

Simulation of an on-grid solar multilevel inverter with purpose of comparative analysis of the impact of modulation methods and voltage levels on THD

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Global attention to solar energy as a free, clean and environment friendly energy resource is increasing significantly in a way that the use photovoltaic (PV) panels on the roofs of urban and rural houses in developed and even undeveloped countries is interesting. In conversion cycle, received energy PV panels is converted to usable energy for houses, industrial applications and power distribution systems by a device called the “inverter”. the inverter which is made of power electronic components, has some disadvantages in addition to its many advantages. One of the problems is waveform distortion or harmonic problem which is produced because of non-linear property of power electronic components of the inverter. In this study we simulated a 5-level H-bridge inverter with various modulation methods and different modulation indices by Matlab to reach the lowest THD value. after increasing voltage levels to 7 we did the same thing as we did for 5 level inverter and the method which had the lowest THD value in both 5-level and 7-level inverters in various modulation indices ed to be the reference method after that we increased the voltage levels to 17 Because of achieving lower harmonics and yielded lowest THD value in all voltage levels and in different modulation indices, then we propose our new method with its new modulation method by implementing a 5-level inverter, yielding THD value and increasing the voltage level until we reach under 5% of THD that is approved by IEEE-519.

Keywords : photovoltaic, multi-level inverters, harmonic, modulation index, modulation methods, voltage levels

