

Improve Closed Loop Performance and Control Signal Using Evolutionary Algorithms Based PID Controller

Authors : Mehdi Shahbazian, Alireza Aarabi, Mohsen Hadiyan

Abstract : Proportional-Integral-Derivative (PID) controllers are the most widely used controllers in industry because of its simplicity and robustness. Different values of PID parameters make different step response, so an increasing amount of literature is devoted to proper tuning of PID controllers. The problem merits further investigation as traditional tuning methods make large control signal that can damages the system but using evolutionary algorithms based tuning methods improve the control signal and closed loop performance. In this paper three tuning methods for PID controllers have been studied namely Ziegler and Nichols, which is traditional tuning method and evolutionary algorithms based tuning methods, that are, Genetic algorithm and particle swarm optimization. To examine the validity of PSO and GA tuning methods a comparative analysis of DC motor plant is studied. Simulation results reveal that evolutionary algorithms based tuning method have improved control signal amplitude and quality factors of the closed loop system such as rise time, integral absolute error (IAE) and maximum overshoot.

Keywords : evolutionary algorithm, genetic algorithm, particle swarm optimization, PID controller

Conference Title : ICCDSR 2015 : International Conference on Control, Dynamic Systems, and Robotics

Conference Location : Amsterdam, Netherlands

Conference Dates : August 06-07, 2015