# Amélioration de la Qualité du Réseau Electrique à l'Aide deCompensateurs Actifs

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**Abstract:** This thesis falls within the framework of harmonic depollution of the low voltage electrical networks usingan active power compensators, this pollution is caused by the unlimited use of non-linear loads. The causes, theeffects of these harmonic disturbances and the international standards imposed to protect the consumers againstthese disturbances are presented. Also, several traditional and modern solutions against the harmonic pollution arepresented. We have focused our study on the development of the control techniques of shunt active power filter, Forthis reason, we have based on the development of methods for determining harmonic reference currents based on amultivariable filter (MVF), These new methods are able to correctly extract the reference harmonic currentsnecessary to control the SAPF, after that, we have implemented the modified (p-q) method on the power active filterin order to carry out a global active compensation of the harmonics currents, the behavior and quality of filtering ofthe APF are evaluated with two kinds of electric loads, with different types of electrical network and with aphotovoltaic power source. Then, we have developed two harmonic selective identification methods based onmultivariable filter, which are implemented in real time, in order to realise a selective active compensation ofspecific harmonic currents under low DC link voltage, this work was closed by an experimental validation of anactive power filter (APF) fed by a PMSG-based wind system, for this we implemented three controllers to controlthis system, which are the predictive current controller, Type-2 fuzzy logic controller, and an ANFIS controller. Theexperimental results obtained show that this system is capable of compensating for harmonics and reactive power,and also injected active power into the electrical network.

**Keywords :** Harmonic pollution, APF, MVF, global active filter, selective active filter, wind system, PMSG