ABSTRACT

An optimized 15-level Switched Capacitor Inverter (SCI) with a hexad voltage boost for enhanced renewable energy integration. The proposed inverter architecture utilizes a combination of switched capacitor circuits and a hexad voltage boosting mechanism to achieve higher voltage levels, thus improving the power quality, efficiency, and grid compatibility of renewable energy systems. By employing a multi-level design, the inverter minimizes harmonic distortion, reduces Electromagnetic Interference (EMI), and provides a more stable output waveform compared to traditional two-level inverters. The hexad voltage boost technique effectively increases the output voltage without significantly increasing the complexity of the control system. Simulation results demonstrate the advantages of the proposed inverter in terms of voltage gain, harmonic performance, and overall system efficiency, making it a promising solution for applications in solar, wind, and other renewable energy systems. Furthermore, the system's ability to handle varying power levels and dynamic load conditions further enhances its suitability for modern renewable energy grids.