

Limiting THD of Grid Connected Photovoltaic System using PWM Switching Frequency Selection based on Solar Irradiance Changing

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Abstract:

Photovoltaic (PV) system becomes the best alternative energy to produce electricity that can replace fuel resource. Grid Connected Photovoltaic (GC-PV) system will supply the AC power generated to the utility grid then distributed to the consumer. Solar irradiance in Malaysia varies daily and throughout the year. The consequence of low irradiance level is the output of the PV array is low and thus the input of the inverter relatively becoming low. The inverter will exhibit large non-linearity when the inverter is operating at low power input during low level of solar irradiance and Total Harmonic Distortion (THD) will increased. Pulse Width Modulation (PWM) techniques that are Continuous Pulse Width Modulation (CPWM) and Discontinuous PWM (DPWM) are implemented in the inverter control of the GC-PV system using MATLAB/Simulink environment to investigate the effect of switching frequency on THD at different level of solar irradiance. THD is limit within standard requirement by selecting appropriate value of switching frequency. Results shows that CPWM has better performance in THD and switching losses at selected switching frequency.

Keywords: Grid Connected Photovoltaic; Inverter; Pulse Width Modulation; Solar Irradiance; Switching Frequency; Total Harmonic Distortion

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