CONTROL ELECTRONIC IMPLEMENTATION OF ACTIVE POWER FILTER WITH RECTIFIER BOOST TECHNIQUE USING OP-AMP UA741CN

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ABSTRACT

This thesis studies on control Electronic Implementation Of Active Power Filter with Rectifier Boost Technique using op_amp UA741CN. It is a technique for series connected harmonic compensation of a single-phase system feeding non-linear load. An active current wave-shaping boost rectifier technique is proposed to mitigate the distortion of the supply current to shape the pulsating nature of into a continuous, sinusoidal and in phase with the supply voltage. A current control loop (CCL) using standard proportional integral was used to implement PFC to correct the pulsating nature of the input current to almost unity power factor form with low total harmonic distortion (THD) level well below the acceptable limit that was defined in the standard of IEEE 519. The UA741CN operational amplifier has used in this CCL circuit in order to meet such specification. The behavior and operation of the proposed filter structure was examined with computer simulation using MATLAB/simulink and verified experimentally.

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CHAPTER 1

INTRODUCTION

1.0 BACKGROUND OF STUDY

In power electronics application, switching devices have found important roles in industry applications, including; uninterruptible power supply (UPS), switch mode power supply (SMPS) and many more. The use of power switching devices inadvertently, results with a non-sinusoidal current are being drawn from the supply, containing harmful harmonic components which are then fed back to the supply system, creating various problems at the point of common coupling (PCC).

The increased use of power electronic equipments in the power system has a profound impact on power quality. The high power non linear loads such as static power converter, computer, laser printers, Switched-Mode Power Supplies (SMPS), rectifier, electronic ballast, refrigerator, TV etc, produce voltage fluctuations, harmonic currents and an imbalance in network system which result into low power factor operation of the power system. End users should be concerned about low power factor because it means that they are using a facility's electrical system capacity inefficiently. It can cause equipment overloads, low voltage conditions, greater line losses, and increased heating of equipment that can shorten service life. Most importantly, low power factor can increase an electric bill with higher total demand charges and cost per kWh [10].