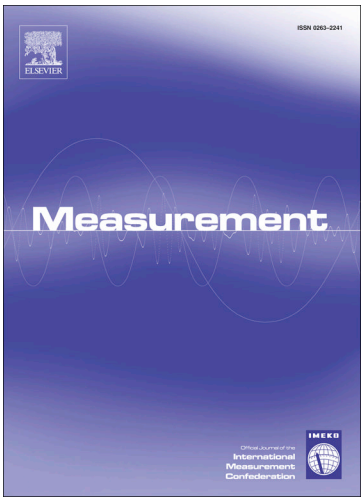

Cancellation of Interference for Emission Measurement in Open Area Test Site

Awan Fahim Gohar, Asima Kiran

PII: S0263-2241(17)30473-6
DOI: http://dx.doi.org/10.1016/j.measurement.2017.07.037
Reference: MEASUR 4877

To appear in: *Measurement*

Received Date: 25 August 2016
Revised Date: 7 February 2017
Accepted Date: 20 July 2017

Please cite this article as: A.F. Gohar, A. Kiran, Cancellation of Interference for Emission Measurement in Open Area Test Site, *Measurement* (2017), doi: http://dx.doi.org/10.1016/j.measurement.2017.07.037

Cancellation of Interference for Emission Measurement in Open Area Test Site

Awan Fahim Gohar, Asima Kiran
University of Engineering and Technology Lahore

ABSTRACT

This paper proposes a technique for implementing the concept of a virtual chamber for radiation emission measurements in time domain. At present measurements for electromagnetic emissions are carried out either with FFT based analyzers or with a conventional-hybrid spectrum analyzer based on heterodyning where interested band of frequencies is swept in the radio frequency range in an anechoic chamber. This method requires a large measurement time especially for wide band frequency measurements; therefore such methods cannot guarantee reliable results in open area. The difficulty lies in the interference cancellation from random sources for prolonged measurement duration.

In this paper time domain measurement technique for electromagnetic emissions at open area test site has been proposed, designed, implemented and tested in a laboratory environment. The proposed technique captures multichannel signal from interference sources and equipment under test (EUT) simultaneously on different antenna ports. The continuous signal streams sampled at a very high rate before being fed to the stochastic gradient based adaptive filter. This materializes the cancelation of interference generated by various electronic sources using advanced digital processing techniques. The factors influencing the exactness in estimating interference are discussed in detail and cancelation of interference over the range of frequency (DC-1GHz) has been simulated. The simulation results exhibit how the proposed technique can revoke different kinds of interferences like continuous or transient, narrow or broad band. The performance evaluation of this method is verified through experiments conducted on real electronic appliances in open space environment and cross validated in an anechoic chamber up to 1 GHz. The outcome of the research demonstrates the cancellation of both generated as well as naturally existing random interfering signals in an urban site polluted with electrical noise. The results substantiate the accuracy and usefulness of this new method for the measurement of radiation emissions and electromagnetic compatibility in accordance with CISPR standards. Pre-compliance electromagnetic compatibility testing is realized with this work without the need of an expensive anechoic chamber and with a reduced measurement time compared to the conventional measurement system.

INDEX TERMS: Measurement, EMC, Time domain, data processing, Interference