

## ABSTRACT

Multilevel Inverters have presented an important development in recent years to reach higher power with increasing voltage levels. Several multilevel topologies have been published in the quest for making the system cost-effective, reliable, and less complex in control from both the hardware and software perspectives. Multilevel Inverters have presented an important development in recent years to reach higher power with increasing voltage levels. The Multilevel Inverters are resourceful in producing a voltage waveform with superior quality staircase output voltage waveform with a lower amount of harmonic content. Several conventional topologies are proposed to realize the Multilevel Inverter however, the limitations of these topologies may involve more DC sources and power-switching devices and less THD (Total Harmonic Distortion), which in turn, increase the cost and size of the inverter.

A new hybrid Multilevel Inverter topology is based in the T-type and H-bridge module is presented. The basic unit of the proposed topology consist of single T-type and double H-bridge Multilevel Inverter (STDH-MLI). It produces 31-levels at the output using three DC voltage sources. The NLC (Nearest Level Control) switching technique is used to generate gate pulses for switches to achieve a high-quality output voltage waveform. The topology is developed for 31-level can be used for renewable energy applications. This reduces the overall components count, cost and size of the system. The obtained THD is under IEEE standards. The topology is simulated in MATLAB/ Simulink and verified. The Simulation model is developed into prototype by reducing the switches and bridges. In which it comprises of T-type and H-bridge. The experimental execution for a new multilevel inverter using T-type and H-bridge topology is portrayed. The Hybrid T-type and H-bridge inverter configuration represent a promising integration of two distinct power inverter topologies, combining the

advantages of both to enhance performance and efficiency. The hybrid T-type inverter incorporates a T-type topology, enabling a three-level output with reduced switch count. This integration aims to minimize complexity and enhance cost-effectiveness. The H-bridge inverter with its bidirectional power flow and simpler structure, provides a versatile and efficient solution for various applications. The combination of these topologies results in a hybrid inverter that delivers improved efficiency, reduced harmonic distortion, and balanced voltage levels, making it suitable for high-power applications. Solar is used as the application in which four DC voltage source is connected to T-type and H-bridge in which it is to generate the PWM pulses for the generation of 31 voltage levels. The experimental and simulation results are demonstrated.