To: Applied Energy Editorial Board
Subject: Article Submit

Dear Editors,

Enclosed with this letter you will find the electronic submission of manuscript entitled "A test of meta-heuristic algorithms for parameter extraction of next-generation solar cells with S-shaped current-voltage curves" O. Olikh.

It is widely recognized that accurately determining the parameters of photovoltaic (PV) models based on measured current-voltage (IV) characteristic curves is vital for the simulation, evaluation, and control of PV systems. The commonly used traditional solar cell lumped-parameter models include the single-diode model, double-diode model, and three-diode model. Many studies have investigated the use of meta-heuristic algorithms to find these parameters within these models.

However, the IV characteristics of new-generation PV devices, such as thin-film, organic, perovskite, and quantum dot solar cells, often exhibit an S-shaped deformation, requiring different models for accurate description. The No Free Lunch theory suggests that no single meta-heuristic algorithm is universally effective for all optimization tasks. Therefore, it is essential to accurately estimate parameters from S-shaped IV curves. Surprisingly, to our knowledge, there are no studies that have identified the most suitable approach to solve these problems. This study aims to compare the effectiveness of parameter estimation using the two-diode model, employing 14 different meta-heuristic algorithms, and determine the best-performing algorithm among them. We have compared the results obtained from these algorithms using various nonparametric statistical methods. We strongly believe that this study, which involves testing and comparative analysis of different meta-heuristic algorithms for estimating solar cell parameters, will be of great interest to the readers.

This is an original paper which has not been simultaneously submitted as a whole or in part anywhere else. No elements of the work have been published in any form. No conflict of interest exits in the submission of this manuscript.

We would very much appreciate if you would consider the manuscript for publication in the *Applied Energy*.

Sincerely yours,
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