the field current are the same in series motors) as shown in Fig. 2.

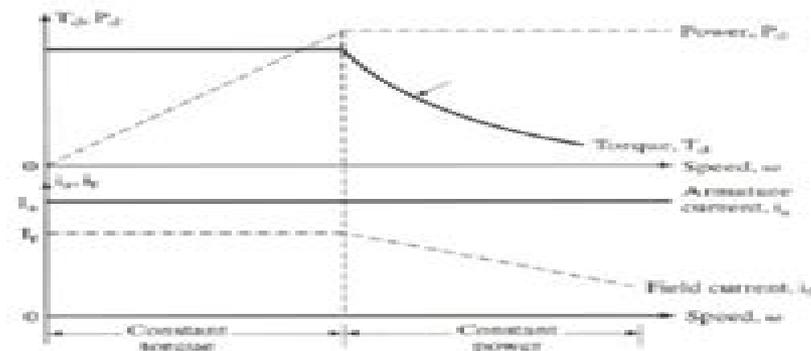


Fig. 1 Speed control characteristic of separately excited DC motors [1]

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David William Reeck



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FPGA-Based Embedded System Developer's Guide A. Arockia Bazil Raj, 2018-04-09 The book covers various aspects of VHDL programming and FPGA interfacing with examples and sample codes giving an overview of VLSI technology digital circuits design with VHDL programming components functions and procedures and arithmetic designs followed by coverage of the core of external I/O programming algorithmic state machine based system design and real world interfacing examples Focus on real world applications and peripherals interfacing for different applications like data acquisition control communication display computing instrumentation digital signal processing and top module design Aims to be a quick reference guide to design digital architecture in the FPGA and develop system with RTC data transmission protocols

Digital Speed Control of a D.C. Motor Aris Gurulian, 1980 *Proceedings 2002 IEEE/RSJ International Conference on Intelligent Robots and Systems*, 2002 **Effects of Gasoline Prices on Driving Behavior and Vehicle Markets** David Austin, United States. Congressional Budget Office, 2008 Gasoline prices and driving behavior Volume of traffic Speed of traffic Applicability of findings to other regions of the United States Gasoline prices and vehicle markets Market shares for cars and light trucks Gasoline prices and vehicle market status Changes in new vehicle fuel economy and pricing Changes in the used vehicle market Study data Analytical approach and economic results **DC Motors, Speed Controls, Servo Systems** Sam Stuart, 2013-10-22 DC Motors Speed Controls Servo Systems An Engineering Handbook is a seven chapter text that covers the basic concept principles and applications of DC and speed motors and servo systems After providing the terminology symbols and systems of units this book goes on dealing with the basic theory motor comparison and basic speed control methods of motors The subsequent chapters describe the phase locked servo systems and their optimization and applications These topics are followed by a discussion of the developments made by Electro Craft in the field of DC Brushless Motors The final chapter provides revised data sheets on Electro Craft products and describes the models in the motomatic range of speed controls servomotor controls and digital positioning systems This handbook is of great value to professional engineers and engineering students **Speed Control of Small D.C. Motors** Klaus Heinz Wiesmann, 1966 **Electric Motor Control** Sang-Hoon Kim, 2017-05-09 Electric Motor Control DC AC and BLDC Motors introduces practical drive techniques of electric motors to enable stable and efficient control of many application systems also covering basic principles of high performance motor control techniques driving methods control theories and power converters Electric motor drive systems play a critical role in home appliances motor vehicles robotics aerospace and transportation heating ventilating and cooling equipment s robotics industrial machinery and other commercial applications The book provides engineers with drive techniques that will help them develop motor drive system for their applications Includes practical solutions and control techniques for industrial motor drive applications currently in use Contains MATLAB Simulink simulation files Enables engineers to understand the applications and advantages of electric motor drive systems *Control of DC Motor Using*

Different Control Strategies Dr. Hidaia Mahmood Alassouli,2020-06-12 The ultimate goal of this paper is to control the angular speed in a model of a DC motor driving an inertial load has the angular speed as the output and applied voltage as the input by varying the applied voltage using different control strategies for comparison purpose The comparison is made between the proportional controller integral controller proportional and integral controller phase lag compensator derivative controller lead integral compensator lead lag compensator PID controller and the linear quadratic tracker design based on the optimal control theory It has been realized that the design based on the linear quadratic tracker will give the best steady state and transient system behavior mainly because the other compensator designs are mostly based on trial and error while the linear quadratic tracker design is based on the optimal control theory which can give best dynamic performance for the controlled system

Speed Control of DC Motors Suhaimi Zakaria,2013 **Analysis of a Feedback Speed Control for a D-C Motor Drive System** Ralph H. Johnson,1958 **Brushless DC Motor Speed Control System with Saturation Nonlinearity** Khawja M. Kamal,1991 *SCR Speed Control of a DC Motor* Robert M. McGarvey,1965 *DC Motors, Speed Controls, Servo Systems* Electro-Craft Corporation,1980 *A Simple Speed Control for Small D.c. Motors ...* Llewellyn Griffith Hoxton,1936 **DC motors, speed controls, servo systems** ,1989 *Minicomputer Speed Control of DC Motors* David William Reeck,1973 *System Identification and Real-time Adaptive Speed Control of a DC Motor* T. G. J. Sunderland,1985 **D.C. Motor Adaptive Speed Control** Adib T. Chebli,1985 **Elimination of Oscillations from D-C Motor Constant Speed Control** Victor M. Wolf,1941 **Model Reference Adaptive Speed Control of a DC Motor Drive** Francesco Valeri,1994

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