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Summary of Abstract

The objectives of this thesis in its first part are to get a knowledge about various components of a PV system and modelling a microgrid with grid integrated PV system to improve various existing issues in these areas. With this aim, at first a gate pulse triggered three phase 180º voltage source inverter (VSI) which is supplying nonlinear loads has been designed in MATLAB SIMULINK. The next study was aimed to study about a microgrid model which is having a grid integrated PV system. The grid integrated three phase PV system has been modelled with controller circuits for analysis of its power quality improvements. To get maximum PV power output from PV source, conventional maximum power point tracking (MPPT) algorithms such as P&O and INC based MPPT techniques have been applied on the dc-dc booster circuit. The other part of this thesis is aimed to study about development of a digital substation with IEC 61850 standard implementation and its real time study with a multivendor installation. To establish the concept of interoperability of substation devices, a digital substation laboratory model has been developed here with IEC 61850 standard implementation. Lastly, testing of the digital substation which incorporates devices from different manufacturers has been performed for validating interoperability operations of substation devices. The process bus communications and protection operations of the intelligent electronic devices (IEDs) have been tested. Three IED protection studies overcurrent, earth fault, and overvoltage have been performed and IED response curves have been obtained.