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Abstract

The Search and Rescue optimization algorithm (SAR) is a recent metaheuristic inspired by the exploration's behaviour for humans throughout search and rescue processes. The SAR is applied to solve the Combined Emission and Economic Dispatch (CEED) and Economic Load Dispatch (ELD). The comparative performance of SAR against several metaheuristic methods was performed to assess its reliability. These algorithms include the Earthworm optimization algorithm (EWA), Grey wolf optimizer (GWO), Tunicate Swarm Algorithm (TSA) and Elephant Herding Optimization (EHO) for the same two networks study. Also, the proposed SAR method is compared with other literature algorithms such as Sine Cosine algorithm, Monarch butterfly optimization, Artificial Bee Colony, Chimp Optimization Algorithm, Moth search algorithm. The cases applied in this work are seven cases: three cases of 6-unit for ELD issue, three cases of 6-unit for CEED issue and 10-unit for ELD problem. The evaluation of counterparts is performed for 30 different runs based on measuring the Friedman rank test and robustness curves. Furthermore, the standard deviation, maximum objective function, minimum, mean and values over 30 different runs are applied for a statistical analysis of all used techniques. The obtained results proved the superiority of the SAR in determining the fitness function of ELD and CEED is minimizing the cost of fuel for ELD and emission and fuel costs for CEED.