

## ABSTRACT

This paper proposes an extended Kalman filter (EKF) based control strategy for fault ride-through operation in twostage grid-connected photovoltaic (GPV) system. Unlike the conventional controllers for ride-through operation, the proposed strategy does not compromise with power quality improvement features in the system while enabling ride through operation. The controller accounts for nonlinear loads in the system, grid harmonic currents elimination and grid-currents balancing even during the harmonic/distorted grid voltages.

The IEEE standard 1547.4 compels the distributed resource to ride-through during voltage disturbances caused by faults. For the ride-through operation, a limit is imposed on PV active power injection to prevent inverter over-currents and DC-link energy aggregation, which reduces the lifetime of DC-link capacitor. The reactive power is fed to the grid, as per the depth in voltage-sag. The derated PV array power is supplied in cases where the inverter cannot handle the utmost PV-power. The power quality improvement is ensured using EKF state estimator, which precisely estimates the fundamental load currents.

In distribution network with modern nonlinear loads, especially at far radial ends, the grid voltages are prone to huge diversions and the proposed controller provides a possible solution to maintain active/reactive power support and maintain power quality in the network. The effectiveness of the strategy is demonstrated through simulations and experiments. Under all disturbances, the harmonic content in grid currents is observed within limits, in accordance with the IEEE standard-519. Keywords: Distributed generation, EKF, Total harmonic distortion (THD), Phase locked loop, PWM.

The complete proposed system will be tested using MATLAB/SIMULINK and the simulation results exhibits the attractive performance characteristics of the proposed system.