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Robust Repetitive Control Design for 3-Phase 4-Wire Distribution System by using Shunt Active Power Filter

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ABSTRACT

In general, with the increasing demand of electrical power, the reliability has to be decrease due to its general power quality issues like harmonics or current unbalances. In order to improve its quality and reliability generally we need a common LC filter. For this, this paper proposes a concept of hybrid cascaded shunt active filter-based Thyristor Controlled Reactor. Current tracking and voltage regulations was done in this a nonlinear control strategy of SPF The small-rating APF is used to improve the filtering characteristics of SPF and to suppress the Possibility of resonance between the SPF and line inductances. The reference for inner current loop is periodic in nature and cannot be easily tracked by PI regulator. The repetitive controllers (RC) are well known for their tracking ability of periodic signals and offers high gain at all the frequencies. The high gain in higher frequency range may leads towards instability. Therefore, in proposed work, the regular RC is modified by squaring its sensitivity function. This approach results in low amplitude of sensitivity function while offering deep notches at low to mid frequencies range and smaller notches at higher frequencies.

KEY WORDS: Harmonics, Shunt Active Filter, PI controller, Total Harmonic Distortion and repetitive controllers.

1.INTRODUCTION:

Advanced power systems demand is increasing with the large usage of electrical power. This implies an increase of the electrical load and power electronic equipment, higher consumption of electrical energy, more demand for generated power, power quality, and stability problems [1]. The concept of multilevel inverters, introduced to performing power conversion in multiple voltage steps by this we are improving power quality and high voltage capacity. In all topologies of multilevel inverters, the most popular is cascaded H-bridge because of it has capability to use variable dc voltages on individual H-bridge cells it causes the splitting of power conversion among higher-voltage lower-frequency and lower-voltage [2] higher-frequency inverters. Without using PWM techniques the total harmonic distortion (THD) is reduced with more number of steps in output voltage. A topology is proposed in this paper to get high 31 levels.