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Thesis Title   : Static Scherbius Drive System by Cycloconverter

Major Field   : Electrical Engineering

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Abstract

The thesis describes a Static Scherbius drive system of speed control of a 3-phase wound rotor induction motor by using cycloconverter. The cycloconverter is connected between the rotor winding of the motor and the a.c. mains to give variable-speed subsynchronous and supersynchronous operations.

The control system of firing thyristors is an important factor for cycloconverter operation in order to provide an alternating current and voltage with varying frequencies. The thesis introduces the Cosine Wave Crossing Method for controlling firing angles of thyristors. The reference signals that are used in the Cosine Wave Crossing Method are a variable 3-phase sine waves. Here, The frequency of the reference signal is continuously varying from 1.00 Hz to 16.66 Hz and there is a distortion of $\simeq 5$ % and< 0.5 % respectively at the stated frequencies.

Performance tests of the cycloconverter was conducted by using 3 type of loads; the resistors, the resistors in series with inductors and the 3 - phase wound rotor induction motor. The result showed that the cycloconverter can operate continuously from 1.00 Hz to 16.66 Hz.

An application of the cycloconverter is to control power in the rotor circuit of a 3-phase wound rotor induction motor. It can control the speeds of the motor from subsynchronous to supersynchronuos speeds.