Review of Shunt Active Power Filters for Compensation

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Abstract: *The interaction of electrical power with electrical devices is known as power quality. We would state that the electrical power is of good quality if it performs appropriately and reliably without being harmed or stressed. If, on the other hand, electrical equipment fails, is unreliable, or is damaged during regular operation, we can assume that the power quality is low. A Shunt Active Power Filter may be a reactive power compensation device that provide and absorb reactive power of the system to boost voltage profile. it's additionally filtering the harmonics elements of the supply current just in case of nonlinear load condition. When analysis and simulation result it's established that a Shunt Active Power Filter will improve the facility quality and stability performance. This paper presents the comprehensive*

Key Words:

1. INTRODUCTION:

Early instrumentality was designed to bear up disturbances such as lightning, short circuits, and sharp overloads without further expenditure. Current power physical science (PE) prices would be a lot of higher if the instrumentality was designed with a similar power rating. Pollution has been introduced into power systems by nonlinear loads like transformers and saturated coils; but, perturbation rate has ne'er reached these levels. Due to its nonlinear characteristics and quick change, PE creates most of the pollution problems. Most of the pollution problems are created thanks to the nonlinear characteristics and quick switching of power electronic devices.

2. SHUNT ACTIVE POWER FILTER:

The shunt active power filter may perhaps be a device that is connected in parallel to and cancels the reactive and harmonic currents from a nonlinear load The subsequent total current drawn from the ac main is sine Ideally, the APF has to generate only enough reactive and harmonic current to compensate the nonlinear hundreds within the line. In an APF, a current controlled voltage supply inverter is employed to come up with the compensating current and is injected into the utility power source grid. This cancels the harmonic elements drawn by the nonlinear load and keeps the utility line current.

3. CONTROL TECHNIQUE OF PROPOSED SYSTEM

Generally Control approach of Active filter is the soul of the active filter and it is executed in given steps

- In the primary step, the necessary voltage and current signals are sensed using potential transformers, current transformers sensors.
- In the next step, compensating commands signals in expressions of current or voltage levels are derived based on control methods and active filter configurations.
- In the final step, the gating signals for the solid-state devices of the active filter are created using hysteresis, pulse-width modulated control techniques

4. LITRETURE SURVEY

AnithaBhukya et al.[1] In order to sustain a quality power mainly for sensitive loads, shunt Active Power Filter are frequently used, which improves the power factor and reduces the proportion of Total Harmonics Distortion. APF when connected with the load generates an reference compensating current which is in phase opposition to the harmonics present in the system, thus the resultant supply current becomes sinusoid and in phase. Compensating reference current waveform is of complex in nature, and therefore a appropriate inverter operated through high frequency switching is essential for generation of such complex waveform. A multistage inverter could be more capable of generating such complex waveform as required for the compensating current. This work explores a three-Level and five-level Cascaded Hbridge (CHB) inverter for shunt Active Power Filter in Power System to compensate the reactive power and harmonics. The performance comparisons between three-level and five-level cascaded H-bridge inverter for a shunt active power filter are presented.
Sumit Kumar et al. proposed Improvement of Power quality is major concern in the field of power supply. [2] A variety of methods have been adapted towards the enhancement of power quality. Trend of improving it by using active power filter has been increased in recent years. In this paper we have used the p-q reference theory as controller to control the output of active power filter to delete the harmonics and to compensate the power factor, PI controller is used to maintain almost constant value under transient and steady state condition. The harmonics occur due to non linear load which draw current in sudden approach rather than smooth way leads to create distorted signal on source side on the

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line which affect the other customers on the same line. By using the vdc as the reference current has been calculated and this reference current is compared with the actual current of active power filter, output from the pq theory is compared with actual current and applied to the gate signal of 3-arm universal bridge used in active filter to delete the harmonics. Hence by using the active power filter IEEE 519 standard which say "IEEE Recommended Practices and Requirements for Harmonic Control in Electrical Power Systems" has been meet. The proposed model has been simulated using MATLAB/SIMULINK and simulation results.

Niklesh Das et al. proposed a power quality issue basically deals with any occurrence manifested in current, voltage or frequency deviation that results in damage, upset or failure of end use equipment.[3] The non-linearity in the properties of power electronics devices and the higher switching frequency are the main causes of power quality issue. Thus this paper deals with power quality improvement by shunt active power filter to eliminate voltage and load current

Rao et al. APFs can be classified into three types on the basis of their topology and connection to the power grid.[4] The series APF, which is connected to the grid via a coupling transformer, constitutes a controlled voltage source and is utilized to directly mitigate voltage distortion

Narayana Divakar et al. In this paper, Realization of Current Control Strategies of Shunt Active Power Filter Operating with Unbalanced Loads.[5] Used hysteresis current controlling to track harmonics current components and finally compensation provided with THD improvement upto 2.64%.

Biraja Prasad Nayak & Animesh Shaw In this paper the Reduction of Harmonics and Voltage Sag Compensation by Series Active Power Filter. Here proposes the hysteresis control algorithm for the improvement of power quality by series active power filter is given .Here, the Simulink model of series active power filter and its control technique by hysteresis PWM controller has been carried out. The voltage sag analysis and total harmonic distortion analysis are also carried out by using FFT analysis. Simulation result shows that the proposed configuration for series APF has the expected Performance.

4. CONCLUSION

In this paper a systematic review of publications related to the design and implementation of Shunt Active Filter is presented. It is found to be an efficient and versatile device to manage electrical power quality problems.

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