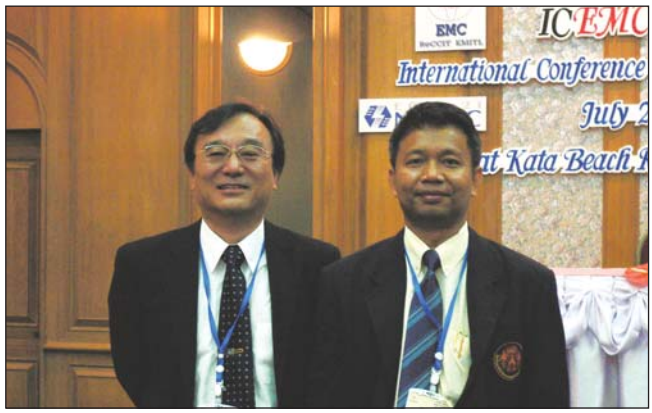

EMCABS

EMC Abstracts

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Osamu Fujiwara, EMCABS Associate Editor, is shown with Professor Werachet Khan-ngern (right) of King Mongkut's Institute of Technology Ladkrabang, Thailand, and Chairman of the 2nd International Conference on EMC, held in Phuket, Thailand.

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: 01-11-2005

DESIGN ISSUES AND A NOVEL APPROACH FOR MEASUREMENT AND ELIMINATION OF CONDUCTED EMI FOR AN INDUCTION COOKTOP

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Proceedings of 2nd International Conference on Electromagnetic Compatibility, Phuket, Thailand, July 27- 29, 2005, 1C-2 (7 pages).

Abstract: The paper describes how a low cost solution is realized to the problem of controlling the operation of a resonant inverter designed for an induction cooker. The controller permits both the control of the output power level of the cooker and assures a unity power factor sinusoidal current to be drawn from the mains side. Then attention is paid to the harmonic content of the input current and conducted EMI problem. A procedure is presented, which is used for assessing and improving EMI performance of the cooker. This procedure is applicable to all types of electronic devices. The EMI measurement in this procedure uses a digital storage oscilloscope and widely used mathematical software both of which are readily available in most laboratories. Hence, the need for using an expensive noise separator or spectrum analyzer is avoided. The procedure is applied to the induction cooker system and the design steps and test results are presented. These results are compared with measurements made by a spectrum analyzer.

Index terms: Induction cooker, conducted EMI, resonant inverter, unity power factor.

EMCABS: 02-11-2005

THE ANALYSIS OF MIXED SERIES AND PARALLEL SNUBBERS TO REDUCE CONDUCTED EMI EMISSION ON A SWITCHING CONVERTER

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Proceedings of 2nd International Conference on Electromagnetic Compatibility, Phuket, Thailand, July 27- 29, 2005, 1C-3 (4 pages).

Abstract: This paper presents the analysis of mixed series and parallel snubbers to reduce conducted EMI emission on a switching converter. How RLD, RCD, and RLD+RCD (mixed series and parallel) passive snubber circuits affect the efficiency and the conducted EMI suppression are investigated. The impacts of di/dt during turn-on period and dv/dt during turn-off period to efficiency and the conducted EMI emission are focused. The buck converter, 100 watts 50 kHz, is used for the simulation and the experiment. The measured and simulated results of conducted EMI emission are compared to verify the effectiveness of each snubber circuit.
Index terms: Conducted EMI emission, snubber circuit.

EMCABS: 03-11-2005

PREDICTING RADIATED EMISSION FROM ANTENNA-LIKE STRUCTURE USING NEURAL NETWORK

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Proceedings of 2nd International Conference on Electromagnetic Compatibility, Phuket, Thailand, July 27- 29, 2005, 2A-3 (6 pages).

Abstract: The Neural Network (NN) is applied to predict the radiated emission of an antenna-like structure using its calculated output from standard antenna models. The radiated patterns and emission from different kinds of antennas that give different radiation patterns are used for training the NN. The unknown radiation source is fed to the NN for prediction of the radiation pattern; the trained NN can predict the radiated emission pattern successfully.
Index terms: Antenna-like structure, radiated emission, neural network, prediction.

EMCABS: 04-11-2005

QUASI-STATIC APPROXIMATION TECHNIQUE FOR FDTD ANALYSIS OF V-DIPOLE ANTENNA

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Proceedings of 2nd International Conference on Electromagnetic Compatibility, Phuket, Thailand, July 27- 29, 2005, 2A-4 (6 pages).

Abstract: In this paper, a quasi-static approximation technique for improving the accuracy in the Finite Difference Time Domain (FDTD) analysis of a V-dipole antenna is proposed. The validity of the quasi-static approximation technique was confirmed for linear dipole and rectangular loop antenna analyses. For the V-dipole antenna analysis, the quasi-static field behavior is derived and incorporated into both conventional FDTD and contour-path (CP) FDTD method. The numerical simulations of a V-dipole antenna using this technique achieved higher accuracy without the need of reducing the cell size. The validity of the method is confirmed by comparison with the results of the Method of Moments.
Index terms: FDTD method, V-dipole antenna, quasi-static approximation, contour-path method.

EMCABS: 05-11-2005

BROADBAND CALIBRATION OF EMI ANTENNAS BY USING DIPOLE ANTENNAS

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Proceedings of 2nd International Conference on Electromagnetic Compatibility, Phuket, Thailand, July 27- 29, 2005, 3A-2 (5 pages).

Abstract: A broadband calibration method in the frequency range of 30 to 1000 MHz is proposed in which a broadband dipole antenna with five element lengths is used. The antenna factors of the proposed antennas are calculated by the moment method (NEC2) and also measured by the improved standard site method. Both values agree well, and are within +/- 0.4 dB in the 30-300 MHz band and within + 0.9 dB/- 0.4 dB in the 300 MHz-1 GHz band. The proposed antennas were therefore found to be very useful as the standard or reference in the calibration for continuous or arbitrary frequencies. In addition, the optimum arrangement and uncertainties of the calibration by the reference antenna method using the proposed broadband dipole antenna set were evaluated when applying the calibration method to EMI broadband anten-

nas. The extended uncertainties (k=2) for the bi-conical antenna (30-300 MHz) and log periodic dipole array antenna (300 M-1 GHz) are estimated as 0.6 - 0.7 dB and 1.2 dB, respectively.
Index terms: Antenna calibration, dipole antenna, EMI measurement, moment method, 3 antenna method.

EMCABS: 06-11-2005

CONSIDERATIONS IN FREQUENCY SPECTRA OF TRANSITION DURATION DUE TO MICRO GAP DISCHARGE USING A 6 GHZ EXPERIMENTAL SYSTEM
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Proceedings of 2nd International Conference on Electromagnetic Compatibility, Phuket, Thailand, July 27- 29, 2005, 4A-2 (5 pages).

Abstract: The frequency spectra distribution of a very fast transition duration due to small gap discharge as the low voltage ESD was investigated in the frequency domain. The measurement system was set as a very wide band experimental system. The insertion loss of the wide band experimental system with a tapered coaxial electrode was within -3dB in the frequency range below 6 GHz. As a consequence of the experiment using the system, the frequency spectra of transition duration was over about 5 GHz. Also, distributions of the frequency spectra were changed in configuration of electrodes and polarity of the discharging voltage.
Index terms: Frequency spectra, transition duration, gap discharge, ESD, distributed constant system.

EMCABS: 07-11-2005

A CIRCUIT APPROACH TO CALCULATE DISCHARGE CURRENT THROUGH HAND-HELD METAL PIECE FROM CHARGED HUMAN-BODY
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Proceedings of 2nd International Conference on Electromagnetic Compatibility, Phuket, Thailand, July 27- 29, 2005, 4A-4 (4 pages).

Abstract: For an immunity test for electrostatic discharge (ESD) being prescribed in IEC 61000-4-2, an ESD-gun is used to simulate the ESD events from a charged human body. What the gun of this kind injects onto a device under test is a transient current through a lumped resistor from a charged lumped capacitor corresponding to the skin resistance and human-body capacitance, respectively. In actual ESD events from charged human bodies, however, charges distributed on the body surface are discharged through a spark, and its situation should be quite different from that of the ESD gun. To understand the behavior of the above-mentioned discharge current, we previously measured the discharge current through a hand-held metal piece from a charged human body, and showed an equivalent circuit model to explain it from the human-body impedance and a time invariant spark resistance. In this study, we presented a method for estimating the voltage waveform of a spark from the measured discharge current, which exhibited the presence of arcs following the spark. Taking account of the arc and a time-varying resistance based on a spark resistance formula, we gave an improved circuit model to calculate the discharge current in relation to the charge voltage of a human body.
Index terms: Charged human body, electrostatic discharge, discharge current, arcs, equivalent circuit model.

EMCABS: 08-11-2005

THE LIGHTNING DISCHARGES AND PROTECTION OF THE AIRCRAFT FRONT NOSE RADOME
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Proceedings of 2nd International Conference on Electromagnetic Compatibility, Phuket, Thailand, July 27- 29, 2005, 5A-1 (5 pages).

Abstract: We introduce the mechanism of lightning discharge to the aircraft. Furthermore, we present an investigation on a suitable ratio LDS (Lightning Diverter Strip) length per antenna length for protection of the nose radome of the aircraft, model scale 1:40. From test and results, it is found that the suitable length of LDS per antenna with a ratio higher than 1 will have the capability of protecting the nose radome from the lightning strike of angle 0-180o.
Index terms: Lightning discharge, LDS lightning diverter strips, aircraft nose radome protection, antenna protection, lightning strikes.

EMCABS: 09-11-2005

INDOOR MEASUREMENT AND MODELING OF ULTRA WIDEBAND ANTENNA WITH LAPTOP COMPUTER FOR WIRELESS PERSONAL AREA NETWORK
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Proceedings of 2nd International Conference on Electromagnetic Compatibility, Phuket, Thailand, July 27- 29, 2005, 5C-2 (4 pages).

Abstract: This paper discusses the indoor measurement and modeling evaluation scheme of an ultra wideband antenna with laptop computer for wireless personal communication. Friis' transmission formula is used to analyze waveform distortion and transmission performance. The matched filter reception is considered to maximize the SNR at the receive for the evaluation. Some experimental examples are shown.
Index terms: Ultra wideband (UWB), UWB radio, Friis' transmission formula, matched filter, WPAN.

EMCABS: 10-11-2005

COMPARISON OF NEAR-FIELD AND FAR-FIELD FREE SPACE CHANNELS FOR UWB IMPULSE RADIO

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Proceedings of 2nd International Conference on Electromagnetic Compatibility, Phuket, Thailand, July 27- 29, 2005, 5C-3 (4 pages).

Abstract: Friis' transmission formula is applied in its complex form to treat UWB signals, taking into account the waveform distortion due to the frequency characteristics of the antennas [1], [2]. It is noted that Friis' transmission formula is applicable only in the far field region. In personal area network (PAN) environments, however, the distance may not satisfy the far field condition. In this paper, we discuss the experimental evaluation of the transmission properties in the Fresnel region.
Index terms: UWB-IR, UWB antennas, UWB measurements, Friis' transmission formula, three antenna method.

EMCABS: 11-11-2005

DEVELOPMENT OF HEMISPHERICAL ISOTROPY ASSESSMENT SYSTEMS FOR SAR PROBES

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Proceedings of 2nd International Conference on Electromagnetic Compatibility, Phuket, Thailand, July 27- 29, 2005, 6C-1 (4 pages).

Abstract: Two hemispherical isotropy assessment systems have been developed. Each system is recommended in the standard documents for SAR compliance tests of cellular phones, although the evaluation method and procedures are different from each other. As preliminary investigation, results of the hemispherical isotropy assessment using one system are shown in this paper. We have found that the incident angle significantly affects the uncertainty of the isotropy. We will add further investigations into the final manuscript.
Index terms: SAR, isotropy, probe, calibration, uncertainty.

EMCABS: 12-11-2005

MEASUREMENT OF COMMUNICATION PERFORMANCE DEGRADATION BY ELECTROMAGNETIC INTERFERENCE ON UBIQUITOUS EQUIPMENT

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Proceedings of 2nd International Conference on Electromagnetic Compatibility, Phuket, Thailand, July 27- 29, 2005, 6C-3 (4 pages).

Abstract: The through-put of the wireless communication was examined as an index of slight performance degradation due to electromagnetic interference among intra- and inter ubiquitous equipment. In the experiment, a fixed amount of data was sent or received using wireless LAN from victim equipment (PC) to a receiving PC and vice versa. The through-put of the data transfer was measured and this value was used for the estimation of the communication performance. When the victim equipment suffers from the external disturbance, the communication performance is reduced and the communication through-put is affected according to the strength and the input point of the disturbance, although the performance does not suffer from fatal error. From these experimental results, the communication quality can be used as the index of EM interference or immunity for the communication equipment such as the ubiquitous equipment.
Index terms: Ubiquitous equipment, wireless LAN, through-put, electromagnetic interference. **EMC**

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