Extraction of Solar Cell Physical Parameters Model with Double Exponential from Illuminated I-V Experimental Curve

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Abstract: In this paper, we present a new method for extracting physical parameters of the illuminated solar cell model. The equivalent circuit includes two diodes with two saturation currents $I_{01}$, $I_{02}$, a current generator $I_{ph}$, a series resistance $R_S$ and a conductance $G_P$ [1-4]. One variable nonlinear equations being easier to manage in an optimization program, we determine experimentally the value of $R_S$, we define a new variable $X = V - R_S I$, and we fit the experimental characteristics using a Mathematica code. This method is compared firstly to the so-called five points method [5-7]. The obtained results are then compared to those given by three extraction methods [5] applied to solar cell model represented by an equivalent circuit containing a single diode. We find that the best agreement with the experimental characteristic is obtained with the two diodes model. The experimental measurements were made, in this study, with a commercial Conrad solar cell.

References

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