Abstract

The photovoltaic (PV) stand-alone system requires a battery charger for energy storage. This paper presents the modeling and controller design of the PV charger system implemented with the single-ended primary inductance converter (SEPIC). The designed SEPIC employs the peak-current-mode control with the current command generated from the input PV voltage regulating loop, where the voltage command is determined by both the PV module maximum power point tracking (MPPT) control loop and the battery charging loop. The control objective is to balance the power flow from the PV module to the battery and the load such that the PV power is utilized effectively and the battery is charged with three charging stages. This paper gives a detailed modeling of the SEPIC with the PV module input. Accordingly, the PV voltage controller, as well as the adaptive MPPT controller, is designed. The effectiveness of the
Photovoltaic Power Converter as an Input Source for SEPIC converter

proposed methods is proved with some simulation and experimental results. The converter achieves higher than 80% efficiency across the entire input voltage range at nominal output voltage, and maintains good efficiency across the whole operating range.

References


Index Terms

Computer Science
Power Systems
Keywords

Maximum power point tracking (MPPT)  power balance control  single-ended primary inductance converter (SEPIC)

stand-alone