

**DEVELOPMENT OF A SINGLE-PHASE SHUNT ACTIVE
POWER FILTER BASED ON PI CONTROLLER FOR
HARMONIC REDUCTION**

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ABSTRACT

This paper presents the employment of a single-phase shunt active power filter to compensate harmonics generated by the AC voltage regulator. Harmonics problems lead to poor power quality in industrial and commercial facility. In order to mitigate the harmonic, shunt active power filter is employed. This type of filters will inject an equal but opposite harmonic portion. For generating the switching signals, proportional-integral (PI) controller is employed for maintaining the DC bus capacitor voltage constant. The operation of these filters is verified using the simulations in Matlab/Simulink. The result are analyzed and presented.

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CHAPTER 1

INTRODUCTION

This chapter provides a brief introduction to the project which includes the important overview, the problem statement, main objectives and project scopes to be carried out.

1.1 Overview

Recently, the number of commercial and industrial equipments based on power electronics is increasing due to the technological advances. Resulting a tremendous expansion of applications such personnel computers, tablets, and smart phones. Generally, the power electronic converters concept is to convert electrical energy from one form to another by using the power semiconductor switches such as thyristor, GTO, and transistor [1]. Compared with the transformer based devices, these electronically controlled device are more suitable for the AC to AC or DC to DC converters due to its fast and simple controllability, lower cost and small in size. Commonly, it is use for voltage regulation or controlling the induction motors [2]. However, these types of loads draw non-sinusoidal current from the mains, causing harmonic distortion to the system which then will contaminate the power quality [3].

In order to eliminate these harmonics, the passive filters were used to suppress the harmonic distortion. Unfortunately, the filters itself causing several problems like fixed compensation, large in size and resonance problem. These problems have leads