DEVELOPMENT OF THREE-PHASE CONTROLLED CONVERTER FOR INDUCTION MOTOR STATOR VOLTAGE CONTROLLED DRIVE USING COMPUTER

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ABSTRACT

This project discusses the development of a simple computer controlled variable three-phase variable supply system for induction motor stator voltage controlled drive. Variable output three-phase voltage supply is generated by the controller using phase-controlled method. The firing scheme for the three pairs of thyristors in inverse-parallel configuration is controlled by the software written in Quick-Basic Language. The control circuit detects the zero-crossing of each line voltage and waveform and upon receiving voltage signal from digital-to-analog converter (DAC), and generates the controlled gating pulses for the triggering hardware circuit. The thyristors used are back to back pairs and the conduction angles of all the thyristors are the same and vary accordingly with the serial command signal from the computer.

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1.0 INTRODUCTION

The objective of this project is to develop a simple computer controlled three-phase converter to generate variable ac supply voltages for the stator windings of an induction motor. Variation of terminal voltages of an induction motor can be used as a means of adjusting its rotor speed over a certain range, since the output torque of the induction motor varies as square of its air-gap electromagnetomotive force.

Thyristors are now widely used for power control in both dc and ac circuits. Different methods are commonly used to provide voltage-controlled thyristors schemes. In phase angle control, a pair of phase-controlled inverse-parallel connected thyristors or a triac are commonly used to obtain the desired voltage variation. A number of different circuits can be used to provide load voltage variation to a three-phase balanced load using the phase-angle control method[1].

Variable frequency supply voltage can also be used to drive the thyristor for speed control of induction motor. For such a case, it is necessary to have thyristor trigger schemes that can operate satisfactorily for a reasonable range of anode frequencies. A single-phase microprocessor-based scheme can be used for constant angle triggering of thyristors working under a variable-frequency anode supply. Applying this scheme to three-phase thyristor circuits has the disadvantage