AUTOMATIC VOLTAGE REGULATOR FOR ALTERNATOR

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ABSTRACT

This project deals with the design and development of an Automatic voltage Regulator (AVR) for medium power alternator. The designed controller is tested on the MAWDSLEY'S machine in the power laboratory. Open loop operation is tested to evaluate the controller performance. This project consists of developing a voltage controller for synchronous generator using peripheral interface controller. The processor used is PIC16F628. [1]

The software is written in PIC language using software development tool, which called MPLAB. Other peripheral circuit is constructed to integrate the system so that it works accordingly. To validate the results, the experimental results obtained are compared with the simulation result.

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A rectifier circuit is one which links an AC supply to a DC load. It converts an alternating voltage supply to a direct voltage. The aim is to give some basic outline on AC-DC conversion can be made to be controllable if the converter switches are thyristors. The amount of DC power delivered to a load from an AC supply can be adjusted by altering the firing angles α of the thyristors.

Traditionally, thyristor and diode rectifiers have been used as DC sources and front-end converters of rectifier inverter systems. These rectifiers present a low power factor and line currents with high harmonic content, which pollute the power distribution network. Therefore, reducing the input current harmonic and improving the power factor of the rectifier is important to mitigate the pollution problem and also satisfy forthcoming standard such as IEEE-519 and IEC 1000-3. These standards recognise the need for high –quality single and three-phase rectifier, with input line currents presenting low harmonic content and behaving as high power factor loads. As a result of recent progress in high-speed power semiconductor devices, forced commutation technique has been used to achieve these goals. In contrast to traditional AC-DC converters, switching-mode rectifiers with pulse width modulation can be controlled to draw sinusoidal current from the utility supply at a near unity input power factor [7].

A synchronous machine rotates at a constant speed in the steady-state. Synchronous machines are used primarily as generators of electrical power. In this case they are called synchronous generators or alternators. There are two broad divisions of automatic regulators, both of which set out to control the output voltage of the synchronous generator by controlling the exciter [8].

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