Conférence Internationale des Energies Renouvelables "CIER'13" / International Journal of Scientific Research & Engineering Technology

Volume 01, Issue 02, 2014, Pages 0-0

MPPT Control of a Small PV Generation System under Diverse Weather Conditions

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Abstract: The power induced in the photovoltaic modules is influenced by the intensity of solar cell irradiation, temperature of solar cells and moreover by the load. Therefore, to maximize the efficiency of the renewable energy system, it is necessary to track the maximum power point of the input source. In this work, we tie to present the constituent of a weak power PV chain dedicated to the storage on battery. The battery bank is connected to the DC network via a DC/DC boost converter, called the storage converter, used for controlling the network.Indeed, the battery is only imperative buffer storage in this case. The PV units are connected to the DC network via its own DC/DC converter, called PV converter, to ensure the required power flow. The purpose of the proposed model is the simulation of the complete system behavior from the electric and energy point of view. A maximum power point tracker (MPPT) scheme is applied through the boost converter to improve the energy conversion efficiency. Fuzzy algorithm based on linguistic rules describing the operator's control strategy is applied to control the step-up converter for MPPT. On the other hand, Fuzzy logic control based on coarse and fine mode is incorporated in order to reduce not only the time required to track the maximum power point but also power fluctuation. A confrontation with a P and O method performed. Another fuzzy battery-charge controller is also applied. Simulation results show that the proposed fuzzy controller exhibits a better performance than the controller based upon the P and O method.

Keywords : Photovoltaic, simulation, MPPT; DC-DC converter, Fuzzy controller