Review on Efficient Approach of Artificial Bee Colony Based DC Motor Victimization Control for PID

Prakash Varma
Dept. of Electronics & Telecommunication
Parthivi College of Engineering &Management
Bhilai-3, India

Sunil Sahu
Dept. of Computer science enginnering
Parthivi College of Engineering &Management
Bhilai-3, India

Bhupesh Deshmukh
Dept. of Electronics & Telecommunication
Parthivi College of Engineering &Management
Bhilai-3, India

***Abstract*- DC drive systems has a very wide area of applications in industrial sector like paper, Power, steel industries. But is robotics and actuation, position control is highly required. Tuning method for PID is very crucial for the process industries. As Proportional Integral Derivative controllers is simple in structure, excellent stability and high consistency. Consequently, PID controllers are used to control outputs in feedback system, particularly for systems with exact mathematical models. But a major factor which effect output of PID controllers is its accurate and efficient tuning of parameters. The aim of this paper is to study the Position control of DC motor using Artificial Bee Colony Algorithm. To solve this problem Artificial Bee Colony Algorithm with self–tuning is applied in PID controller, which can achieve high and efficient position control. The effectiveness of Control Algorithm is represented through simulation and hence compared with the superiority of PID controller. The proposed method is compared with Ziegler Nichols method. It is observed that the Artificial Bee Colony Algorithm with the proposed PID parameters is giving better result than the Ziegler & Nichols' method.**

Keywords- DC Drive, PID Controllers, Artificial Bee Colony Algorithm, Ziegler & Nichols' Method

I. INTRODUCTION

The direct current (DC) motor is a device that used in many industries in order to convert electrical energy into mechanical energy. This is all result from the availability of speed controllers is wide range, easily and many ways. In most applications, speed control is very important. For example, if we have DC motor in radio controller car, if we just apply a constant power to the motor, it is impossible to maintain the desired speed. It will go slower over rocky road, slower uphill, faster downhill and so on. So, it is important to make a controller to control the speed of DC motor in desired speed.

DC motor plays a significant role in modern industry. The purpose of a motor speed controller is to take a signal representing the demanded speed, and to drive a motor at that speed. There are numerous applications where control of speed is required, as in rolling mills, cranes, hoists, elevators, machine tools, transit system and locomotive drives. These applications may demand high-speed control accuracy and good dynamic responses.

The control of DC motor uses the digital signal processing system. Proportional Integral Derivative (PID) controller has been widely used for processes and motion control system in industry. Now more than 90% of control systems are still with PID controllers. The most critical step in the application of PID controller is parameters tuning. The main objective of the work is to design a position controller of a DC motor by selection of PID parameters using Artificial Bee Colony algorithm

II. BACKGROUND

A. D. C. Motor

At the most basic level, electric motors exist to convert electrical energy into mechanical energy. This is done by way of two interacting magnetic fields – one stationary, and another attached to a part that can move. A number of types of electric motors exist, but mostly used DC motors in some form or another. DC motors are also not only the simplest, but the oldest electric motors.

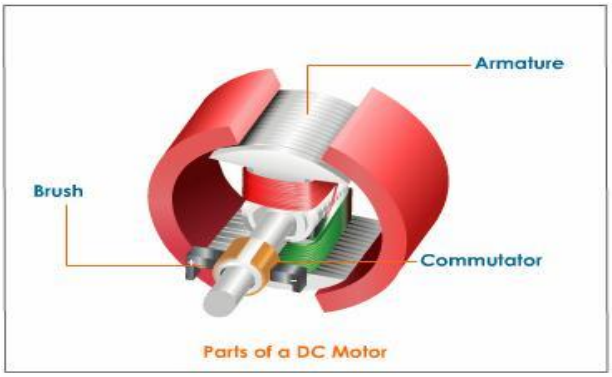

Fig. 1. Parts of a DC motor

The basic principles of electromagnetic induction were discovered in the early 1800's by Oersted, Gauss, and Faraday. By 1820, Hans Christian Oersted and Andre Marie Ampere had discovered that an electric current produces a magnetic field. The next 15 years saw a flurry of cross-Atlantic experimentation and innovation, leading finally to a simple DC rotary motor. A number of men were involved in the work, so proper credit for the first DC motor is really a function of just how broadly we choose to define the word "motor".

B. Position Control of a DC motor

The position of the motor is the rotation of the motor shaft or the degree of the rotation which is to be controlled by giving the feedback to the controller which rectifies the controlled output to achieve the desired position.

Proportional Integral Derivative (PID) controller has been widely used for processes and motion control system in industry.

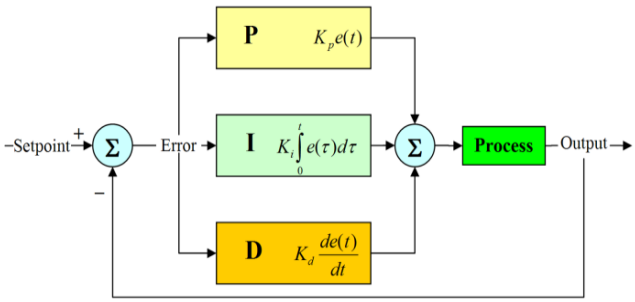

Fig. 2. Schematic of the PID Controller

III. CONCLUSIONS

Artificial Bee Colony (ABC) has much faster response than the response of the classical Ziegler Nichols method. The classical method is good for giving us as the starting point of what are the PID values. However the ABC designed PID with DC motor is much better in terms of the rise time and the settling time than the conventional method. Finally the Artificial Bee Colony algorithm provides much better results compared to the conventional methods. And also the error associated with the ABC based PID is much lesser than calculated in the conventional scheme. In this paper, implementation of the Artificial Bee Colony algorithm based PID controller for the DC motor position control system is covered.

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