ABSTRACT
This work deals with low-voltage ride-through operation of solar photovoltaic (PV) array along with power quality (PQ) improvement features in the distribution grid such as grid currents balancing, improve solar power penetration into the distributed network, power factor correction features.
- Under balanced/unbalanced grid voltage faults, the proposed strategy controls DC-DC converter in such a way that voltage source converter (VSC) currents are achieved within its permissible limits along with improving stability of the grid (it is mandatory to follows since 2014 as per conditions).
- The effectiveness of the GI algorithm is illustrated with frequency domain analysis and Lissajous plots to extract fundamental load component (PLC).
- Test results show satisfactory performance for a proposed system under steady state and dynamic conditions such as load currents unbalancing, variable solar insolation, distribution static compensator mode and line to ground fault.

FUNCTIONALITIES OF THE CONTROL STRATEGY
- Ride-through operation under symmetrical and unsymmetrical faults in the grid.
- Inverter is protected by accommodating its rating into control strategy.
- Balanced grid currents are achieved even under unbalanced load currents.
- Improve dynamics of the grid currents by including solar PV feed-forward term.
- Reduce losses in VSC. Adaptive DC link approach of h is adopted for reference DC link voltages.
- System performance is not affected even under presence of DC offset (for continuous/short time) in the load current.
- Capable to operate even under distorted grid voltages.
- Grid currents are balanced even under balanced and unbalanced faults and its total harmonics distortions are maintained according to IEEE-519 standard.

PRESENTED TOPOLOGY AND CONTROL STRATEGY

EXPERIMENTAL RESULTS
Case-I Grid currents Balancing Features

Case-II DSTATCOM Feature

Case-III Ride-through Feature

Fig. 1: Performance of the system under L-G and L-L-G fault

Fig. 2: Equivalent circuit of experimental prototype

REFERENCES

LIST OF PUBLICATIONS AND PATENTS