

Voltage and Frequency Regulation of Isolated System under Unbalanced Condition

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Abstract: *In this dissertation, a 3-phase 3-wire isolated microgrid system is designed for standalone conditions. The components of the isolated system are wind driven SEIG, solar photovoltaic (SPV), insulated gate bipolar transistor (IGBT) based voltage source converter (VSC), interfacing inductors, energy storage system (ESS) and 3-phase nonlinear load. An EPLL-PLL based control algorithm with VSC is implemented to regulate the voltage, frequency and improve the power quality of the wind-solar hybrid system. Moreover, the proposed control with VSC also provides harmonic compensation, load balancing and reactive power support of the hybrid system. The SPV with battery system is interfaced at DC link of the VSC to provide active and reactive power support under transient conditions. An incremental conductance method is used to extract maximum power from a SPV. The battery system consumes the unused power under varying load demand. The entire system is designed MATLAB/Simulink and results are taken under varying wind speed and varying solar insolation feeding 3-phase nonlinear load.*

Keywords: SEIG, voltage source converter, phase locked loop

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