
Identify the Supra Harmonics in Low Voltage Distribution System Due to Photovoltaic Inverters

H.C. Ganage

Department of Engineering Technology, Faculty of Technology, University of Ruhuna

Corresponding author: hasiniganage@gmail.com

A significant amount of voltage and current distortion were detected in the power distribution system due to the problem of power system harmonics; it is the impact of the poor power quality. Over the past few decades, different types of power electronic devices are introduced to the power distribution system and electricity grid has undergone dramatic changes due to them. High-frequency switching power electronic device usage is becoming more popular for residential and commercial loads. Underlying all those power electronic equipment are popular with high energy efficiency, controllability, ecologically friendly, durable quality, cost-efficient, low maintenance, lesser weight, and smaller size. These techniques are supported to reduce harmonic contents generated by loads, using active power factor correction (PFC) circuits. The smart grid concept is very often used in the world; it intends to increase energy efficiency, reduce the energy cost, and simultaneously to achieve a sustainable balance between production and consumption, increasing the reliability of the power grid and the power quality of the electrical energy delivered to the loads. The electrical power grid has to be developed to support reference technologies, as integrated communications, power electronic devices, Energy Storage Systems and Advance metering infrastructure with more environmentally friendly and energy efficient systems. The devices introduce additional distortion for high frequencies, which is above 2 kHz due to their internal switching frequency. Between 2 kHz to 150 kHz, frequency range harmonics are named as High frequency harmonics (HF) or supra-harmonics. This research is focused to identify the supra-harmonic emission in the low voltage distribution system due to photovoltaic inverters. For that, MATLAB/Simulink software is used to model and simulate single-phase, three-phase inverters.

Keywords: Distribution system, High frequency, Inverter, Photovoltaic, Supra-harmonics