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Maximum Power Point Tracking in PV System with Industry Applications

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ABSTRACT

The paper work is the new maximum power point tracking method using in voltage controller in photo-voltaic system for Stand-Alone industry Applications with battery energy storage. The output of the PV array is unregulated DC supply due to change in weather conditions. The maximum power is tracked with respect to temperature and irradiance levels by using DC-DC converter. The perturbation and observes algorithm is applied for maximum power point tracking (MPPT) purpose. This algorithm is selected due to its ability to withstand against any parameter variation and having high efficiency. The solar cell array powers the steady state energy and the battery compensates the dynamic energy in the system. The aim of the control strategy is to control the SEPIC converter and bi-direction DC-DC converter to operate in suitable modes according to the condition of solar cell and battery

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1. INTRODUCTION (10 PT)

Solar energy has become a promising alternative source because it has many advantages such as abundance, pollution free and renewability. The solar photovoltaic (PV) power will play an important role in alleviating the energy crisis and reducing the environmental pollution and has a bright prospect of applications. Due to the nonlinear relationship between the current and the voltage of the photovoltaic cell, it can be observed that there is a unique maximum power point (MPP) at a particular environment, and this peak power point keeps changing with solar illumination and ambient temperature. In recent years, a large number of techniques have been proposed for maximum power point tracking (MPPT), such as the constant voltage tracking (CVT), the incremental conductance (INC) method, the perturb-and-observe (P&O or hill-climbing) method [1], [2]. Perturbation and Observation (P&O) method has a simple feedback structure and fewer measured parameters. It operates by periodically perturbing (i.e. incrementing or decreasing) the array terminal voltage and comparing the PV output power with that of the previous perturbation cycle. In this manner, the peak power tracker continuously seeks the peak power condition. MPP is tracked by using DC-DC converters [3]. Much attention has been given to the single ended primary inductor converter (SEPIC) topology recently because output voltage may be either higher or lower than input voltage .The output is also not invertedas is the case in a fly back or Cuk topology. The input and output voltages are DC isolated by a coupling capacitor and the converter works with constant frequency PWM.

Inverters are static power converters that produce an ac output waveform from a dc power supply. The dc power from SEPIC is fed to inverter to get ac output power [4], [5]. A Bi-Directional DC-DC Converter (BDC) is connected between the Sepic Converter and Inverter. BDC is used to store the dynamic energy in battery and supply to load when there is overcast sky or at night [6], [7], [8], [9]. For sinusoidal ac outputs, the magnitude and frequency should be controllable. This is done by comparing a sinusoidal wave of