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PERFORMANCE EVALUATION OF THREE EVOLUTIONARY ALGORITHMS FOR SELECTIVE HARMONIC ELIMINATION IN VOLTAGE SOURCE MULTILEVEL INVERTER

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ABSTRACT

In Selective Harmonic Elimination-Pulse Width Modulation (SHE-PWM) technique, optimal switching angles at fundamental switching frequency are computed such that low order harmonics are eliminated, while the fundamental voltage is obtained as desired. In this paper, ant colony optimization (ACO), particle swarm optimization (PSO), and real coded genetic algorithm (RCGA) were implemented and compared for solving selective harmonic elimination (SHE) equations of an 11-level inverter. Using the same population size and the same step size of modulation index, performance evaluations of the three methods show that PSO is the fastest, RCGA are is the most efficient in terms of low order harmonic elimination while ACO is the most efficient in terms of minimization of total harmonic distortion (THD) over a wide range of modulation indices. Computational results are validated with MATLAB simulations.

KEYWORDS: Multilevel Inverter, Ant Colony Optimization (ACO), Particle Swarm Optimization (PSO), Real Coded Genetic Algorithm (RCGA)