A Multilevel PV Inverter Control with Minimal Total Harmonic Distortion (THD)

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Abstract

In this article, we improved the control of the multilevel inverter for a photovoltaic system connected to the grid, in order to minimize the total harmonic distortion of curren. This topology being considered as a new converter topology applied to photovoltaic systems and has the advantage of very high-energy efficiency, but has the disadvantage linked to harmonics injected into the grid, which causes switching of states if the number of levels increases, which increases the rate of harmonic distortion. In this paper, an improved control based on sinusoidal control (SPWM) and space vector control (SVPWM) was proposed to improve the control of multilevel inverters. The simulation is based on MATLAB SIMULINK platform is presented for different multilevel inverter topologies with fewer switches and with different control methods and sinusoidal pulse. A detailed comparison of various Sinusoidal Pulse Width Modulation (SPWM) and vector control schemes (SVPWM) is presented in this article with reference to Total Harmonic Distortion (THD) in the output voltage and current of the grid. This control strategy eliminates current harmonics and improves the quality of energy supplied to the grid by the photovoltaic system, and it can be seen that among all the control methods, the THD is minimum at the output of different multilevel inverter topologies.

Keywords

Multilevel Inverter, Photovoltaic System, Three-phase Inverter, Sinusoidal Control, Harmonics Distortion, Grid