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[Home](#) > [Vol 12, No 3](#) > [Patil](#)

Five parameters extraction of single diode PV model by metaheuristic optimization method by identified built-up data

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Abstract

Precision calculation of unknown photovoltaic (PV) modules or single diode models for PV cell specifications under various environmental conditions is needed to build a sunlight-based PV framework. Installing a PV system requires knowledge of all parameters, modeling, and optimization techniques because PV system analysis and configuration help generate renewable energy. This concept requires accurate modeling and calculation of identified and unknown parameters. The single-diode model is simple and accurate for different mathematical equations. Streamlining calculations requires distinguishing this nonlinear model. The current investigation calculated five unknown parameters and compared them with particle swarm optimization (PSO) and wind-driven optimization (WDO) optimization results. The said approach utilizes MATLAB software, analytical as well as optimization methods, and manufacturing data. The suggested method is simple, fast, and accurate for calculating diode ideality factor (A), output currents (I_0), series resistance (R_s), Shunt resistance (R_{sh}), and photocurrent (I_{ph}).

Keywords

Metaheuristic optimization; Particle swarm optimization; Photovoltaic module; Single diode model; Wind-driven optimization

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