

Parameter identification of photovoltaic cells

Why is parameter identification of solar photovoltaic (PV) cells important?

Scientific Reports 14, Article number: 16765 (2024) Cite this article Parameter identification of solar photovoltaic (PV) cells is crucial for the PV system modeling. However, finding optimal parameters of PV models is an intractable problem due to the highly nonlinear characteristics between currents and voltages in different environments.

How to identify the parameters of different configurations of photovoltaic models?

Identifying the parameters of different configurations of photovoltaic models based on recent artificial ecosystem-based optimization approach A particle-swarm-optimization-based parameter extraction routine for three-diode lumped parameter model of organic solar cells

What are the parameters of PV cells?

The parameters of the PV cells are generated photocurrent, ideality factors, saturation current, series resistance and shunt resistance , The models are considered for identification of the PV cell parameters.

What are the characteristics of a PV cell?

In a single diode model, a complete characteristic of a PV cell can be described by five model parameters i.e.: light generated current, leakage or reverse saturation current, diode quality factor, series resistance and shunt resistance.

What is the optimal identification of PV systems?

The optimal identification of PV systems is formulated as a single objective function. It appears in the form of the Root Mean Square Error (RMSE) between the PV model current from the experimental data and the current calculated using the identified parameters considering the parameter constraints (limits).

What is a single diode model of a PV cell?

In a single diode model, a complete characteristic of a PV cell can be described by five model parameters (called as five lumped parameters) i.e.: light generated current (I_l), leakage or reverse saturation current (I_o), diode quality factor (n), series resistance (R_s) and shunt resistance (R_{sh}).

A nonlinear least-squares optimization algorithm based on the Newton model modified with the Levenberg parameter was proposed for the identification of the five unknown PV parameters from the experimental data by Easwarakhanthan et al. [23]. The Genetic algorithm optimization to extract seven unknown variables of the PV panel was modeled by Ismail et al. ...

Parameters identification of PV solar cells and modules using flexible particle swarm optimization algorithm. Energy, Volume 179, 2019, pp. 358-372.

PDF | On Apr 20, 2022, Danyang Li and others published Recent Photovoltaic Cell Parameter Identification Approaches: A Critical Note | Find, read and cite all the research you need on ResearchGate

To study the mechanisms of the proposed OLMSSA for the extraction of the parameters of the DDM-based equivalent electrical circuit of a TITAN-12-50 solar panel, different experimental tested data are acquired from works by Abbassi et al. [95], Abbassi et al. [70]. The present study aims to identify the model that carefully describes the real performance of the ...

In this paper, a parameter identification method of photovoltaic cell model based on improved lion swarm optimization is presented. Lion swarm optimization is a novel intelligent algorithm proposed in recent years, but it has problems such as ...

On the contrary, the classification of parameters for PV cells is implemented by sociology-based algorithms, such as Teaching Learning-Based Optimization (TLBO) and Harmony Search. These algorithms assist in the identification of PV cell parameters for the single-diode model (SDM) and double-diode model (DDM) .

Accurate physical modeling and parameter extraction for the nonlinear current-voltage (I-V) characteristics of photovoltaic (PV) cells and modules are essential prerequisites for the design ...

Also, the RMSE involved in parameter identification of PVM-752-GaAs PV cell models based on single, double, and triple diodes are $1.59256\text{e-}4$, $1.408989\text{e-}4$, and $1.30181\text{e-}4$, respectively.

The fast and accurate convergence property of FIPSO-SQP make it a powerful algorithm for parameter identification of PV solar cells. Now, using the parameters achieved by FIPSO-SQP, FPSO and PSO algorithm, the I-V and the ...

At present, the intelligent algorithms applied to the parameter identification of photovoltaic model are particle swarm optimization, genetic algorithm, cat swarm algorithm and artificial bee colony algorithm, and so on [10]. Among them, particle swarm algorithm (PSO) distributes individual position randomly in the initialization, and via the global and current two ...

The parameters identification for solar cell model based on GA has the relatively high percentage of errors associated with the estimated parameters and the complex binary ...

Identification of photovoltaic (PV) module characteristics in solar systems is a vital task, nowadays, for optimal PV power estimation. In this paper, this challenge task has been studied using a novel advanced Kepler optimization algorithm (KOA). The standard version of KOA is adopted and assessed for getting the nine parameters of the PV triple diode model ...

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Accurate modeling and parameter identification of photovoltaic (PV) cells is a difficult task due to the nonlinear characteristics of PV cells. The goal of this paper is to propose a multi strategy sine-cosine algorithm (SCA), named enhanced sine-cosine algorithm (ESCA), to evaluate nondirectly measurable parameters of PV cells.

For being applicable and solving the equation for the extraction of the PV cells parameters, the fitness function need to be continuous, convex and differentiable. ... Identification of PV solar cells and modules parameters using the genetic algorithms: Application to maximum power extraction. Sol. Energy, 85 (1) ...

The experiments of using MBB-ICA to identify the parameters of PV cells are detailed explained in Section 4. In the last, Section 5 draw the conclusion remarks. Section snippets Single diode model. Single diode model (SDM) stimulate the I-V characteristic of PV cell using a current source parallel with a single diode. Fig. 1 shows the ...

Photovoltaic systems have become more attractive alternatives to be integrated into electrical power systems. Therefore, PV cells have gained immense interest in ...

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