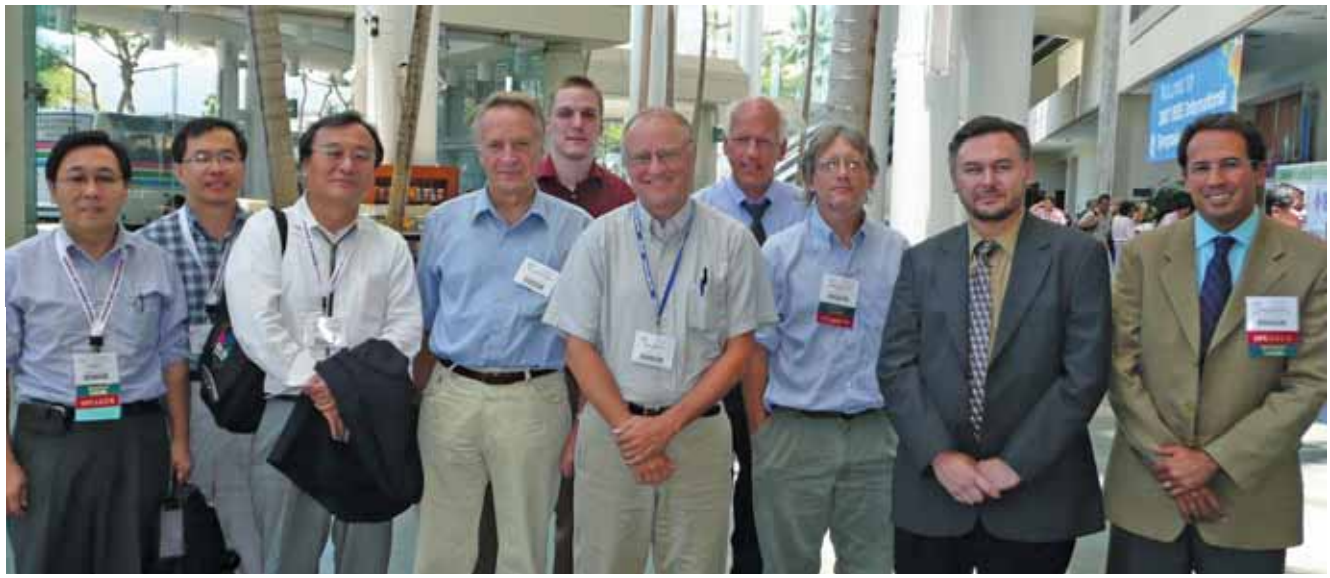
EMCABS

EMC Abstracts

Osamu Fujiwara, Associate Editor



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Osamu Fujiwara does double duty as an Associate Editor for the EMC Newsletter and for the IEEE Transactions on EMC. He's shown here with his colleagues on the Transactions on EMC editorial board at the 2007 IEEE International Symposium on EMC, including, from left, Erping Li, Joungho Kim, Osamu Fujiwara, Hermann Singer, Sven Korte (representing Heyno Garbe), Perry Wilson (editor-in-chief), Jan Luiken ter Haseborg, Chris Holloway, Vladimir Rakov, and Farhad Rachidi.

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

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"How Can I Get a Copy of an Abstracted Article?"

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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: 01-8-2007

AN EXPERIMEMTAL STUDY ON THE EFFECT OF EM-WAVE ABSORBER BY USING COMMON BUILDING MATERIALS FOR WIRELESS LAN COMMUNICATION ENVIRONMENT

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The IEICE Transactions on Communications (Japanese Edition), Vol.J88-B, No.1, 2005, pp.310-318.

Abstract: Indoor propagation by dipole antenna and transmitting measurement by commercial wireless LAN equipment are conducted for the experimental room, in order to investigate the effectiveness of setting the EM-Wave Absorber for the better wireless LAN communication environment. Comparison of a well reflected environment, replacement of one side wall with the three layers type absorber using common building material

reduces average delay profile by 50%, and makes average throughput 40% faster. So, desired results of the better wireless LAN communication environment are confirmed by setting the absorber by this work. The relationship of throughput to delay spread for the experimental room is also discussed in this paper.
Index terms: EM-wave absorber, building material, wireless LAN, throughput, delay spread.

EMCABS: 02-8-2007

CONSIDERATION ON REDUCTION METHOD OF CROSS TALK IN COMMON MODE MSLs
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The IEICE Transactions on Communications (Japanese Edition), Vol.J88-B, No.2, 2005, pp.481-484.
Abstract: How to suppress the cross talk in common-mode MSLs is one of the important problems for designing the circuit design in a PCB. Recently, in order to suppress this problem, the differential-mode MSLs have been utilized, however, comparatively wide space must be necessary for this technique. Here, we propose a new method by the FDTD simulation and experiment. In this method, by covering the thin dielectric seat on the multiple common-mode MSLs, we can obtain fairly good suppression with the same space.
Index terms: Common-mode MSL, dielectric seat, FDTD.

EMCABS: 03-8-2007

EVALUATION METHOD OF SMALL ANECHOIC CHAMBER BY SITE ATTENUATION DISTRIBUTION USING SPHERICAL DIPOLE ANTENNA
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The IEICE Transactions on Communications (Japanese Edition), Vol.J88-B, No.3, 2005, pp.656-664.
Abstract: The evaluation method by a site attenuation distribution has been investigated using a spherical dipole antenna. The calculation result of the site attenuation by the wire-grid model closely agreed with the measured one. The site attenuation distribution was calculated by the ray tracing method. The antenna factor and directivity were calculated by the wire-grid model and the reflection coefficient of the radio wave absorber was calculated by the multi-layer approximation method. The calculation result closely agreed with the measured one. The measurement example indicates that this method is effective to find a good performance area and to evaluate the influence of the absorber.
Index terms: Spherical dipole antenna, NEC2, site attenuation, ray tracing, method of moments.

EMCABS: 04-8-2007

A FUNDAMENTAL STUDY ON THE THREE LAYERS TYPE WAVE ABSORBER USING COMMON INTERIOR BUILDING MATERIAL
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The IEICE Transactions on Communications (Japanese Edition), Vol.J88-B, No.6, 2005, pp.1130-1138.
Abstract: Three layers type wave absorber by using common building materials was proposed in this paper, which can be covered by two frequency ranges of wireless LANs simultaneously for solving problems that occurred in using wireless LANs. By conducting experimental equations (relationships between water content and complex relative permittivity) and theoretical calculations, the absorber with the particular structure (thickness of first layer was thinner than that of third layer) was selected as superior performance for the variety of water content. Meanwhile, an agreement of absorption between theoretical and experiment was confirmed. Consequently, the effectiveness of the absorber and the design method proposed above were concluded.
Index terms: Wave absorber, building materials, complex relative permittivity, water content, wireless LAN.

EMCABS: 05-8-2007

PERFORMANCE ANALYSIS OF BLUETOOTH SYSTEM IN THE PRESENCE OF MICROWAVE OVEN NOISES
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The IEICE Transactions on Communications (Japanese Edition), Vol.J88-B, No.6, 2005, pp.1139-1149.
Abstract: Electromagnetic noises radiated from microwave ovens may cause serious interference with Bluetooth systems utilizing the 2.4-GHz ISM band. This paper conducts theoretical and experimental investigations into the impact of microwave oven noises on a Bluetooth system. Using a time-domain oven noise model, the bit error rate (BER) and packet error rate (PER) are theoretically calculated. The results show that inverter-type oven noises generally have a stronger influence on the PER degradation of a Bluetooth system than transformer-type oven noises. Experiments are also conducted to evaluate the PER performance. PER characteristics measured with actual oven noises are in good agreement to those with simulated oven noises based on the noise model, which demonstrates the validity of the noise model for analyzing the performance of the Bluetooth system interfered by microwave oven noises.
Index terms: EMI, ISM band, microwave oven, FH-SS, packet error rate.

EMCABS: 06-8-2007

RADIATION CHARACTERISTICS OF A TRANSMISSION LINE WITH A SIDE PLATE
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The IEICE Transactions on Communications (Japanese Edi-

tion), Vol.J88-B, No.6, 2005, pp.1150-1158.
Abstract: In this paper, a transmission line with a side plate is proposed in order to reduce the radiation from the finite transmission line with input/output terminals. Radiated power is derived analytically by integrating the radiated field of the traveling wave current on the transmission line. From this, it has been found that the line height and the side plate distance should be decreased, and the characteristic impedance and the propagation constant should be increased, in order to reduce the radiation loss. Also, experimental results are compared and examined with theoretical results, and the validity of this paper is clarified.
Index terms: Transmission line, radiation characteristics, side plate, radiation loss.

EMCABS: 07-8-2007

EMI ANALYSIS IN AUTOMOBILE AT FM RADIO BAND USING COMBINATION METHOD
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The IEICE Transactions on Communications (Japanese Edition), Vol.J88-B, No.7, 2005, pp.1319-1328.
Abstract: Electromagnetic radiation phenomena due to electronic equipment inside an automobile have been investigated using a combination method of a noise currents measurement from sources, 2-D MoM, a transmission line technique and a FDTD method. Numerical results were compared with experimental measurements using a real automobile, showing a good agreement between them. This combination method is suitable for solving electromagnetic phenomenon inside the automobile with complex arranged wires connected to an electric control unit. Finally, the combination method was applied to electromagnetic design of the antenna position where it is the least sensitive to the radiated noise from the wire harness.
Index terms: Combination method, finite difference time domain method, transmission line technique, electromagnetic interference, wire harness, electric control unit.

EMCABS: 08-8-2007

STUDY ON COINCIDENCE MEASUREMENT OF COMPLEX PERMITTIVITY AND COMPLEX PERMEABILITY BY ELLIPSOMETRY METHOD IN MILLIMETER-WAVE BAND
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The IEICE Transactions on Communications (Japanese Edition), Vol.J88-B, No.8, 2005, pp.1532-1538.
Abstract: The Ellipsometry method is one of the methods of permittivity measurement at the millimeter-wave band. This method is used for the estimation of complex relative permittivity by measuring the ratio of the reflection coefficients of TM and TE waves. One of the advantages of this method is that phase angle error due to uncertainty of sample location does not appear. In this paper, the coincidence measurement of complex permittivity and complex permeability is examined by the ellipsometry method. We propose five methods of changing the measurement condition and employed the method that is changing a condition of sample background because this method is able to decrease the measurement error as evidenced by theoretical examination. And, the validity of the employed method is checked by experimental investigations.
Index terms: Ellipsometry method, coincidence measurement, complex permittivity, complex permeability, millimeter-wave band.

EMCABS: 09-8-2007

THEORETICAL AND EXPERIMENTAL STUDY FOR THE INFLUENCE OF THE REFERENCE PLATE CURVATURE IN FREE SPACE METHOD
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The IEICE Transactions on Communications (Japanese Edition), Vol.J88-B, No.8, 2005, pp.1539-1548.
Abstract: In this paper, influences of a curvature of the reference plate that affects the measurements in free space method were studied. At first, reflection coefficients of plates were measured under many conditions. As a result, reflection coefficients were in the range from □2.5dB to +1.5 dB for 5 GHz-8 GHz, though reflection coefficients of the reference plate should be 0 dB normally. Next, height distributions of steel plates were measured. Curvatures of approximately 3 mm p-p were observed. By numerical simulation using physical optics approximation with consideration of measured curvature of steel plates, it was also observed that the reflection coefficients vary according to the orientation of the steel plate. To investigate the relation with the size of the curvature and errors, modification of the curvature of the steel plates in simulation were performed. The calculation results gave good agreement with experiments. Theoretical calculations for θ directional pattern of scattered waves were performed. The results showed good agreement with measured ones.
Index terms: Electromagnetic compatibility, wave absorber, free space method, reference plate, curvature, physical optics approximation.

EMCABS: 10-8-2007

DIGITAL IC MODEL FOR ESTIMATING NORMAL-MODE RADIATION
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The IEICE Transactions on Communications (Japanese Edition), Vol.J88-B, No.10, 2005, pp.2079-2087.

Abstract: The digital IC model for estimating normal-mode radiation was studied. The applicable frequency of the former model was up to 500 MHz. In order to predict the normal-mode radiation generated from the electric equipment by which improvement in the speed progresses, the digital IC model, which can respond to high frequency, is required. Accordingly, in consideration of the impedance of IC packages, the output impedance of digital IC was modeled when IC was switching. The calculated values of the normal-mode radiations by using this model agreed very well with the measurement results up to 1 GHz. And it was confirmed that the output resistance of our model is different from the output resistance without switching.
Index terms: Normal-mode, radiated emission, digital IC, open-circuit output voltage, output resistance.

EMCABS: 11-8-2007

TEMPERATURE DISTRIBUTION ANALYSIS OF λ/4 TYPE WAVE ABSORBER USING RESISTIVE FILM CONSIDERING AIR CONVECTION

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The IEICE Transactions on Communications (Japanese Edition), Vol.J88-B, No.11, 2005, pp.2296-2305.

Abstract: In this paper, temperature distribution in λ/4 type EM-absorber using resistive film under high electric power is obtained by analyzing the electromagnetic field with the finite-difference time-domain (FDTD) method and the heat conduction and surrounding air convection with the semi-implicit method for pressure-linked equation (SIMPLE) method. First, to confirm the validity of the SIMPLE method, the analytical results are compared to that by the profile method for convection and heat transfer, and heat transport equation (HTE) method for heat transport, which is the conventional heat transport analysis method. As a result, both calculated results agreed well and the validity of the SIMPLE method is confirmed. Next, to combine both FDTD and SIMPLE methods, the temperature distribution of the EM-absorber under high electric power was calculated. As a result, considering the influence of surrounding air convection, the higher temperature distribution moves in the upper region of the EM-absorber because of taking the local heat transfer into account. And it is confirmed that a more detailed temperature distribution of the EM-absorber can be obtained using this analytical method.
Index terms: λ/4 type wave absorber, convection, heat transfer, FDTD method, SIMPLE method.

EMCABS: 12-8-2007

CHARACTERISTIC COMPARISON OF DISCHARGE CURRENTS CAUSED BY ELECTROSTATIC DISCHARGE GUN FOR IEC IMMUNITY TESTING

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The IEICE Transactions on Communications (Japanese Edition), Vol.J88-B, No.12, 2005, pp.2401-2403.

Abstract: Peak current and rise time were observed for contact and air discharge of an ESD-gun with various charge voltages. As a result, we found that for charge voltages below 1 kV approaching the speed of the ESD gun does not really affect the discharge current, and also that the current peak and rise time become higher and shorter, respectively, in comparison with those for the contact discharge.
Index terms: ESD-gun, air discharge, discharge current waveform, peak current, rise time. EMC

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