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Talbi Mourad

Modeling of Photovoltaic Systems and Real-Time Implementation

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About This Book

This book is intended for engineers as well as professional masters and research students. It composed by five chapters where the first chapter describes a modeling technique of a photovoltaic (PV) module, employing MATLAB/SIMULINK. The aim of the second chapter is to present the non-uniform partial shading impact on the performances of a photovoltaic generator. Hence, a theoretical modeling of a generator composed of two series photovoltaic panels is presented. The aim of the Chap. 3 consists in investigating the shading effect on an architecture of a photovoltaic generator (PVG) proposed in our previous research work. This architecture consists of three PV modules in series connected. This architecture is conceived as a PV concentrator, where the two amorphous PV modules are located in the lower positions, left and right. The third PV module is located in the upper position precisely in the focus. This architecture is aimed at solving the problems existing with the architecture of tandem solar cells proposed in the literature. These problems are the mismatch between cells and the tunnel junction costs and fabrication. In this chapter, we use MATLAB/SIMULINK for modeling this architecture and studying its characteristics (P-V and I-V) in case of partial shading. In the Chap. 4, a *PV* panel model is proposed employing MATLAB/SIMULINK, and three commands of the MPP Tracking (MPPT), are applied in our proposed PV system. These MPPT commands are (P&O), the Incremental Conductance (IC), and the *ANN*-based one. In the Chap. 5, we perform the modeling and real-time implementation of a Photovoltaic (PV) System. The latter includes a PV panel, a DC-DC boost converter, and a resistive load. This DC-DC boost converter is controlled by an MPPT controller using Perturb and Observe (P&O) or Incremental Conductance (IC) algorithm. Also, this DC-DC boost converter is controlled via Pulse Width Modulation (PWM) generated from the used Arduino card. The modeling of this PV system is performed under ISIS (Proteus). The implementation of P&O or IC algorithm is performed using Arduino Uno card.

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