EMCABS

EMC Abstracts
Osamu Fujiwara, Associate Editor

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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: 01-05-2008

A NEW METHOD TO DESIGN A CIRCUIT FOR THE ELECTROSTATIC DISCHARGE CURRENT

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Proceedings of THE 17th INTERNATIONAL CONFERENCE ON ELECTROMAGNETIC DISTURBANCES, Bialystok, Poland, September 19-21, 2007, pp.1.2-1 - 1.2-6.

Abstract: The aim of this paper is to give an alternative and more accurate way of designing a circuit that will produce the electrostatic discharge (ESD) current. An equation, which is very accurate, has been used as the equation of the ESD current. Furthermore, the Prony method is applied on this equation to obtain an approximation of the impulse response of a circuit that produces it. Then, a theoretical realization is proposed using operational amplifiers.

Index terms: Circuit design, electrostatic discharge (ESD) current, Prony method.

EMCABS: 02-05-2008

MEASUREMENT OF DISCHARGE CURRENTS THROUGH FINGERTIP FROM CHARGED HUMAN BODY

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Proceedings of THE 17th INTERNATIONAL CONFERENCE ON ELECTROMAGNETIC DISTURBANCES, Bialystok, Poland, September 19-21, 2007, pp.1.5-1 - 1.5-4.

Abstract: It has widely been accepted that electrostatic discharge (ESD) events due to charged human bodies with low charge voltages below 1000 V cause a fatal electromagnetic malfunction in high-tech information equipment. In the present study, to understand a mechanism of such human ESD events, using a 12-GHz digital oscilloscope, we measured discharge currents through a hand-held metal bar or a fingertip with an aluminum foil attachment from a charged human body with a charge voltage of 600V, and examined the effect of the aluminum foil size on discharges through a fingertip. In addition, using an equivalent circuit previously proposed for calculating the discharge currents, we estimated the corresponding discharge voltages, measurement of which is basically impossible. As a result, we found that the hand-held metal bar and aluminum foil attachment produce a one-shot discharge current with steeply rising time shorter than a hundred picoseconds and the corresponding discharge voltage abruptly changing from the charge voltage to certain remaining voltages due to arcs following sparks, and the peaks of discharge currents through a fingertip increase with the attachment foil size. This

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suggests that the growth of a spark can be affected mainly by the amount of charges accumulated in the stray capacitances around the fingertip. For the discharge through a fingertip without any aluminum foil attachments, however, the measurement shows that the fingertip produces multiple shot discharge currents with gently rising time larger than a hundred picoseconds and significantly low amplitudes, which are entirely different from the above cases. This means that the fingertip only could not provide electric energy enough for a spark to grow.
Index terms: Human ESD, fingertip, discharge currents.

EMCABS: 03-05-2008

MEASUREMENT OF TRANSITION DURATION AND BREAKDOWN FIELD DUE TO LOW VOLTAGE ESD USING 12GHz EXPERIMENTAL SYSTEM
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Proceedings of THE 17th INTERNATIONAL CONFERENCE ON ELECTROMAGNETIC DISTURBANCES, Bialystok, Poland, September 19-21, 2007, pp.2.9-1 - 2.9-4.
Abstract: Voltage rise time and current rise time due to small gap discharge as the low voltage ESD was investigated in time domain. The measurement system was improved on the bandwidth from 6 GHz to 12 GHz using the coaxial electrode system. Also, the sensing system was changed from the coupled transmission lines to an E-field sensor and a H-field sensor. The insertion loss of the experimental system was within about –3 dB in frequency range below 12 GHz. As a consequence of the experiment using the system, voltage and current rise time of transition duration were shown to be 32 ps or less. The rise times were changed in configuration of electrodes, source polarity and discharging voltage. In addition, the breakdown field was examined to corroborate the very fast transition durations of about 32 ps. The breakdown field was very high of about 8x107 V/m in low voltage discharging of below 330 V.
Index terms: Electrostatic discharge, low voltage, voltage and current rise times.

EMCABS: 04-05-2007

CROSSTALK ANALYSIS OF DIFFERENT LENGTH PARALLEL CONDUCTOR IN HOMOGENEOUS MEDIUM
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Proceedings of THE 17th INTERNATIONAL CONFERENCE ON ELECTROMAGNETIC DISTURBANCES, Bialystok, Poland, September 19-21, 2007, pp.3.2-1 - 3.2-4.
Abstract: In this paper, we examine a simple analysis method using chain matrix including terminal conditions to calculate frequency characteristics of near end crosstalk (NEXT) and far end crosstalk (FEXT) of a multi conductor transmission line (MTL) with different length conductors. We analyze two MTLs that have two or three parallel and unequal length conductors. They are a simple example of a wiring-harness in an automobile because the wiring-harness usually has many branches and the branches are different in length.
Index terms: Crosstalk, multi conductor transmission lines, chain matrix, wiring-harness.

EMCABS: 05-05-2007

METHODS TO REDUCE THE ACI LEVEL IN THE GSM SYSTEM
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Proceedings of THE 17th INTERNATIONAL CONFERENCE ON ELECTROMAGNETIC DISTURBANCES, Bialystok, Poland, September 19-21, 2007, pp.3.3-1 - 3.3-6.
Abstract: The paper presents a technique that reduces the adjacent channel interference for GSM signals. This method resides in implementing a Gaussian FIR filter - designed using the windows method - in the modulator. The use of this type of filter ensures an additional attenuation of the secondary lobes and, implicitly, a better spacing of the carries. It was observed that applying the Gaussian filter designed using the Blackman window, the level of ACI (Adjacent Channel Interference) was reduced with 9 dB for a carrier spacing of 400 kHz.
Index terms: Adjacent Channel Interference (ACI), windows method, spectral power.

EMCABS: 06-05-2007

THE APPROXIMATE ESTIMATION OF EMF INTENSITY IN THE NEAR VICINITY OF BASE STATIONS BY PLANNING MOBILE NETWORKS
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Proceedings of THE 17th INTERNATIONAL CONFERENCE ON ELECTROMAGNETIC DISTURBANCES, Bialystok, Poland, September 19-21, 2007, pp.3.4-1 - 3.4-6.
Abstract: The models of electromagnetic field (EMF) intensity evaluation in the near vicinity of base stations and the method for approximate estimation of EMF intensity parameters in the analyzed situation has been presented in this paper. The investigated method provides a sufficiently reliable and the most cost-effective solution for EMF intensity evaluation in the worst-case scenario with respect to the amount of apriori information given.
Index terms: EMF intensity, mobile networks, near vicinity, exclusion zones.

EMCABS: 07-05-2007

ADAPTIVE NOISE FILTER BASED ON OUTPUT SIGNAL DELAY CONTROL SCHEME FOR PREVENTION OF ELECTROMAGNETIC INTERFERENCE PROBLEMS

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Proceedings of THE 17th INTERNATIONAL CONFERENCE ON ELECTROMAGNETIC DISTURBANCES, Bialystok, Poland, September 19-21, 2007, pp.3.6-1 - 3.6-4.
Abstract: This paper presents an adaptive noise filter capable of canceling high-frequency noise to resolve electromagnetic disturbance (EMD) problems. To improve on the performance of conventional methods that cannot necessarily be applied to relatively high-frequency signals, we used a scheme that controls the output signal delays of the filter according to the time-shift of the observed noise signals. Experiments conducted on a prototype using field programmable gate arrays showed that this scheme is effective for countering EMD problems on a communication cable.
Index terms: Adaptive noise filter, common-mode noise, electromagnetic interference, field programmable gate array.

EMCABS: 08-05-2007

COMPUTER SIMULATION OF ULTRA-WIDEBAND ANTENNAS FOR RADIO COMMUNICATION SYSTEMS
Marek Garbaruk
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Proceedings of THE 17th INTERNATIONAL CONFERENCE ON ELECTROMAGNETIC DISTURBANCES, Bialystok, Poland, September 19-21, 2007, pp.3.9-1 - 3.9-4.
Abstract: The paper presents the results of computer design and simulation of ultra-wideband (UWB) pulse antennas. A complex approach to computer-aided design and investigation of the frequency characteristics of the UWB antennas is discussed. Planar monopole pulse ultra-wideband antennas in microstrip and stripline realization for use in radio communication systems are proposed. Design of the antennas is discussed and frequency characteristics, current and near electromagnetic field distributions are presented. Obtained results may be effectively used for the evaluation of EMD properties of UWB radio communication systems.
Index terms: Ultra-wideband antenna, computer-aided design, radiation of UWB antennas.

EMCABS: 09-05-2007

ANALYSIS OF LEMP FIELD INSIDE LPS IN THE CASE OF INDIRECT LIGHTNING STRIKE
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Proceedings of THE 17th INTERNATIONAL CONFERENCE ON ELECTROMAGNETIC DISTURBANCES, Bialystok, Poland, September 19-21, 2007, pp.8.1-1 - 8.1-4.
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Abstract: Shielding effected by a lightning protection system (LPS) during an indirect lightning strike is analyzed. Reduction of electric and magnetic fields has been evaluated using the method of moments in the frequency domain. The time-domain waveforms have been obtained by the DFT. Some results are compared to the formulas presented in the IEC 62305-4 standard.
Index terms: Lightning, modeling, shielding effect.

EMCABS: 10-05-2007

LIGHTNING THREAT AS A RESULT OF POTENTIAL DIFFERENCES IN A TELECOMMUNICATION CENTRE DURING DIRECT STRIKE TO THE TOWER
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Proceedings of THE 17th INTERNATIONAL CONFERENCE ON ELECTROMAGNETIC DISTURBANCES, Bialystok, Poland, September 19-21, 2007, pp.8.9-1 - 8.9-4.
Abstract: The paper presents some results of numerical calculations of lightning surge currents and voltages in a telecommunication building during direct strike to the tower. The analysis concerned currents in waveguides and DC return conductors, potential differences between installations and voltages induced in cable loops. Large voltages were observed between isolated cable installations. For cables grounded at one end, the corresponding voltages were much lower.
Index terms: Lightning currents, lightning surge voltages, telecommunication centers, numerical calculations.

EMCABS: 11-05-2007

LIGHTNING SURGES AT THE PORTS OF EQUIPMENT IN LOCAL AREA NETWORKS

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Proceedings of THE 17th INTERNATIONAL CONFERENCE ON ELECTROMAGNETIC DISTURBANCES, Bialystok, Poland, September 19-21, 2007, pp.8.10-1 - 8.10-4.

Abstract: This paper presented the results of investigation, which concerned the lightning surges at the inputs/outputs ports of equipment in local area networks (LAN). In analysis the over-voltages in low-voltages nets and generic cabling systems are taken into account. Basic attention was paid on the influence of impulse magnetic fields caused by surge currents in different arrangements of wires on copper generic cabling systems.

Index terms: Generic cabling system, lightning over-voltages, local area network, surge protection.

EMCABS: 12-05-2007

DETERMINATION OF TWO LAYER EARTH STRUCTURE PARAMETERS

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Proceedings of THE 17th INTERNATIONAL CONFERENCE ON ELECTROMAGNETIC DISTURBANCES, Bialystok, Poland, September 19-21, 2007, pp.10.1-1 - 10.1-6.

Abstract: In this paper, a methodology has been proposed, according to which one can compute the parameters of the two-layer earth structure after carrying out a set of soil's resistivity measurements. On that purpose, different optimization functions have been used. These optimization functions are the relative error, the absolute error, the square error, and the L-infinity norm. By comparing the results of each optimization function, the relative error is proven to be the most suitable optimization function that gives the best fitting curve to the experimental data.

Index terms: Genetic algorithms, grounding system, soil resistivity measurements, two-layer earth structure. EMC