EMCABS

EMC Abstracts

Osamu Fujiwara, Associate Editor

Osamu Fujiwara is Chairman of the Japan Chapter of the IEEE EMC Society. He is shown welcoming members to one of the Chapter's recent meetings.

Following are abstracts of papers from previous EMC symposia, related conferences, meetings and publications.

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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: 01-02-2006

ANALYSIS AND REDUCTION OF CONDUCTED EMI FROM AN AC/DC HIGH POWER CONVERTER

Xue Wenyan and Ma Xikui
Xi'an Jiaotong University, China

IEEE 2005 International Symposium on Microwave, Antennas, Propagation and EMC Technologies for Wireless Communications Proceedings, Beijing, China, August 8-12, 2005, pp. 503-506

Abstract: This paper discusses how to reduce conducted electromagnetic interference (EMI) from an AC/DC high power converter to agree with EN Class A. Herein, some passive methods of suppressing conducted EMI noise, such as mixed-mode (MM) EMI filters and snubber circuits, are used. Based on measurement, the sources of noise are detected with the characteristics analyzed in detail. The MM EMI filter is a valuable means by which the conducted EMI noise can be efficiently reduced. A simple method of designing an EMI filter, combining theoretical calculation with practical modification, is presented. It is easily implemented with only the amplitude of the noise and sinks impedances required. The experiment results prove that the methods adopted are viable and effective.

Index terms: EMI reduction, AC/DC converter, conducted EMI.

EMCABS: 02-02-2006

EFFECT OF PINOUT ASSIGNMENT ON THE CROSSTALK IN RIBBON CABLE

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IEEE 2005 International Symposium on Microwave, Antennas, Propagation and EMC Technologies for Wireless Communications Proceedings, Beijing, China, August 8-12, 2005, pp. 527-530

Abstract: Ribbon cable, as one kind of transmission line, is mainly used for the signal transmission in and between electrical equipment of information systems. In this paper, the crosstalk in ribbon cable of different pinout assignments is discussed, based on multi-conductor transmission line theory. The simulation results give the spectral response and transient response of terminal voltage, which can show the coupling characteristic between the conductors.

Index terms: Transmission line, crosstalk, ribbon cable, pinout.

EMCABS: 03-02-2006

EXPERIMENTAL INVESTIGATIONS INTO MEASUREMENT OF AC SURFACE CURRENT

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IEEE 2005 International Symposium on Microwave, Antennas, Propagation and EMC Technologies for Wireless Communications Proceedings, Beijing, China, August 8-12, 2005, pp. 544-549
Abstract: This paper presents a method to measure AC surface current at a frequency band of 50 Hz to 200 KHz. Measures were taken to mitigate striction effects and proximity effects. Some methods to improve the test accuracy were presented. Verification results indicate the maximum error is under 2dB.
Index terms: Measurement method, power supply, AC surface current.

EMCABS: 04-02-2006

GROUND ELECTROMAGNETIC SMOG ESTIMATION FROM AIRBORNE MEASUREMENTS: AN EFFECTIVE APPROACH
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IEEE 2005 International Symposium on Microwave, Antennas, Propagation and EMC Technologies for Wireless Communications Proceedings, Beijing, China, August 8-12, 2005, pp. 550-553
Abstract: A new approach to find the electromagnetic field distribution on the ground from airplane surveys is proposed. The method exploits a temporal and spatial incoherent electromagnetic model of the radiation and an on board array antenna made of few elements. By solving a regularized ill-posed inverse problem, the technique allows the estimation of the on the ground intensity scene, taking explicitly into account the noise and the measurement errors due to the aircraft deviation from the nominal flight path and attitude of flight.
Index terms: Airplane, field distribution, inverse problem.

EMCABS: 05-02-2006

INFLUENCES OF EUT WITH DIFFERENT PROPERTIES ON THE PERFORMANCE OF A REVERBERATION CHAMBER
Zhou Xiang, Jiang Quan-xing, Wang Wen-jin
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IEEE 2005 International Symposium on Microwave, Antennas, Propagation and EMC Technologies for Wireless Communications Proceedings, Beijing, China, August 8-12, 2005, pp. 569-572
Abstract: The influences of EUTs with different properties on reverberation chamber performance are studied in detail. Different amounts of absorbers have been added to load the chamber. It is found that a suitable amount of load may increase the chamber performance but more absorbers may decrease it. The influences of metal EUT on the performance of a chamber have been studied by placing different sizes of metal enclosures in the chamber. It is found a large size metal EUT deteriorates the performance though the load is small.
Index terms: Measurement method, reverberation chamber, absorber, metal EUT.

EMCABS: 06-02-2006

MULTIBAND ARTIFICIAL MAGNETIC CONDUCTORS USING STACKED MICROSTRIP PATCH LAYERS
Koji Inafune and Eiichi Sano
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IEEE 2005 International Symposium on Microwave, Antennas, Propagation and EMC Technologies for Wireless Communications Proceedings, Beijing, China, August 8-12, 2005, pp. 590-593
Abstract: A two-dimensional microstrip patch array with a conducting via connecting the center of each patch to ground has been proposed for an artificial magnetic conductor (AMC). On the other hand, a microstrip patch array without vias has been shown to produce an AMC. This paper analyzes AMC structures with and without vias by using an effective medium model and finite difference time domain (FDTD) full-wave analysis method. The difference between the properties of these AMC structures is investigated in detail. Based on the results, we devised a multiband AMC structure having stacked microstrip patch layers. FDTD calculations and measurements were performed to demonstrate the effectiveness of the multiband AMC.
Index terms: Microstrip patch layer, artificial magnetic conductor, FDTD.

EMCABS: 07-02-2006

EFFECTS OF SPREAD SPECTRUM CLOCKING ON MEASURED NOISE SPECTRA
Yasushi Matsumoto, Katsumi Fujii, and Akira Sugiura
Tohoku University, Japan
Proceedings of EMC Europe Workshop, Roma, Italy, Sept. 19-21, 2005, pp. 9-12
Abstract: Recently, spread spectrum clocking (SSC, or clock frequency modulation (FM)) techniques have been widely used in electronic devices, such as personal computers, to reduce the spectral amplitude of clock harmonics measured in EMI tests. In this paper, simple formulae are theoretically derived with some approximations to show how amplitude reduction is related to clock FM parameters and resolution bandwidth in the spectrum measurement. The validity of the analysis is clearly demonstrated by numerical simulations and experiments. Because SSC techniques do not reduce the actual power of clock harmonics, the apparent decrease in harmonic amplitude must be carefully treated when evaluating the interference potential of radiated harmonics to wireless systems.
Index terms: Spread spectrum clocking, dithered clock, FM, spectrum measurement, electromagnetic interference.

EMCABS: 08-02-2006

FEASIBILITY OF ELECTROMAGNETIC DETECTION OF CELLULAR PHONES ABOARD AIRCRAFT
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Proceedings of EMC Europe Workshop, Roma, Italy, Sept. 19-21, 2005, pp.45-49
Abstract: The numerical prediction and experimental detection

of the electromagnetic field distribution aboard aircraft, generated by cellular phones and portable electronic devices, require the following skills: techniques for the numerical modelling of complex EM environments and in particular of real aircraft, simulation models of emitting sources in the presence of the human body, interference effects among radiating sources, design and realization of selective field sensors. This paper presents the early results of the feasibility study of an electromagnetic detection system of cellular phones aboard aircraft.
Index terms: Aircraft EM analysis, cellular phones, EM source detection.

EMCABS: 09-02-2006

INTERFERENCE BETWEEN UWB AND CONVENTIONAL SYSTEMS IN THEORY AND PRACTICE
Peter Munday and David Tee
Thales Research and Technology Limited, Reading, UK
Proceedings of EMC Europe Workshop, Roma, Italy, Sept. 19-21, 2005, pp. 110-113
Abstract: This paper presents theoretical analysis and practical measurements of interference between Ultra Wideband (UWB) systems and conventional systems like Wireless LANs and radars. It shows that conventional systems may produce spurious signals at higher levels than UWB, and that all radio systems need to be robust against interference, e.g. by error correction.
Index terms: Ultra Wideband, electromagnetic interference, wireless LANs, radar.

EMCABS: 10-02-2006

CHALLENGING RESEARCH DOMAINS IN FUTURE EMC BASIC STANDARDS FOR DIFFERENT APPLICATIONS
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Proceedings of EMC Europe Workshop, Roma, Italy, Sept. 19-21, 2005, pp. 169-174
Abstract: The EMC area was initiated due to radio interference problems. It is likely to assume that wireless issues will once again cause a strong development of the EMC area. The rapid development within multimedia and wireless systems has lead to an increased need of development activities in order to make the current EMC product standards to be relevant for these emerging technologies. The complexity of these development issues is, however, significant and includes several challenging research activities to be carried out. In this paper, examples of such research activities are presented to give an overview of future needs within some technical areas.
Index terms: EMC standard, radiated emission, APD.

EMCABS: 11-02-2006

SHIELDING OF METAL ENCLOSURE OPENING BY ANISOTROPIC HIGH-PERMEABILITY SHEET
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Proceedings of EMC Europe Workshop, Roma, Italy, Sept. 19-21, 2005, pp. 275-278
Abstract: A new method for field reduction passing through electric metal enclosure openings is proposed. An anisotropic high-permeability sheet attached inside the enclosure makes the shielding effect increase. Experimental results using a rectangular waveguide operating below its cutoff frequency are introduced as well as numerical analysis.
Index terms: Shielding, metal enclosure opening, anisotropic high-permeability, demagnetizing factor.

EMCABS: 12-02-2006

SOME CRUCIAL PROBLEMS IN LARGE-SCALE FDTD CALCULATION OF WHOLE-BODY AVERAGE SAR WITH PML ABSORBING BOUNDARIES
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Proceedings of EMC Europe Workshop, Roma, Italy, Sept. 19-21, 2005, pp. 434-437
Abstract: In examining the validity of the reference level with respect to the basic specific absorption rate (SAR) limit for radio frequency (RF) exposure, it is essential to have a high accuracy of human modeling and numerical code. In this study, we made a detailed error analysis in the whole-body average SAR calculation for the finite difference time domain (FDTD) method in conjunction with the perfectly matched layer (PML) absorbing boundaries. We derived a basic rule for the PML employment based on a dielectric sphere and the Mie theory solution. We also pointed out some possible problems in the previously reported whole-body average SAR by other researchers, and attempted to clarify to what extent the whole-body average SAR may reach at some interested frequencies using an anatomically based Japanese model.
Index terms: Whole-body average SAR, basic safety limit, reference level, FDTD method, UPML. **EMC**