Abstract

In this paper an efficient solar power controller (SPC), suitable for real-time applications with reduced transmission loss is proposed. The power generated by solar panel is not constant and varies with the solar radiation. So, a battery is used as back-up. The proposed SPC can maintain constant power at the load end irrespective of solar radiation. This proposed SPC consists of two step-up DC-DC converters along with MPPT controllers and storage batteries. The DC-DC converters act parallel and share a common load in order to maintain constant power at load end. One of the DC-DC converters is connected directly to the solar panel output terminal and the other DC-DC converter is directly connected to the terminals of storage battery. MPPT controllers extract maximum possible electric power from solar panel. The converter steps up solar panel output voltage, normally unregulated DC voltage to a regulated 125 V at the load end. The output voltage of the converter can be adjusted to any desired level between 20 V-250 V DC voltages, for different applications. Here, 125 V is selected as solar loads are available at this voltage and transmission line loss reduced significantly. The proposed
controller provides constant power at constant terminal voltage (125V) and charges the battery when photo-voltaic (PV) generated power is greater than load requirements. During insufficient solar radiation or when panel output power is insufficient to maintain constant power at load end, the controller takes required power from the battery. This controller has almost constant efficiency about 87% at full load and reduces solar power transmission loss and overall cost of off-grid solar home system (SHS) for a multi-storied building.

References


**Index Terms**

Computer Science  
Circuits and Systems

**Keywords**

Solar transmission power loss, Solar power controller (SPC), MPPT, Step-up DC-DC converter.