

Multiple scenarios multi-objective salp swarm optimization for sizing of standalone photovoltaic system

ABSTRACT

The paper presents a new multiple scenario multi-objective salp swarm optimization (MS-MOSS) algorithm to optimally size a standalone PV system. An accurate estimation of the number of PV modules and storage battery is crucial as it affects the system reliability and cost. Three scenarios have been presented focusing on Pareto optimal solutions by minimizing two conflicting objectives. Loss of load probability (LLP) and life-cycle cost (LLC) are considered to obtain the Pareto front. The iterative method is employed for validation of the superiority results of the proposed MS-MOSS algorithm. The results show that the scenarios are able to find Pareto optimal configuration at a high level of accuracy and at a very low cost. The proposed three scenarios are faster than iterative approach approximately by 158, 194.2, and 141.6 times, respectively. The third scenario outperforms other scenarios in terms of coverage and convergence of the distribution of solution to the Pareto front. As a conclusion, The MS-MOSS algorithm is found to be very effective in sizing of SAPV system.

Keyword: Standalone PV system; Multiple scenarios; Multi-objectives optimization; Salp swarm algorithm; LLPLCC