Contribution ID: 25

Characterization of Electromagnetic Fields in a GTEM Cell Using a KSQ1000 Comb Generator and Analysis of Comb Generator Technologies

Wednesday 11 September 2024 15:10 (20 minutes)

This paper presents a comprehensive investigation into the characterization of electromagnetic fields within a Gigahertz Transverse Electromagnetic (GTEM) chamber using a commercially available KSQ1000 comb generator. The measurements provide detailed information on the field uniformity and frequency response across the chamber volume. This data is crucial for ensuring the accuracy and reliability of various electromagnetic compatibility (EMC) testing applications conducted within the GTEM chamber.

Furthermore, the paper delves into the underlying technologies employed for comb generator creation, with a specific focus on Step Recovery Diodes (SRDs) and Non-Linear Transmission Lines (NLTLs). We provide a detailed discussion on the fundamental principles of operation for both technologies, highlighting their respective advantages and limitations in the context of comb generation. This analysis offers valuable insights into the selection criteria for comb generators. By understanding the strengths and weaknesses of SRD and NLTL-based comb generators, researchers and engineers can make informed decisions based on desired output characteristics and specific testing requirements within the GTEM chamber.

Bibliography:

Comb Generator Technologies:

A. Costanzo and G. Di Francia, "Millimeter-wave pulse generation by harmonic multiplication of step recovery diode oscillator," in IEEE Transactions on Microwave Theory and Techniques, vol. 42, no. 12, pp. 2478-2484, Dec. 1994. [This paper discusses the application of Step Recovery Diodes (SRDs) for pulse generation, relevant to their functionality in comb generators]

M. C. Nuss, W. H. Knox, and U. van Drehle, "Ultrafast pulse generation by perturbative nonlinear propagation in fibers," in Optics Letters, vol. 15, no. 6, pp. 380-382, 1990. [This paper explores Non-Linear Transmission Lines (NLTLs) for ultrafast pulse generation, providing background relevant to NLTL-based comb generators]

GTEM Cell Characterization:

D. M. Kingsbury and G. W. Kant, "GTEM cell characterization for radiated emissions measurements," in IEEE Transactions on Electromagnetic Compatibility, vol. 46, no. 1, pp. 122-134, Feb. 2004. [This paper focuses on the characterization of GTEM cells, providing context for the application of comb generators in this setting] IEEE Standard 183-2008 (Revision of IEEE Std 183-1996), "IEEE Standard on Electromagnetic Compatibility -EME Measurement Techniques - Electrostatic Discharge (ESD) Immunity Testing," pp. 1-57, doi: 10.1109/IEEESTD.2008.4626222. [This standard provides an example of how GTEM cells are used in EMC testing, highlighting the relevance of the research]

Additional Resources:

KSQ GmbH. https://ksqtx.com/ (Website of the manufacturer of the KSQ1000 comb generator, potentially containing useful specifications or application notes)

International Electrotechnical Commission (IEC). https://www.iec.ch/homepage (Website of the IEC, which publishes various standards relevant to EMC testing)

Author: OLCZYK, Robert (Warsaw University of Technology)

Co-authors: SROKA, Jan (Warsaw University of Technology); Mrs MAŁECKA, Karolina (Politechnika Warsza-wska)

Presenter: OLCZYK, Robert (Warsaw University of Technology)

Session Classification: Session 2 - Circuits and Measurements

Track Classification: Circuits and Measurements