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ENERGY QUALITY IMPROVEMENT USING AN ADVANCED CONTROL STRATEGY BASED TRANSFORMERLESS SHUNT HYBRID POWER FILTER

MUSTAPHA SARRA[1], JEAN-PAUL GAUBERT[2], KAMAL DJAZIA[3] & FATEH KRIM[4]

[1]Department of Electronics, University of Bordj Bou Arreridj, El Anasser Ex Galbois, Algeria

[2]Laboratoire d'Informatique et d'Automatique Pour Les Systèmes (LIAS), University of Poitiers, Poitiers, France

[3]Department of Electronics, University of M'sila, Algeria

[4]Department of Electronics, University of Setif, Algeria

ABSTRACT

A Shunt Hybrid Active Power Filter (SHAPF) is proposed in this paper in order to enhance the power quality and compensate reactive power required by nonlinear load. The advanced control algorithm applied to the SHAPF in based on a Multi-Variable Filters (MFV) combined with a robust PLL to determine the reference current. The SHAPF is formed by a single 7^{th} tuned LC filter per phase and a small-rated three-phase active filter, which are directly connected in series without any matching transformer. Proposed topology provides significant inverter power rating reduction. The required rating of the active filter is much smaller than that of a conventional standalone active filter be. All simulations are performed by using Matlab-Simulink Power System Blockset and validated with an experimental test bench developed in the LIAS laboratory, University of Poitiers. Various simulation and experimental results of the proposed control algorithm are presented under steady state and transient conditions to confirm his validity and effectiveness.

KEYWORDS: Energy Quality, Harmonics, Multi-Variable Filter (MVF), Phase Looked Loop (PLL), Shunt Hybrid Active Power Filter, Voltage Source Inverters