



A NEW APPROACH OF TOTAL LEAST SQUARE ALGORITHM FOR PARAMETER EXTRACTION OF A PHOTOVOLTAIC PANEL: A COMPARISON STUDY

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Abstract *The degradation of the photovoltaic panels due to their long outdoor exposure leads to a variation in their internal parameters. The function describing the I-V characteristic of the photovoltaic cell is known to be non-linear and implicit, with five unknown parameters. To identify these photovoltaic parameters, the cost function used for optimization is the Total Least Square function (TLS), defined as a sum of quadratic terms representing the quantification of the errors between a mathematical model and a measured set of experimental data, which is usually accompanied by measurement uncertainties (measuring current and voltage). However, the studies that have been done so far to extract the photovoltaic parameters work with the Ordinary Least Square (OLS) function defined as the sum of quadratic terms representing the quantification of the errors between a mathematical model and a measured set of experimental data of one variable (current only), because it is facile to apply, especially in the case of nonlinear models. Nether less, taking into account both differences in measurement uncertainties accompanying both variables will help to achieve more efficient optimization and more precise results. This work presents a new iterative, simple to implement algorithm that can calculate the value of the Total Least Square function at each step of the optimization process. The results are then compared with the ones obtained by applying the OLS function.*