

APPLICATION OF WOUND ROTOR INDUCTION GENERATORS FOR A STAND-ALONE-MINI-HYDROS

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Mini-hydro systems use synchronous machines to generate electricity. In order to maintain constant frequency, a governor or an electronic load controller (ELC) is employed. Because of the excitation system, governor or ELC and its associated control, and requirement of highly skilled operators, the capital and operational cost of the presently used mini-hydro systems are high.

Induction generators are being used for micro-hydro systems as a cost effective solution. However, as their frequency and output voltage is changing with the load, they are not yet considered for mini-hydro applications. With the advances of doubly-fed technology, especially for wind generation, it is now possible to explore the possibility of using doubly-fed induction generator (DFIG) system for mini-hydro applications as a cost effective solution.

In this paper basic principle of operation of a wound rotor induction generators (WRIG) for stand-alone applications is presented. Both experimental and simulation results are used to demonstrate the ability of voltage and frequency control.

The following figures show the possibility of using decoupled control of the frequency and terminal voltage of the generator by controlling the external rotor resistance and excitation capacitance.

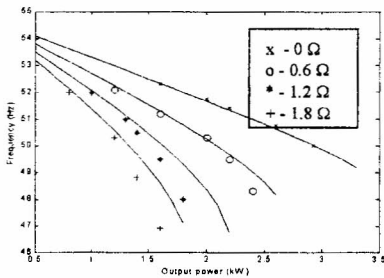


Fig. 1 Frequency vs. output power for variable external rotor resistances

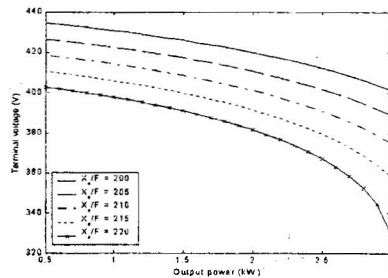


Fig. 2 Terminal voltage vs. output for variable excitation capacitance

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