

SINGLE PHASE RECTIFIER WITH POWER FACTOR CORRECTION IMPLEMENTATION

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ABSTRACT

Single phase rectifier with power factor correction (PFC) was developed using boost topology. Single phase rectifier is a converter to convert AC to DC waveform. The main function of this technique is to correct the pulsating of input current to nearly unity power factor with low total harmonic distortion (THD). This technique used current control loop (CCL) to control the pulse. The low power factor and high THD of the rectifier was due to non-linear input current. The result from the single phase rectifier with PFC implementation was compared without PFC control. The IEEE519std on harmonic was used as the reference to determine the performance of the developed rectifier.

Keywords

Single phase rectifier, power factor correction, total harmonic distortion (THD), current control loop (CCL).

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CHAPTER 1

INTRODUCTION

1.1 OVERVIEW OF PROJECT

Nowadays rectifier is a very important for power switching circuit in industrial application. Rectifier is a converter to convert AC to DC either in term of current or voltage waveform. The rectifier will use diode and thyristor for uncontrolled and controlled rectifier with unidirectional and bidirectional power flow. Rectifier will contribute low power factor (PF), high total harmonic distortion (THD) and low efficiency to the power system. Most of electrical devices have harmonic such as personal computer, radios, fax machine and any other equipment powered by switched mode power supply equipment.

Power factor is a measure the effectively of the current being converted into useful work output. When electric load has a PF lower than 1, the apparent power delivered to the load is greater [2]. The power factor will depends on the input source impedance and the characteristic of the load. In power electronics field, a few of that equipment generates pulsating currents to the value grids with low power quality at high harmonics contents. Since, the power electronic appliances is growing it will make an increasing the amount of non-sinusoidal current is drawn from the system. The distorted input current of a power converter is composed of the line frequency component and higher frequency harmonic components of the current. It should be noted that only the line frequency component of the current is carrying the power when voltage is sinusoidal.