

ABSTRACT

A single stage dual leg DC to AC Converter with Sliding Variable Structure Control (SVSC) is proposed for a standalone Hybrid Electric Power Generation System. The solar and wind energies are the most preferred sources of energy for the hybrid system because they are pollution-free, inexhaustible and eco-friendly. Photo Voltaic (PV) system which consists of PV modules with Maximum Power Point Tracking (MPPT) control is used to extract the maximum possible power from the PV module. Wind turbine system which consists of rectifier circuit is used to provide constant DC output and both the outputs of solar and wind energy systems are connected to a single DC bus.

Voltage source inverter (VSI) plays a major role in a DC power to AC power conversion areas. The conventional power conversion system has two power conversion stages to meet rated voltage and frequency because of the output voltage of VSI is always lower than the input voltage. In order to overcome the above said limitations of the conventional controllers, the proposed controller has been used to give regulated output voltage of the Dual leg DC to AC converter in a single stage under variable loads.

It can be seen from the literature that, various power controller for power converters, such as double loop control method and sliding mode control method are advanced and efficient methods. But, these methods are complex in design with variable switching frequency. Therefore, the objective of this research work is to design a simple controller for the proposed converter to maintain constant rated voltage and frequency under nonlinear and abrupt load conditions. There are three controllers—namely,

Sinusoidal Pulse Width Modulation (SPWM) technique based controller, Sliding Mode Controller (SMC) and SVSC methods are proposed and implemented for the single stage dual leg DC to AC Converter. The proposed controller is analysed for various load conditions, and the results are compared.