5- D. Yousri, M. Mohammed, Y. Shaker, L. Abualigah, E. Tag-Eldin, M. Abd Elaziz, and Dalia Allam. "Modified interactive Algorithm Based on Runge kutta optimizer for Photovoltaic Modeling: Justification under Partial Shading and Varied Temperature Conditions". IEEE ACCESS. Volume 10, Page 20793-20815, DOI 10.1109/ACCESS.2022.3152160, Published Feb 2022.

Abstract

The accuracy of characteristic the PV cell/module/array under several operating conditions of radiation and temperature mainly relies on their equivalent circuits sequentially; it is based on identified parameters of the circuits. Therefore, this paper proposes a modified interactive variant of the recent optimization algorithm of the Rung- Kutta method (MRUN) to determine the reliable parameters of single and double diode models parameters for different PV cells/modules. The results of the MRUN optimizer are validated via series of statistical analyses compared with five new meta-heuristic algorithms including Aquila Optimizer (AO), Electric Fish Optimizer (EFO), Barnacles Mating Optimizer (BMO), Capuchin Search Algorithm (CapSA), and Red Fox Optimization algorithm (RFO) moreover, twenty- five state-of the art techniques from literature. Furthermore, the identified parameters certainty has been evaluated during implementing the characteristics of an entire system consists of series (S), and series-parallel (S-P) PV arrays with numerous dimensions. The considered arrays dimensions are three series (3S), six series (6S), and nine series (9S) PV modules. For the investigated arrays, three-dimensional arrays are recognized. The first array comprises 3S-2P PV modules where two parallel strings (2P) have three series modules in each string (3S). The second array consists of six series-three parallel (6S-3P) PV modules, and the third one has nine series-nine parallel (9S-9P) PV modules. The results prove that the proposed algorithm precisely and reliably defines the parameters of different PV models with root mean square error and standard deviation of 7:7301e-4 ± 4:9299e-6, and 7:4653e-4± 7:2905e-5 for 1D, and 2D models, respectively meanwhile the RUN have 7:7438e-4± 3:5798e-4, and 7:5861e-4± 4:1096e-4, respectively. Furthermore, MRUN has provided extremely competing results compared to that of the other well-known PV parameters extraction methods statistically.