

Frequency Control of Self-Excited Induction Generator Based Microgrid during Transition from Grid Connected to Island Mode

Authors : Azhar Ulhaq, Zubair Yameen, Almas Anjum

Abstract : Frequency behaviour of self-excited induction generator (SEIG) wind turbines during control mode transition from grid connected to islanded mode is studied in detail. A robust control scheme for frequency regulation based on combined action of STATCOM, energy storage system (ESS) and pitch angle control for wind powered microgrid (MG) is proposed. Suggested STATCOM controller comprises a 3-phase voltage source converter (VSC) that contains insulated gate bipolar transistors (IGBTs) based pulse width modulation (PWM) inverters along with a capacitor bank. Energy storage system control consists of current controlled voltage source converter and battery bank. Both of them acting simultaneously after detection of island compensates for reactive and active power demands, thus regulating frequency at point of common coupling (PCC) and also improves load stability. STATCOM integrates at point of common coupling and ESS is connected to microgrids main bus. Results reveal that proposed control not only stabilizes frequency during transition duration but also minimizes sudden frequency imbalance caused by load variation or wind intermittencies in islanded operation. System is investigated with and without suggested control scheme. The efficacy of proposed strategy has been verified by simulation in MATLAB/Simulink.

Keywords : energy storage system, island, wind, STATCOM, self-excited induction generator, SEIG, transient

Conference Title : ICIEEE 2019 : International Conference on Industrial Engineering and Electrical Engineering

Conference Location : London, United Kingdom

Conference Dates : December 09-10, 2019