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Analysis and experimental evaluation of shunt active power filter for power quality improvement based on predictive direct power control

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Abstract: This paper discusses the use of the concept of classical and predictive direct power control for shunt active power filter function. These strategies are used to improve the active power filter performance by compensation of the reactive power and the elimination of the harmonic currents drawn by non-linear loads. A theoretical analysis followed by a simulation using MATLAB/Simulink software for the studied techniques has been established. Moreover, two test benches have been carried out using the dSPACE card 1104 for the classic and predictive DPC control to evaluate the studied methods in real time. Obtained results are presented and compared in this paper to confirm the superiority of the predictive technique. To overcome the pollution problems caused by the consumption of fossil fuels, renewable energies are the alternatives recommended to ensure green energy. In the same context, the tested predictive filter can easily be supplied by a renewable energy source that will give its impact to enhance the power quality.

Keywords : Harmonic pollution, Power quality, Direct power control, Predictive direct power control, Shunt active filter, Renewable energy source, power factor