Assessment of Roof-Top Photovoltaic Installations on the Total Harmonic Distortion of Low Voltage Distribution Networks

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Abstract:

The connections of roof-top photovoltaic (PV) systems with low voltage distribution networks have been raised dramatically in the last years due to decreasing in the capital cost and investing in the operating cost. However, the power generation of this source is variable owing to the solar irradiance dependency. This variation in the PV generation can cause a Total Harmonic Distortion (THD) into the low voltage distribution network. In this paper, the effect of roof-top PV system installations on the total harmonic distortion is assessed under different weather conditions. Regarding this, the voltage and current of an on-grid PV system composited at the roof-top of Brunel university London campus are measured and analysed for sunny and cloudy days. Furthermore, this installed PV system is developed based on MATLAB/Simulink. The results prove that the solar irradiance of the surround PV system has a significant impact on the THD-current when compared with the THD-voltage.