

Performance Comparison of Droop Control Methods for Parallel Inverters in Microgrid

Authors : Ahmed Ismail, Mustafa Baysal

Abstract : Although the energy source in the world is mainly based on fossil fuels today, there is a need for alternative energy generation systems, which are more economic and environmentally friendly, due to continuously increasing demand of electric energy and lacking power resources and networks. Distributed Energy Resources (DERs) such as fuel cells, wind and solar power have recently become widespread as alternative generation. In order to solve several problems that might be encountered when integrating DERs to power system, the microgrid concept has been proposed. A microgrid can operate both grid connected and island mode to benefit both utility and customers. For most distributed energy resources (DER) which are connected in parallel in LV-grid like micro-turbines, wind plants, fuel cells and PV cells electrical power is generated as a direct current (DC) and converted to an alternative currents (AC) by inverters. So the inverters are assumed to be primary components in a microgrid. There are many control techniques of parallel inverters to manage active and reactive sharing of the loads. Some of them are based on droop method. In literature, the studies are usually focused on improving the transient performance of inverters. In this study, the performance of two different controllers based on droop control method is compared for the inverters operated in parallel without any communication feedback. For this aim, a microgrid in which inverters are controlled by conventional droop controller and modified droop controller is designed. Modified controller is obtained by adding PID into conventional droop control. Active and reactive power sharing performance, voltage and frequency responses of those control methods are measured in several operational cases. Study cases have been simulated by MATLAB-SIMULINK.

Keywords : active and reactive power sharing, distributed generation, droop control, microgrid

Conference Title : ICPCE 2015 : International Conference on Power and Control Engineering

Conference Location : Paris, France

Conference Dates : August 27-28, 2015