ABSTRACT

This research work is focused on the need to acquire high current prior to the supply to inverter. Over the last decade, there has been remarkable increase in sources that use renewable energy for various applications. There are many kinds of converters that are required to convert energy that has been offered by primary sources adequately. However, the total cost incurred on utilization of a renewable energy system is quite high. Moreover, a higher number of conversion stages are required to charge the battery from the PV panel and to utilize the supply. This leads to power losses, huge sizes voltage and current stress and higher costs across semiconductor devices. The main goal of this research work is to minimize the higher number of conversion stages and the higher number of semiconductors which in turn results in minimized power losses, current stress and costs across semiconductor devices. Thus, a novel converter topology is a necessary aspect in the modern era applications.

In this research work, primarily, a new concept of converter known as the Hybrid High Gain Interleaved converter with single-stage conversion stage has been proposed. This has been deployed here in order to maximize the power from PV panel. The proposed converter has the capacity to generate a dc bus using either a photovoltaic panel array or perhaps a battery bank. Thus this process facilitates simultaneous battery charging with respect to the level of radiation. The proposed topology primarily focuses on reducing the number of conversion stages. This in turn facilitates in increasing converter efficiency as well as simplifies the respective control system.
The proposed converter has been validated with BLDC load and speed varying condition using PI and fuzzy controlling techniques. In this work, dynamic load variation of BLDC is analyzed. Under dynamic load variation conditions, the impact of fuzzy controller is validated through parameters settling time, peak overshoot and peak undershoot. The fuzzy logic controller is observed to consume lesser time in comparison to PI controller. This would result in durability and the reliability of the BLDC motor.

Moreover, the solar irradiation conditions have a great impact in the performance of the converter. So, the performance of the proposed converter is validated under dynamic irradiation condition of the PV panel. The main goal of this evaluation is to validate the performance of the converter under dynamic conditions when connected with BLDC motor. The proposed research work has been simulated in MATLAB 2011a environment.