ABSTRACT:

To accurately model the PVmodule, it is crucial to include the effects of irradiance and temperature when computing the value of the modelparameters. Considering the importance of this issue, this paper proposes an improvedmodeling approach using differentialevolution (DE) method. Unlike other PVmodeling techniques, this approach enables the computation of modelparameters at any irradiance and temperature point using only the information provided by the manufacturer's data sheet. The key to this improvement is the ability of DE to simultaneously compute all the modelparameters at different irradiance and temperature. To validate the accuracy of the proposed model, three PVmodules of different types (multi-crystalline, mono-crystalline and thin-film) are tested. The performance of the model is evaluated against the popular single diode model with series resistance Rs. It is found that the proposed model gives superior results for any irradiance and temperature variations. The modelingmethod is useful for PV simulator developers who require comprehensive and accurate model for the PVmodule.