



EMCABS

EMC Abstracts

Osamu Fujiwara, Associate Editor

Osamu Fujiwara (left) is shown in this photo taken in a building of the Wroclaw University of Technology after a meeting of the symposium bodies on Friday, June 13, 2008. He is joined by Prof. Andrzej Karwowski, Chairman of the Scientific Program Committee, with the Silesian University of Technology.

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As the EMC Society becomes more international, we will be adding additional worldwide abstractors who will be reviewing articles and papers in many languages. We will continue to set up these informal cooperation networks to assist members in getting the information or contacting the author(s). We are particularly interested in symposium proceedings which have not been available for review in the past. Thank you for any assistance you can give to expand the EMCS knowledge base. **EMC**

EMCABS: 01-02-2009

MEASUREMENT INSTRUMENTATION UNCERTAINTY OF RADIATED DISTURBANCES DUE TO ANTENNA - RECEIVER TRANSMISSION

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Proceedings of 2008 19th International Wroclaw Symposium and Exhibition on Electromagnetic Compatibility, Wroclaw, Poland, June 11-13, 2008, pp.50-53.

Abstract: Guidelines on how to estimate measurement instrumentation uncertainty by RF measurements are assembled in document [1]. Uncertainty contributions due to antenna – receiver transmission by radiated emission is unnecessarily blown up in this document. It is split into two components due to antenna – receiver attenuation and antenna - receiver mismatch. Moreover, arithmetic summation of uncertainty contributions by antenna - receiver mismatch is applied. This is too pessimistic, unrealistic and overestimated. The target of this paper is to show how to reduce this uncertainty contribution. The author integrates two uncertainties from [1] in one component. Beyond this, he benefits from U-shaped distribution and from theorem about variation of sum of independent random events. All these measures diminish uncertainty. Numerical examples confirm that the target of the paper is achieved.
Index terms: Measurement uncertainty, mismatch, scattering parameters, U-shaped distribution, insertion loss.

EMCABS: 02-02-2009

PREDICTION OF EXPOSURE CONDITION IN VICINITY OF CELLULAR TELEPHONY BASE STATION ANTENNAS

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Proceedings of 2008 19th International Wroclaw Symposium and Exhibition on Electromagnetic Compatibility, Wroclaw, Poland, June 11-13, 2008, pp.161-164.

Abstract: In this paper, the methods for evaluation of exposure condition to electromagnetic fields radiated by base station antennas are outlined. The approaches are examined with regard to the offered accuracy and potential usefulness in routine evaluation of exposure conditions.

Index terms: Base-station antennas, exposure assessment, mobile communication.

EMCABS: 03-02-2009

EXPERIMENTAL VERIFICATION OF SPARK-RESISTANCE FORMULA FOR MICRO-GAP ESD DUE TO CHARGED HUMAN

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Proceedings of 2008 19th International Wroclaw Symposium and Exhibition on Electromagnetic Compatibility, Wroclaw, Poland, June 11-13, 2008, pp.185-188.

Abstract: Micro-gap electrostatic discharge (ESD) events due to a human with charge voltages below 1000 V provide a serious electromagnetic failure to high-tech information equipment. For clarifying the mechanism, it is indispensable to grasp the spark process of such micro-gap ESDs. For this objective, spark-resistance laws are often used, while their validity has not been well investigated. In the present study, with a 12-GHz digital oscilloscope, the authors measured the discharge current due to the collision of a hand-held metal piece from a charged human-body, and thereby derived spark conductance with respect to charged voltages of 200 V and 2000 V and collision speed from 2 cm/s and 20 cm/s. For two types of the different spark resistance formulae proposed by Rompe-Weizel and Toepler, the authors examined their hypotheses assumed for spark-channel conductivity. As a result, they found that initial spark process could be better explained by the Rompe-Weizel formula than the Toepler one, though both of their hypotheses are roughly valid in the initial stage of sparks.

Index terms: Micro-gap human ESD, discharge current, spark conductance, spark-resistance formula, verification.

EMCABS: 04-02-2009

RELATION BETWEEN BREAKDOWN FIELD AND RADIATED ELECTROMAGNETIC FIELD STRENGTH DUE TO MICRO GAP DISCHARGE

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Proceedings of 2008 19th International Wroclaw Symposium and Exhibition on Electromagnetic Compatibility, Wroclaw, Poland, June 11-13, 2008, pp.193-196.

Abstract: The relationship between breakdown field strength and radiated electromagnetic field strength was examined in an experimental study. In the first, the transition duration of voltage and current rise time due to small gap discharge as the low voltage ESD is investigated in the time domain. The measurement system used the 12 GHz experimental system. The sensing system used was an E-field sensor and an H-field sensor. As a consequence of the experiment using the system, the voltage and current rise time of transition duration were shown as 32 ps or less. In addition, the breakdown field was examined to corroborate the very fast transition durations of about 32ps. The breakdown field was very high of about 8×10^7 V/m in low voltage discharging of below 350V. The authors also confirmed that the radiated electromagnetic field strength value in low voltage discharge of about 400V was higher than high voltage discharge of about 900V.

Index terms: Breakdown field, radiation, ESD, micro-gap discharge, electromagnetic field.

COMPARISON OF LEMP-INDUCED CURRENT SIMULATION WITH THE USE OF DIFFERENT COMPUTER CODES

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Proceedings of 2008 19th International Wroclaw Symposium and Exhibition on Electromagnetic Compatibility, Wroclaw, Poland, June 11-13, 2008, pp.223-226.

Abstract: A simulation of lightning-induced currents with the use of four popular computer codes (NEC-2, AWAS-2, CDEGS and FEKO) is presented. Different approximation methods applied in the software cause discrepancies of results observed both in the time and the frequency domains. Effects of these errors are compared using an example of a loop located inside a lightning protection system.

Index terms: Simulation, LEMP, overvoltages, lightning protection system.

EMCABS: 06-02-2009

INVESTIGATION METHODS OF LEMP EFFECT ON RADIO BASE STATIONS

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Proceedings of 2008 19th International Wroclaw Symposium and Exhibition on Electromagnetic Compatibility, Wroclaw, Poland, June 11-13, 2008, pp.227-232.

Abstract: This paper presents an overview of different numerical and field investigation methods of lightning effects on radio base stations. The final purpose is to develop a practical application of these combined techniques as an effective approach for lightning protection of these structures.

Index terms: Lightning, LEMP, simulation methods, radio base station.

EMCABS: 07-02-2009

AWE-BASED WIDEBAND COMPUTATION OF ELECTROMAGNETIC TRANSMISSION THROUGH A DIELECTRIC COVERED APERTURE

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Proceedings of 2008 19th International Wroclaw Symposium and Exhibition on Electromagnetic Compatibility, Wroclaw, Poland, June 11-13, 2008, pp.244-247.

Abstract: The method of wideband analysis of the phenomenon of transmission of electromagnetic waves through an aperture in an infinite metal screen is investigated. The aperture may be covered by a dielectric slab of finite extent. The problem is solved using an integral-equation method-of-moments technique accelerated by an asymptotic waveform evaluation method.

Index terms: Aperture, dielectric cover, transmission, electromagnetic waves, asymptotic waveform evaluation.

EMCABS: 08-02-2009

EMC MODELLING OF LOADED ENCLOSURES WITH APERTURE BY HYBRID MOM/FEM ANALYSIS

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Proceedings of 2008 19th International Wroclaw Symposium and Exhibition on Electromagnetic Compatibility, Wroclaw, Poland, June 11-13, 2008, pp.248-252.

Abstract: This paper presents a hybrid formulation in the frequency domain which combines the Method of Moments (MoM) and the edge-based vector finite element method (FEM) for electromagnetic field distribution inside a loaded enclosure with aperture. While MoM is used for solving the surface integrals related to the aperture field components using equivalent surface currents, FEM is used for solving electromagnetic fields inside of the enclosure. Numerical results for the shielding effectiveness of an enclosure with apertures calculated by the hybrid method are presented and validated by comparison with literature. Then, by changing dielectric properties and the location of the dielectric slab inside the enclosure, stored electrical energy and dissipated power in load are examined.

Index terms: Shielding effectiveness, finite element method, method of moments, dissipated power.

EMCABS: 09-02-2009

SMALL REVERBERATION CHAMBER AS A TOOL FOR INVESTIGATION OF MOBILE COMMUNICATION HANDSETS

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Proceedings of 2008 19th International Wroclaw Symposium and Exhibition on Electromagnetic Compatibility, Wroclaw, Poland, June 11-13, 2008, pp.285-289.

Abstract: This paper gives a short description of small reverberation chamber design as well as an overview of the different measurement procedures in reverberation chambers that have been developed for characterizing small antennas and complete wireless terminals that are intended for use in environments with Rayleigh fading. The antennas and phones can be measured with or without the presence of a head phantom or other objects.

Index terms: Reverberation chamber, mobile phone, antenna, measurements.

EMCABS: 10-02-2009

TESTING OF IMMUNITY OF DIGITAL ICs AGAINST ELECTROMAGNETIC DISTURBANCES

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Proceedings of 2008 19th International Wroclaw Symposium and Exhibition on Electromagnetic Compatibility, Wroclaw, Poland, June 11-13, 2008, pp.342-347.

Abstract: The measurement methods and selection of test signals for immunity (susceptibility) testing of digital integrated circuits (ICs) against electromagnetic (EM) disturbances are discussed in this paper. Both radiated and conducted disturbances, having the form of continuous waves (CW) and pulse signals, were taken into account. Special attention was paid to the standards elaborated on this topic within the IEC.

Index terms: Digital integrated circuits, immunity against EM disturbances, testing methods, test signals selection.

EMCABS: 11-02-2009

FIELD EXTRAPOLATION TO TEST LARGE RADIATORS IN THE NEAR FIELD REGION

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Proceedings of 2008 19th International Wroclaw Symposium and Exhibition on Electromagnetic Compatibility, Wroclaw, Poland, June 11-13, 2008, pp.362-367.

Abstract: In this paper the electromagnetic radiation emitted by large EUTs is investigated. The aim of the investigation is to extrapolate measured near field values to a distance instructed in standards, e. g. CISPR 16. In CISPR 16, the radiation in the upward direction is disregarded because practical constraints are considered. However, emission levels calculated for a closed hemispheric test area around the EUT can be higher than values obtained according to the CISPR 16 procedure. Nevertheless, practical circumstances can prevent an application of a hemispheric test area. If the hemisphere is small, and thus measurement distances are short, practical constraints in measuring the upward direction could be overcome. Therefore, an adequate method to extrapolate results measured in the near field region is necessary if instructed measuring distances cannot be accessed.

Index terms: Emission test, CISPR16, near field, far field.

EMCABS: 12-02-2009

CALCULATION OF THE CHARACTERISTICS OF TWO-WIRE LINES IN MULTICONDUCTOR CABLES

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Proceedings of 2008 19th International Wroclaw Symposium and Exhibition on Electromagnetic Compatibility, Wroclaw, Poland, June 11-13, 2008, pp.384-389.

Abstract: The rigorous method of parameters calculation of two-wire lines (twisted pairs) inside a metal cable sheath and mutual coupling between lines is offered. It is shown that the mutual coupling between lines in multi-conductor cables results in the appearance of electromagnetic interferences (cross distortions) in communication channels, and the asymmetry of excitation and loads causes an appearance of common wave in lines. The values of voltages (interferences) on resistors placed in the start and finish of an adjacent line at a predetermined power in a base line are calculated.

Index terms: Communication channels, electromagnetic interference, lossy circuits, mutual coupling.

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