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Validation of Solar PV Inverter Harmonics Behaviour at Different Power Levels in a Test Network

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Abstract : Grid connected solar PV inverters need to be compliant to standard regulations regarding unwanted harmonic generation. This paper gives an introduction to harmonics, solar PV inverter voltage regulation and balancing through compensation and investigates the behaviour of harmonic generation at different power levels. Practical measurements of harmonics and power levels with a power quality data logger were made, on a test network at a university in Germany. The test setup and test results are discussed. The major finding was that between the morning and afternoon load peak windows when the PV inverters operate under low solar insolation and low power levels, more unwanted harmonics are generated. This has a huge impact on the power quality of the grid as well as capital and maintenance costs. The design of a single-tuned harmonic filter towards harmonic mitigation is presented.

Keywords : harmonics, power quality, pulse width modulation, total harmonic distortion
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