

# Optimal Tuning of PID Controller to Control speed of DC Motor Using PSO Algorithm

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**Abstract:** DC motor is an electrical machine which is used in many day to day life applications. So, it is essential to control the speed for various applications. In this paper, to control the speed of DC motor, tuning of PID controller parameters are considered using Particle Swarm Optimization (PSO) and Zeigler-Nichol's (ZN) methods. The main objective of this paper is to minimize the Overshoot, Steady State Error, Rise time and settling time by finding the optimum value of Proportional Gain ( $K_p$ ), Integral Gain ( $K_i$ ) and Derivative Gain ( $K_d$ ). PSO algorithm is population based technique where population size (space), initial velocity, location and direction are randomly allotted and based on these parameters reached to optimal solution. PSO algorithm gives more optimum value of  $K_p$ ,  $K_i$  and  $K_d$  as compared to ZN method. Matlab Simulink software is used for experimentation and optimization of DC motor model. It gives the graphical representation of output and respective analysis done through it.

**Keywords:** DC Motor, Particle Swarm Optimization (PSO), Ziegler-Nichols Tuning Method, PID Controller.

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