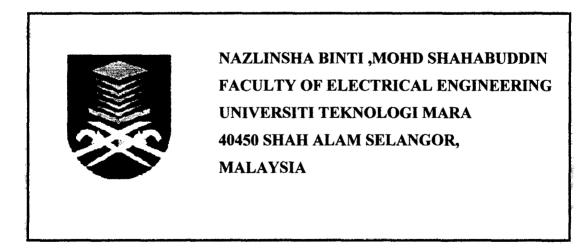# REDUCING HARMONICS DISTORTION USING ACTIVE FILTER

This thesis is presented in partial fulfillment for the award of the

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ABSTRACT

Harmonic distortion in not a new phenomenon in power systems. The ac power system harmonic problems are mainly due to the substantial increase of non-linear loads due to technological advances. The connection of high power non-linear loads contributes to the generation of current and voltage harmonics components. This can lead to power quality problem if the harmonics are not reduced to acceptable level. Active filter have become a viable alternative for controlling harmonic levels in industrial and commercial facilities. In this project, technique for reducing harmonic by using shunt active filter is presented. The shunt active filter is implemented with a pulse-width modulation (PWM) voltage source inverter. For the purpose of studying harmonics, design of single-phase and three-phase rectifier has been done. Simulation using MATLAB/Simulink has shown encouraging results.

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CHAPTER 1

INTRODUCTION

1.1   Background

Ideally the voltage and current in an AC power system are purely sinusoidal. Non-sinusoidal currents result when the current flowing in the load that is not linearly related to the applied voltage. Loads that have current that is not proportional to the applied voltage is called non-linear loads.

Harmonic distortion is not a new phenomenon in power systems. Harmonic currents have been present in the electricity supply system for many years. They were produced due to the widespread application of switched mode power supplies (SMPS), electronic fluorescent lighting ballasts, small uninterruptible power supplies (UPS) units and variable speed drives. Harmonic distortion has received increased attention. Recently, the range of types and the number of units of equipment causing harmonics have risen sharply, and will continue to rise due to the grow of power electronic devices.

Harmonic distortions have caused problems both on the supply system and also within the installation. Harmonic problems may cause primarily current distortion and voltage distortion. Generally, current distortion affects the reliability of electrical distribution systems whereas voltage distortion affects load reliability.

For the mitigation method, harmonics filters could be used to eliminate harmonic distortion in power systems. Harmonic filters are broadly classified into passive and active filters. Harmonic active filters use active conditioning to compensate for harmonic currents in a power system. The filters samples the distorted currents and using power electronic switching devices, draws a