Analysis of a modified sliding mode controller for grid-connected inverter to control the voltage and frequency of the microgrid considering chattering problem and in presence of unbalance linear and non-linear loads

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Renewable energy sources like photovoltaic, Fuel cells and micro-turbines under the microgrid have a vital role in today's power systems. In other words, Microgrid is a small power system with a variety of energy sources to enhance the reliability and quality of electric energy. Micro grids are connected to upstream network, so, voltage and frequency control of the micro grids are very important. In this regard, a fixed-frequency switching method using sliding mode control for a three-phase inverter is evaluated in this thesis. On the other hand, the possibility of hiring sliding mode control method for controlling the inverter switching because of the chattering phenomenon is not possible. Therefore, The PWM techniques have been used to soften control rules and High-frequency fluctuations in the output has been eliminated as much as possible and the main goal is reducing THD level. In this regard and to evaluate the performance of control methods, a variety of scenarios have been analyzed. In addition, the dynamic response of the inverter in sudden load changes is analyzed and the maximum response time in case of non-linear load is equal to 0.11 msec.

Keywords : Sliding mode control, three-phase inverter, load changes, pulse width modulation

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