ABSTRACT

A fifteen level transformer-less inverter for photovoltaic applications is proposed. It is possible to transmit power at higher voltages by raising the voltage level in a multilevel inverter. Reduced line losses as a result of higher transmission voltages boost the system's overall efficiency. Higher voltage levels for multilevel inverters can lower the amount of harmonics in the output waveform. One of the main causes of power loss and decreased efficiency in power converters is switching losses. Multilevel inverters can significantly lower switching losses with fewer switches, which leads to increased efficiency. The output voltage waveform can be more easily controlled with multilevel inverters. The output voltage levels can be easily controlled by modifying the modulation scheme, making them suitable for a variety of voltage regulation and control applications. SVPWM reduces switching losses by optimizing the switching patterns for the multilevel inverter. By reducing the number of switching transitions and ensuring symmetric voltage waveforms, switching losses and heat dissipation are reduced, and this is accomplished. SVPWM makes it possible to precisely regulate the multilevel inverter's output voltage and frequency. This enables improved frequency stability and voltage regulation. SVPWM enables a higher modulation index, allowing for the achievement of more levels of voltage or current. Voltage stress on various components, including capacitors and power semiconductor devices, can be decreased by raising the voltage levels in a multilevel inverter. By extending their lifespan and reliability, these components may require less frequent maintenance or replacement. The objective is to reduce the harmonic in the output voltage and thereby reducing the cost of filter requirement and maintaining high efficiency throughout the operating range. By a suitable combination of switches, the MLI produces a staircase output with low harmonic distortion. This configuration is studied and simulated in MATLAB/SIMULINK. A fifteen level inverter allows for better utilization of the available photovoltaic system capacity. It can convert a wider range of DC voltage levels from the solar panels into AC power, maximizing the energy output of the system. Due to the presence of multiple levels of voltage, multilevel inverters can

generate output waveforms with low distortion. With less harmonic content operating, the PV system is able to produce better power with fewer grid disruptions. With the help of multilevel inverters, the PV system can more closely match the grid's requirements by controlling voltage and reactive power with greater precision. By lowering voltage fluctuations and preserving stability, this improves the system's overall performance.