

Voltage Stabilization of Hybrid PV and Battery Systems by Considering Temperature and Irradiance Changes in Standalone Operation

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Abstract : Solar and battery energy storage systems are very useful for consumers who live in deprived areas and do not have access to electricity distribution networks. Nowadays one of the problems that photo voltaic systems (PV) have changing of output power in temperature and irradiance variations, which directly affects the load that is connected to photo voltaic systems. In this paper, with considering the fact that the solar array varies with change in temperature and solar power radiation, a voltage stabilizer system of a load connected to photo voltaic array is designed to stabilize the load voltage and to transfer surplus power of the battery. Also, in proposed hybrid system, the needed load power amount is supplemented considering the voltage stabilization in standalone operation for supplying unbalanced AC load. Electrical energy storage system for voltage control and improvement of the performance of PV by a DC/DC converter is connected to the DC bus. The load is also feed by an AC/DC converter. In this paper, when the voltage increases in its reference limit, the battery gets charged by the photo voltaic array and when it decreases in its defined limit, the power gets injected to the DC bus by this battery. The constant of DC bus Voltage is the cause for the reduced harmonics generated by the inverter. In addition, a series of filters are provided in the inverter output in to reduced harmonics. The inverter control circuit is designed that the voltage and frequency of the load remain almost constant at different load conditions. This paper has focused on controlling strategies of converters to improve their performance.

Keywords : photovoltaic array (PV), DC/DC Boost converter, battery converter, inverters control

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