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DEVELOPMENT AND INTEGRATION OF PHOTOVOLTAIC COMPLEX SYSTEMS IN OPTOELECTRONIC AND POWER APPLICATIONS

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Abstract: *This thesis presented innovative dimensioning and implementation of autonomous photovoltaic systems is primarily aimed at ensuring the energy independence of the receiver (consumer), the security of electricity supply and the adaptation to meteorological conditions in the area where they are located. The PV system components are based on literature, but their characterization was possible by implementing the components / system in the MATLAB / Simulink work environment to determine the behavior and performance of the analyzed system for different applications. We also analyzed the interdependence of the subsystems and how they affect the efficiency of the PV system. The main contribution of this paper is based on MPPT method and FLC controller used in order to optimize the behavior of applied PV systems.*

Keywords: Optimized PV system, application, simulation, modeling, software tools, MPPT, FLC

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1. Introduction

1.1 Photovoltaic technology

The solar cell represents the fundamental unity of the PV system. The photovoltaic module is the solar cell matrix. The specific parameters of photovoltaic module are: 1) open circuit voltage (Voc), 2) short circuit current (Isc), and 3) FFM module fill factor. The power generated by PV modules in real-world applications can range from 20 to 60 Wp or 300-350 Wp depending on panel size and technology.
The BOS system represents all the photovoltaic components with conversion (inverter), stabilization (electrical regulator) and electrical energy storage (battery).
The DC-AC inverter or converter is a BOS element that is particularly important for photovoltaic systems, especially for PV-integrated PV systems, but also for stand-alone PV systems. In the case of PV-connected PV systems, the inverter faces more delicate tasks due to the fluctuating power of photovoltaic modules. As a result, the inverter has an essential role (in addition to the DC to AC conversion) to stabilize the voltage and THD (Total Harmonics Distortions), respectively.
The DC-DC converter (regulator) also called DC voltage regulator can be defined as a device to convert DC power with constant parameters.

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