Analysis of the Stationary and Transient Behavior of a Photovoltaic Solar Array: Modeling and Simulation

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Abstract

The behavior of a photovoltaic solar array is investigated by performing a simulation in Simulink (MATLAB). The modeling of the system is based on the one diode model (in which the solar cell’s equivalent circuit is composed by a current source, diode, series and parallel resistance). The simulation results show how the series and parallel connection of the solar cells have a direct impact under the maximum voltage and current that the array can generate, respectively. The linear dependence of the array’s current with respect to the solar irradiance is also exposed. Not only its stationary performance but also its transient behavior is discussed by adding a capacitor on the model to represent the influence of the charge separation that occurs at the depletion region.

References


Index Terms

Computer Science

Pattern Recognition

Keywords
Solar Array, Mathematical Model, Simulation, Stationary and Transient State.