

## **Nine-Level Shunt Active Power Filter Associated with a Photovoltaic Array Coupled to the Electrical Distribution Network**

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**Abstract :** The use of more and more electronic power switches with a nonlinear behavior generates non-sinusoidal currents in distribution networks, which causes damage to domestic and industrial equipment. The multi-level shunt power active filter is subsequently shown to be an adequate solution to the problem raised. Nevertheless, the difficulty of adjusting the active filter DC supply voltage requires another technology to ensure it. In this article, a photovoltaic generator is associated with the DC bus power terminals of the active filter. The proposed system consists of a field of solar panels, three multi-level voltage inverters connected to the power grid and a non-linear load consisting of a six-diode rectifier bridge supplying a resistive-inductive load. Current control techniques of active and reactive power are used to compensate for both harmonic currents and reactive power as well as to inject active solar power into the distribution network. An algorithm of the search method of the maximum power point of type Perturb and observe is applied. Simulation results of the system proposed under the MATLAB/Simulink environment shows that the performance of control commands that reassure the solar power injection in the network, harmonic current compensation and power factor correction.

**Keywords :** Actif power filter, MPPT, pertub&observe algorithm, PV array, PWM-control

**Conference Title :** ICEEE 2017 : International Conference on Electrical and Electronics Engineering

**Conference Location :** Paris, France

**Conference Dates :** August 28-29, 2017