The study of a hybird genetic algorithm and its applications on control sysstems

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ABSTRACT

Both Genetic Algorithm (GA) and Particle Swarm Optimization (PSO) are two most popular methodologies used for solving various optimization problems nowadays. GA has a potential for getting the global solution because of the mutation mechanism, but it can be trapped into the local optima due to the effect of crossover. On the contrary, PSO has both computationally fast and efficient properties. The disadvantages of PSO are that it can be trapped either into the locality and fast convergence on local optima especially in the search of solutions in high dimensionality of problems. Therefore, in this thesis, advantages of both PSO and GA are combined together to form a proposed hybrid optimization algorithm (GA-PSO) in which local search capability and fast speed of PSO and exploitation effect of mutation in GA are effectively employed. This hybrid method can enhance the capability and probability of finding global optima in the last result. From those results of sample examples, this GA-PSO hybrid algorithm shows better results than that by using simply either GA or PSO one. Therefore, GA-PSO algorithm is capable in finding PID gains frequently used in control systems for controller design.

Keywords : Genetic Algorithm (GA)、Particle Swarm Optimization (PSO)、Hybrid optimization algorithm (GA-PSO)、PID

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