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Optimization of Proton Exchange Membrane Fuel Cell Parameters Based on Modified Particle Swarm Algorithms

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Abstract : In recent years, increasing usage of electrical energy provides a widespread field for investigating new methods to produce clean electricity with high reliability and cost management. Fuel cells are new clean generations to make electricity and thermal energy together with high performance and no environmental pollution. According to the expansion of fuel cell usage in different industrial networks, the identification and optimization of its parameters is really significant. This paper presents optimization of a proton exchange membrane fuel cell (PEMFC) parameters based on modified particle swarm optimization with real valued mutation (RVM) and clonal algorithms. Mathematical equations of this type of fuel cell are presented as the main model structure in the optimization process. Optimized parameters based on clonal and RVM algorithms are compared with the desired values in the presence and absence of measurement noise. This paper shows that these methods can improve the performance of traditional optimization methods. Simulation results are employed to analyze and compare the performance of these methodologies in order to optimize the proton exchange membrane fuel cell parameters.

Keywords : clonal algorithm, proton exchange membrane fuel cell (PEMFC), particle swarm optimization (PSO), real-valued mutation (RVM)
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