

This study is an attempt to present a multilevel inverter based on a modular structure with a single dc source. This inverter is a switched-capacitor topology, which controls the charging as well as the discharging of the capacitors in the predetermined time intervals. The most important attribute of this multistage structure is the multiple charging capacities of the capacitors at each stage compared with those of the previous stages, which can ultimately increase the output voltage of the low input dc voltage source. Different combinations of these capacitors will be discharged across the load to generate a high-level staircase ac voltage waveform. The high number of switching states provides different paths for capacitors to achieve a self-balancing capability. The low switching frequency and the elimination of transformer are among the advantages of the proposed topology. Compared with other topologies, the number of semiconductor devices and capacitors is also reduced largely. The simulation results and the laboratory test setup of a 49-level inverter using DSP TMS320F28335 are presented to verify the analysis.