

ABSTRACT

The controlling of a synchronous hydro generator is mainly achieved through a device called the 'Generator Excitation Controller' (GEC) this controller allows two main methods of control, the first being 'Automatic Voltage Regulation' (AVR) and the second being 'Automatic Power Factor Controller' (APFC). Either system as an individual controlling method has proven marginally effective with some drawbacks in each of the methods. Both of the aforementioned methods are constant modes of operation. Most commonly the APFC controlling method is implemented in mini-hydro power plants with the 'Power Factor' set to unity.

In recent years the scale of power systems has been expanding and with that expansion stable power supply and smooth power system operation is becoming increasingly important. One measure for increasing stability is to improve the main circuits by raising the voltage or employing series capacitors in power transmission lines but the generator exciter control method which makes use of AVR(Automatic Voltage Regulator) is attracting attention because of its inherent cost advantage.

This study focuses on designing and developing a system with the ability of the operator to operate the generator in a customizable manner. The designed system allows the user control power factor control. This feature enables the engineers to set the power factor of the machine at a lower value during peak times and at unity during normal operation, upon analyzing the voltage profile of a particular hydro generator. The previous units consisted of a constant mode of operation thus the machines were set to unity power factor for maximum profit margins. This method allows the generator to be controlled to benefit both the power producer and the national electrical grid.

