

## Interfacing Photovoltaic Systems to the Utility Grid: A Comparative Simulation Study to Mitigate the Impact of Unbalanced Voltage Dips

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**Abstract :** This paper presents the modeling and the control of a grid-connected photovoltaic system (PVS). Firstly, the MPPT control of the PVS and its associated DC/DC converter has been analyzed in order to extract the maximum of available power. Secondly, the control system of the grid side converter (GSC) which is a three-phase voltage source inverter (VSI) has been presented. A special attention has been paid to the control algorithms of the GSC converter during grid voltages imbalances. Especially, three different control objectives are to achieve; the mitigation of the grid imbalance adverse effects, at the point of common coupling (PCC), on the injected currents, the elimination of double frequency oscillations in active power flow, and the elimination of double frequency oscillations in reactive power flow. Simulation results of two control strategies have been performed via MATLAB software in order to demonstrate the particularities of each control strategy according to power quality standards.

**Keywords :** renewable energies, photovoltaic systems, dc link, voltage source inverter, space vector SVPWM, unbalanced voltage dips, symmetrical components

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