

Novel C2R-R Configuration for Micro-hydro Plants used in Islanded Systems

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Abstract

This paper presents a novel strategy used to obtain single phase power from three phase power generated through a three phase induction generator. In pico and micro hydro power generations in rural areas, the traditional C-2C configuration is used with the three phase induction generator. The above traditional method reduces the utilization of the generator to 50% of its rating while operating at 0.5 power factor. This paper discusses the drawbacks of the conventional C-2C method in micro hydro power generation and how they can be overcome by introducing the proposed new method. This method is preferable to called as C2R-R method based on its configuration.

A clear theoretical analysis is given on the C-2C and C2R-R methods. The result revealed that machine utilization can be increased to 86.6% without over loading the machine when the proposed method is used. Further simulation study was carried out using EMTDC/PSCAD software on a 27.7kW induction generator. Both traditional C-2C method and proposed C2R-R method have been studied along with its Electronic Load controller to maintain the generator output voltage and frequency. Stability of the machine operations is also checked for input torque and output load power variations. The simulation results confirmed that, with the proposed method, the machine utilization is increased while having more stable operation for sudden input torque or output load changes.