IMPROVE PERFORMANCE OF ELECTRONIC BALLAST USING BOOST TECHNIQUE

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ABSTRACT

A high-frequency electronic ballast with high power factor and low harmonic distortion for driving fluorescent lamps is presented in this project. This project presents an efficient, small-sized, and cost-effective power factor correction scheme for high-frequency series resonant electronic ballast.

This project also presents electronic ballast with no boost feature and with dimming capability and effect of harmonics on input current. The proposed scheme introduces additional small energy tanks processing partial power and thus can perform the function of input current shaping. The power factor correction (PFC) is required to shape input line current.

The electronic ballast incorporating with only few reactive components can achieve nearly unity power factor and low harmonic distortion shown in the simulation results.

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CHAPTER 1

INTRODUCTION

1.1 Background

Up until the early 1990's the magnetic ballast was the most commonly used ballast for all fluorescent lighting systems. Magnetic ballasts consist of aluminum or copper wire wound around a laminated steel coil, a power factor correction capacitor in high power factor units, and an appropriate thermal potting compound. Other ballast technologies that have gained acceptance in the past decade include hybrid magnetic (low frequency electronic) ballasts and high frequency electronic ballasts **[2]**.

Electronic ballasts for high-frequency operation of fluorescent lamps have been increasingly adopted as an energy efficient solution in residential, commercial and industrial lighting applications. Typical advantages of using electronic ballast include: improved efficiency of the overall systems, higher lumen output per watt and a longer lifetime of the fluorescent lamps. Electronic ballasts are essentially switched mode power electronic circuits. Most of the modern electronic ballast design and research proposals employ series resonant converters as the power circuits for driving the lamps as shown in **Figure 1.1**. The basic concept is to utilize the resonant voltage across the resonant capacitor C, to cause the lamp arc to strike at high frequency, typically from 25kHz to 50kHz. Because of the high frequency of the excitation voltage, the lamp is essentially in a continuous on-state, there- fore providing high-quality illumination by eliminating the flickering effect **[2]**.

Electronic ballasts consist of electronic components and small magnetic devices that change the 60Hz line input frequency to 20,000 Hz or greater output