A Simple Theoretical Method for the Estimation of Dynamic Resistance in Photovoltaic Panels

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For practical reasons, we assume that the power delivered by a photovoltaic generator which is connected to an MPPT controller is always maximal. When studying the behavior of a PV generator the most interesting aspect is the evolution of the point of maximum power. So, the analysis of the I-V characteristic must be centred in the area of maximum of photovoltaic (PV) power systems under atmospheric conditions. By focusing on the resistance effect of the solar cells, we propose a simple method to determine directly the dynamic resistance of the PV panel from a current-voltage curve characteristic.

On the other hand, the information currently provided by manufacturers is insufficient to model PV. In our method, we develop the ability to determine the dynamic resistance based on simplified equations, which allows the estimation of the resistances of any PV panel. A series of experiments, including simulations and field data tests, are conducted to examine the dynamic behavior of the PV modules during power tracking. Experimental results show the direct resistance-estimation method allows the PV module to achieve their maximum power under various weather conditions.

Keywords: Array, circuit, equivalent, model, modeling, photovoltaic, PV, simulation.