Design and Implementation of GA and PSO based D.C. Motor Speed control using a tachogenerator Feedback

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ABSTRACT: This paper presents a particle swarm optimization (PSO) and Genetic Algorithm (GA) techniques for defining the Proportional-Integral-Derivative (PID) controller parameters, for speed control of a DC motor using a tachogenerator feedback. Quantization error is occurring when the encoder is used as the feedback element in closed-loop DC Motor control to conquer this error a tachogenerator is used as feedback and it converts motor speed to corresponding voltage. The DC motor is modelled in Simulink and the PSO and GA algorithms are implemented in MATLAB Simulink. However, for best validation, it is always recommended to test a real-time rather than in simulation, the author has implemented the same real-time approach by using Hardware-in-loop (HIL) concept. Comparing simulation and real-time (HIL) results of GA and PSO methods, to find which soft technique method was more efficient in improving the Time-domain characteristics response characteristics such as, rise time, settling time, and maximum overshoot in speed control of a DC motor. The simulation and real-time (HIL) results clearly show PSO method is efficient for the proposed approach.