DEVELOPMENT OF A FOUR-STEP SWITCHING TECHNIQUE FOR PWM OPERATION OF AC CONTROLLER.

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ABSTRACT

Solid state ac controllers are widely used as ac power main regulators in various applications. Recently, Pulse Width Modulation (PWM) switching techniques have been employed for improved performance of the regulator. In particular, a four-step switching technique has proven to be effective in realizing a higher power PWM operated ac controller. In this work, an ac controller employing the above technique is developed and tested.

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1. INTRODUCTION

AC Controller or regulators are widely used as a means of converting and controlling electric power in various applications such as industrial heating, lighting controls, induction motor drives, etc. A conventional ac controller which operates on a technique called phase angle control employs thyristors as switching devices.

Semiconductor devices such as thyristors are passive elements in the circuit and thus absorb reactive voltamperes. A circuit which employs phase angle control requires a reactive current that varies directly with the amount of phase angle delay used. This circuit feature requires some amount of reactive compensation in order to keep the load power factor to an acceptable level. In doing this, power factor penalties whether in the form of inefficient use of conductors and power apparatus or additional billing can be avoided.

It is also desirable to eliminate the majority of supply current harmonics to help improve the power factor and supply current waveform.

The presence of harmonic currents in the circuit always causes concern to electrical utilities. This is because these harmonics will be fed back into the ac power system and cause harmonics voltage drop across the line inductance which is always present in the system. This, in turn may result in distorted voltage and current waveforms at the supply terminals and in the power distribution system.