

Comparison and statistical validation of a model of a photovoltaic module

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Abstract: The study presented in this paper includes a comparison, and a statistical validation. The results that are obtained by a numerical simulation in MATLAB are compared with the experimental results that are taken from the Unit of Applied Research in Renewable Energy "Ghardaïa" (URAERG) (Experience in the field of solar energy). The work is to exploit the experimental data obtained by exposing the solar cells (panel BP3160W) to light (sunlight), wherever the place of use and the operating conditions. The purpose of this study was to evaluate the model of single diode proposed by Walker of University of Queensland, Australia, uses the electric model with moderate complexity. The numerical results are presented relating to the current-voltage characteristics and power-voltage; during a change of weather conditions such as light, and temperature. To compare, objectively, the performance of the model with the diode modeled using experimental data, statistical indicators proposed by Chang and Hanna (2004) were calculated for different measurement points of light and temperature; the analysis shows that the results for the current and the power reflect the physical reality. Note; however, that the model results are in a very good agreement with experimental measurements.

Keywords : Model of single diode, solar panels, Matlab, statistical validation