New method to assess the loss parameters of the photovoltaic modules

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Abstract/Résumé : The determination of an effective method able to estimate the parameters of a photovoltaic panel is essential for the development and the performance of analysis of such equipment. In this paper, we present a new simple and effective method in order to extract the parameters of the photovoltaic (PV) modules by using the standard diode model. This model requires the five parameters be known, the photocurrent Iph, the reverse saturation current Is, the resistance Rs, the shunt resistance Rsh, and the curve fitting parameter A (the ideality factor) or the thermal voltage a. In order to find the five parameters, we formulated an equation binding only the two loss parameters Rs and Rsh. In order to solve this equation and to determine the shunt resistance and the thermal voltage, we expose the computation models of the series resistance Rs, which give excellent approximations. While the other parameters Iph and Is depend exclusively on the parameters Rs, Rsh, a, and the short circuit current Isc, and the open circuit voltage Voc. This method is validated experimentally by three different flat plat PV modules of various technologies (monocrystalline, polycrystalline, and thin film panels) and manufacturers. (C) 2012 American Institute of Physics. [http://dx.doi.org/10.1063/1.4767812]

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