3- Dalia Allam, D.A. Yousri, M.B. Eteiba. “Parameters extraction of the three diode model for the multi-crystalline solar cell/module using Moth-Flame Optimization Algorithm”. Elsevier, Energy Conversion and Management 123 (2016) 535–548.

Abstract

As a result of the wide prevalence of using the multi-crystalline silicon solar cells, an accurate mathematical model for these cells has become an important issue. Therefore, a three diode model is proposed as a more precise model to meet the relatively complicated physical behavior of the multi-crystalline silicon solar cells. The performance of this model is compared to the performance of both the double diode and the modified double diode models of the same cell/module. Therefore, there is a persistent need to keep searching for a more accurate optimization algorithm to estimate the more complicated models’ parameters. Hence, a proper optimization algorithm which is called Moth-Flame Optimizer (MFO), is proposed as a new optimization algorithm for the parameter extraction process of the three tested models based on data measured at laboratory and other data reported at previous literature. To verify the performance of the suggested technique, its results are compared with the results of the most recent and powerful techniques in the literature such as Hybrid Evolutionary (DEIM) and Flower Pollination (FPA) algorithms. Furthermore, evaluation analysis is performed for the three algorithms of the selected models at different environmental conditions. The results show that, MFO algorithm achieves the least Root Mean Square Error (RMSE), Mean Bias Error (MBE), Absolute Error at the Maximum Power Point (AEMPP) and best Coefficient of Determination. In addition, MFO is reaching to the optimal solution with the shortest execution time when it is compared with the other tested algorithms.