Contribution ID: **294** Type: **Poster Presentation**

Application of Genetic Algorithm Parameter Optimisation on Current-Voltage data of multi-crystalline Silicon solar cells

Tuesday, 4 July 2017 17:10 (1h 50m)

The models relating current and voltage for a diode and other related devices contain many parameters and the relations often contain multiple terms hindering explicit formulae for specific parameters. Optimisation procedures are useful for fitting a model to a dataset. In this study a Genetic Algorithm (GA) is proposed as the solution to the Parameter Optimisation (PO) of the models used to describe a solar cell. In particular, GAPO is applied to the current-voltage (I-V) relation of a multi-crystalline Si PV cell.

A GA is a type of Evolutionary Algorithm based upon biological processes such as genetic crossover during sexual reproduction, genetic mutation, breeding pair selection, and other such processes. GAs search the solution space with parallel proposed solutions, increasing the probability of convergence to a global minimum error for the parameters obtained for the applied model to the data. Alternatively, more classical approaches, such as the Gradient Descent parameter optimisation, are prone to acquiring only local minima. This paper addresses the application of GAPO in the parameter optimisation of a model applied (a multiple diode model) to the dark I-V curve of a Si solar cell, as well as the application of the technique on a model applied to (a hybrid model containing multiple diode terms to account for various factors) Light Beam Induced Current (LBIC) measurements which is used to spatially resolve device parameters of a Si solar cell. The GAPO used in this paper is constructed to ensure effective and relatively fast convergence to a global minimum while maintaining physically realisable values.

Keywords: Genetic Algorithm, parameter optimisation, LBIC

Apply to be
 considered for a student
   award (Yes / No)?

No

Level for award
 (Hons, MSc,
   PhD, N/A)?

MSc

Main supervisor (name and email)
and his / her institution

Prof EE van Dyk
Ernest.vanDyk@nmmu.ac.za
NMMU

Would you like to
 submit a short paper
 for the Conference
 Proceedings (Yes / No)?

Yes

Primary author: Mr DIX-PEEK, Ross (NMMU)

Co-authors: Mr PRETORIUS, Christiaan (NMMU); Prof. VAN DYK, Ernest (NMMU); Dr VORSTER, Frederik (NMMU)

Presenter: Mr DIX-PEEK, Ross (NMMU)

Session Classification: Poster Session 1

Track Classification: Track F - Applied Physics