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Modeling and simulation of an off-grid PV system with a battery storage system

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Many parts of remote areas in the world are not connected to the electrical grid even with current advanced technology. Photovoltaic energy systems (PV) are very suitable and effective solution to supply electricity to remote and isolated areas. Furthermore, in order to meet the needs of the consumers, these systems should be connected to a battery storage system, especially for off-grid systems, to supply electricity at night. This paper focuses on the modeling, analysis, and simulation of a PV energy system with battery storage system. The PV energy system is used as a primary energy system, and the battery storage system is used as a backup energy system. The battery storage system is applied to store extra power from PV system and to supply continuous power to load when the PV system power is less than load power. A bidirectional DC-DC converter controlled by a Fuzzy Logic Controller (FLC) is used to manage and regulate the energy system. A control technique, which is Maximum Power Point Tracking (MPPT), has been applied to capture the maximum power point from the PV energy system. A DC-DC converter is applied with MPPT controller to reduce losses in the PV system. The photovoltaic energy system is studied under changing environmental conditions. MATLAB/Simulink software is used to model, simulate, and analyze the entire PV/battery system.

Biography

Tareq Kareri has completed his MS from Northern Illinois University School of Engineering. He is pursuing his PhD at University of South Florida School of Engineering.

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