

عنوان مقاله:

A non-isolated DC-DC converter parameter improvement with PID control method in PV systems

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خلاصه مقاله:

Global demand for electrical energy is constantly growing. Along with the declining production of the dominating energy supplies since the industrial revolution, fossil fuels, there has been a growing interest in exploring renewable energies internationally. Among a variety of the renewable energy sources, photovoltaic (PV) sources have no supply limitations and are predicted to become the biggest contributors to electricity generation among all renewable energy candidates by 2040. Electronic power inverter is one of the enabling technologies required for utilizing PV energy and its cost is becoming more visible in the total price of the PV system. DC-DC boost converters are unable to provide high step-up voltage gains due to the effect of power switches, rectifier diodes, and the equivalent series resistance of inductors and capacitors. A high step-up DC-DC converter based on the modified SEPIC converter is presented in this paper. Step up non-isolated converters generally suffer from problems such as high voltage stress and low efficiency. In this paper, a new structure of a non-isolated DC-DC converter with a high voltage static gain is presented. In this proposed converter, a PID controller has been added, which reduces the input current. It is led to reduce of tension at the output voltage. In addition to these features, the time response for the output voltage is improved by reducing the transient time and peak time. In full load conditions and whit PID controller, the proposed converter is at the highest efficiency with 93.3% efficiency over other topologies presented by others and in the same conditions, the inrush current of the proposed converter is 37.6A that is 22.7A less than the best converters in the previous works. The transient time of the output voltage in of the proposed converter is 3.4ms while for the best previous converter this time is was 10.6ms. This impresses on the speed of the system response to load changes. According to all said reasons, the proposed converter can be a good choice for many renewable energy systems applications with a simple design and high efficiency.

کلمات کلیدی:

.Boost converter, SEPIC converter, DC-DC power converter, non-isolated converter, PID control

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