

Abstract Details

Title: Reactive Power Control of Wind & Diesel Hybrid System using SVC and STATCOM

Authors: Nisar and Chetan Praveer

Abstract: For the development of modern society electricity is one of the important ingredients. However, everyone in this world is not lucky enough to have access to electricity. It may be due to remoteness, cost, or non-availability of sufficient grid power especially in the developing countries. The most common way to supply electricity to remote area loads is with diesel power plants. The main advantage of diesel system is that it is extremely proven technology and it is highly reliable, if maintained properly. The cost of electricity can be made comparable with the grid power by integrating diesel systems with other non-conventional energy systems (wind, small hydro, P.V. etc.) depending upon sitting conditions. In the proposed system, the wind–diesel autonomous system is considered for reducing diesel fuel cost by tapping wind energy potential, which is inexhaustible and available in abundance all over world. However, the intermittency associated with wind may affect the quality of supply considerably and even may damage the system in the absence of proper control mechanism. In any electrical power system network, especially in autonomous system, the main parameters to be controlled are the system frequency and voltage, which determine the stability as quality of the supply. In a power system, frequency deviations are mainly due to the real power mismatch between generation and demand, whereas voltage mismatch is the sole indicator of reactive power unbalance in the system, in the power system active power balance can be achieved by controlling the generation. Reactive power balance in hybrid system can be obtained by making use of the variable reactive power device e.g. Static VAR Compensators (SVC), Static Compensator (STATCOM). In this proposed work, a wind–diesel hybrid system is modeled and simulated while controlling main parameters of the system frequency and voltage, which is very crucial for system stability. Voltage miss match is the sole indicator of reactive power unbalance in the system. In this work, a step disturbance is applied to wind–diesel hybrid system, which disturbs the system frequency and voltage. Therefore, a thorough investigation on wind–diesel hybrid system has been performed under stepped disturbance. First, we have considered an IEEE type-I excitation system connected to wind–diesel hybrid system for controlling its terminal voltage, which is found to insufficient proper voltage control. However, SVC and STATCOM are considered to be more efficient in meeting out any sudden change in reactive power demand and a better control of the terminal voltage may be easily obtained. The Secondary source to control the reactive power of wind–diesel hybrid system we have taken SVC and STATCOM in which STATCOM give batter performance. That have been thoroughly studied and simulated.

Keywords: Autonomous System, MATLAB, STATCOM.