Technical Program

:Excellent Paper Nominated
:Student Paper Nominated

Room A	June 1, Tuesday

1A1 PCB and Circuit Design for EMI Control I
10:00-11:00 Chairperson: J.L. Drewniak
(University of Missouri-Rolla, USA)
Co-chairperson: T. Harada
(NEC Corporation, Japan)

1. **A study on common-mode current on feed cable attached to PCB with different cross sectional structures**
   Y. Kayano, M. Tanaka and H. Inoue, Akita University, Japan
2. **EMI reduction method of a PCB with an I/O board**
   M. Kanda and N. Oka, Mitsubishi Electric Corp., Japan
3. **Characteristics of LCTL and radiated emission for differential type microstrip lines with partial unbalance**
   K. Fujiyoshi*, M. Shigenaga*, C. Miyazaki** and M. Tokuda*, *Musashi Institute of Technology, **Mitsubishi Electric Corporation, Japan

Room A	June 1, Tuesday

1A2 PCB and Circuit Design for EMI Control II
11:20-12:20 Chairperson: J.L. Drewniak
(University of Missouri-Rolla, USA)
Co-chairperson: T. Harada
(NEC Corporation, Japan)

1. **Novel concepts for noise mitigation in high-speed boards and packages using metallo-dielectric electromagnetic band gap material - theory, simulation, and measurements**
   O.M. Ramahi and S. Shahparnia, University of Maryland, USA
2. **Radiated emission from signal line driven by digital IC**
   C. Miyazaki*, N. Oka*, Y. Sasaki* and M. Tokuda**, *Mitsubishi Electric Corporation, **Musashi Institute of Technology, Japan
3. **Decoupling characteristic improvement by using plural MLCCs**
   T. Ikenaga, M. Shimizu and S. Kazama, TAIYO YUDEN Co., Ltd., Japan

Room A	June 1, Tuesday

1A3 PCB and Circuit Design for EMI Control III
14:00-15:40 Chairperson: B. Archambeault (IBM, USA)
Co-chairperson: N. Oka
(Mitsubishi Electric Corporation, Japan)

1. **Analysis of differential to common mode conversion characteristics of connected two PCB boards**
   Y. Shimoshio* J.L. Drewniak**, D. Pommerenke** and T. Van Doren**, *Kumamoto National College of Tech., Japan, **University of Missouri-Rolla, USA
2. **Electromagnetic emission from edge placed differential traces on printed circuit board**
   F. Xiao*, K. Murano**, M. Tayarani*** and Y. Kami*, *University of Electro-Communications, **Tokai University, Japan, ***Iran University of Science and Technology, Iran
3. **On effects of slot in PCB ground plane interconnection**
   H. Hirayama* and Y. Kami**, *Nagoya Institute of Technology, **The University of Electro-Communications, Japan
4. **Study for temperature dependability of radiation noise**
   C. Igarashi*, J. Oouchi*, S. Irokawa*, S. Kuroki** and K. Itoh***, *Tohoku Ricoh Co., Ltd., **SOKA University, ***Itoken Research Laboratory, Japan
5. **Electromagnetic interference (EMI) self-learning kits based on power electronics approach**
   W. Khan-ngern, King Mongkut's Institute of Technology Ladkrabang, Thailand

Room A	June 1, Tuesday
1A4 PCB and Circuit Design for EMI Control IV	
16:00-17:40	Chairperson: W. John (Fraunhofer Institute for Reliability and Microintegration, Germany) Co-chairperson: T. Kuriyama (NEC Corporation, Japan)

1. **Extracting R, L, G, C parameters of microstrip and striplines with dispersive substrates**
   J. Zhang, M. Koledintseva and J.L. Drewniak, University of Missouri-Rolla, USA
2. **Extracting a SPICE compatible equivalent circuit from measured S-parameter data**
   G. Selli*, A. De Luca**, S. Luan*, G. Antonini**, J.L. Drewniak*, J.L. Knighten***, J. Fan*** and A. Orlandi**, *University of Missouri-Rolla, USA, **University of L'Aquila, Italy, ***NCR Corporation, USA
3. **FDTD analysis of microstrip line under non-contact measurement using magnetic field probe**
   T. Uchida*, T. Doi* and N. Masuda**, *Ashikaga Institute of Technology, **NEC Corporation, Japan
4. **High-isolated and high-performance vertical transitions for multilayer printed circuit boards**
   T. Kushta*, K. Narita*, T. Saeki** and H. Tohya*, *NEC Corporation, **NEC Electronics, Japan
5. **Three-conductor modeling of striplines at via discontinuities**
   A.E. Engin*, W. John**, G. Sommer**, W. Mathis***, *University of Paderborn, **Fraunhofer Institute for Reliability and Microintegration, ***University of Hannover, Germany

Room B	June 1, Tuesday
1B1 Communication System EMC I	
10:00-11:00	Chairperson: Y. Matsumoto (Tohoku University, Japan)

1. **BS-to-BS interference of WCDMA and PCS 1900 (IS-95)**
   S. Malisuwan*, A. Ieamgusonkit** and V. Ungvichian***, *Chulachomklao Royal Military Academy, **Rangsit University, Thailand, ***Florida Atlantic University, USA.
2. **Numerical study on the disturbance measurements related to the performance of digital wireless communication systems**
   K. Gotoh, Y. Yamanaka and T. Shinozuka, Communications Research Laboratory, Japan
3. **An empirical 802.11b WLAN performance prediction model in a noise environment by APD**
   S.J. Lim, M.H. Hur, S.W. Kwon and Y.J. Yoon, *Yonsei University, Korea

Room B	June 1, Tuesday
1B2 Communication System EMC II	
11:20-12:20	Chairperson: Y. Yamanaka (National Institute of Information and Communications Technology, Japan)

1. **A study on issues of electromagnetic interference for 5.2-GHz-band wireless LANs**
   Y. Hiroshima, Y. Akiyama and H. Yamane, NTT Energy and Environment Systems Laboratories, Japan
2. **Radiated electromagnetic field immunity test method for wireless LAN**
   Y. Honma, M. Kitora and M. Tokuda, Musashi Institute of Technology, Japan
3. **Real-time formant analysis system for EMI discrimination**
   F. Ishiyama, K. Murakawa and H. Yamane, NTT Energy and Environment Systems Laboratories, Japan

Room B	June 1, Tuesday
1B3 Communication System EMC III	
14:00-15:00	Chairperson: H. Yamane (NTT, Japan)

1. **Uplink capacity of all-packet-service WCDMA mobile internet systems in EMI environment**
   S. Malisuwan*, A. Ieamgusonkit** and K. Rosesukon***, *Chulachomklao Royal Military Academy, **Rangsit University, ***Ericsson (Thailand) Ltd., Thailand

2. **BER analysis of bluetooth system interfered by microwave oven noises**
T. Murakami*, Y. Matsumoto*, K. Fujii*, A. Sugiura* and Y. Yamanaka**, *Tohoku University, **Communications Research Laboratory, Japan
3. **Call-blocking probability of ATM-centric ADSL system due to crosstalk and cable length effects**
S. Malisuwan*, A. Ieamgusonkit** and V. Ungvichian***, *Chulachomklao Royal Military Academy, **Rangsit University, Thailand, ***Florida Atlantic University, USA.

Room B	June 1, Tuesday

1B4 Communication System EMC IV
15:20-16:20 Chairperson: Y. Matsumoto (Tohoku University, Japan)

1. **Suppression of microwave oven interference in WLAN systems using adaptive filters**
M. Nakatsuka, Y. Matsumoto, K. Fujii and A. Sugiura, Tohoku University, Japan
2. **UWB communication signals coupling to wires**
C. Buccella, M. Feliziani and G. Manzi, University of L'Aquila, Italy
3. **Broadband characteristics design of semi-circle type bow-tie antenna with hole slots using FDTD analysis**
I. Murata*, Y. Miyazaki** and N. Goto*, *Toyohashi University of Technology, **Aichi University of Technology, Japan

Room C	June 1, Tuesday

1C1 EMC Test Facilities I
10:00-11:00 Chairperson: F. Amemiya (NTT, Japan)

1. **PW (Parallel Wired) cell using pyramid ferrite absorber as a microwave absorber**
Y. Tanaka*, M. Tokuda* and K. Shimada**, *Musashi Institute of Technology, **Riken Eletech Corporation, Japan
2. **The measurement result of E-field distribution in a TEM cell using optical E-field sensor**
S. Enomoto, S. Torihata, J. Ichijoh and R. Osawa, NEC TOKIN Corporation, Japan
3. **Four-septum TEM cell for immunity/susceptibility test by rotating EM fields**
Y. Suganuma*, F. Xiao*, K. Murano**, M. Tayarani*** and Y. Kami*, *The University of Electro-Communications, **Tokai University, Japan, ***Iran University of Science and Technology, Iran

Room C	June 1, Tuesday

1C2 EMC Test Facilities II
11:20-12:20 Chairperson: K. Komiyama (National Institute of Advanced Industrial Science and Technology, Japan)

1. **Field uniformity characteristics of a reverberation chamber with dispositions of diffuser sets**
E. Rhee and J. G. Rhee, Hanyang University, Korea
2. **EMC engineer training**
K. Williams, Underwriters Laboratories Inc., USA
3. **Experimental evaluation of the validation method using broadband antenna for radiated emission test site**
K. Osabe*, T. Yamanaka** and J. Kawano***, *Panasonic Mobile Communications Co., Ltd., **Akzo Nobel K. K., ***Voluntary Control Council for Interference by Information Technology Equipment, Japan

Room C	June 1, Tuesday

1C3 EMC Test Facilities III
14:00-14:40 Chairperson: N. Shibuya (Takushoku University, Japan)

1. **Prediction of electric field strength at 10m distance using emission source finding method**
N. Aoki*, M. Kawabata**, Y. Ishida*** and N. Kuwabara*, *Kyushu Institute of Technology, **Fukuoka Industrial Technology Center, ***ADOX Fukuoka, Japan
2. **A study on ISN for measuring conductive disturbance at communication port**
H. Yamane*1, A. Konemori*2 T. Matsumoto*3, T. Komatsuzaki*4, K. Sanno*5, S. Matsuda*6, M. Fukuda*7, M. Hirato*8, Y. Hiratsuka*9, M. Denda*10, H. Muramatsu*11, I. Minematsu*12, J. Kawano*13, Y. Mogi*14 and Y. Hiroshima*1, *1NTT, *2Mitsubishi Electric, *3Fuji Xerox, *4Panasonic Mobile communications, *5Canon, *6AKZO NOBEL, *7NEC Engineering, *8Gloval Techno Management Lab., *9FUJITSU, *10VLAC, *11NEC Access Technica, *12KEC, *13VCCI, *14Kyoritsu, Japan

Room C	June 1, Tuesday

1C4 Near-Field Probe and Sensor I
15:00-16:00 Chairperson: R.E. DuBroff (University of Missouri-Rolla, USA)
Co-chairperson: N. Kuwabara (Kyushu Institute of Technology, Japan)

1. **The high sensitive three dimensional optical E-field sensor for time domain measurements**
S. Torihata, Y. Toba, S. Enomoto, M. Sato, J. Ichijoh and R. Osawa, NEC TOKIN Corporation, Japan

2. **Invasiveness of optical magnetic field probes with a loop antenna element**
S. Arakawa*, E. Suzuki*, H. Ota*, K. Arai*,** and R. Sato*, *Sendai EMC Research Center, **Tohoku University, Japan
3. **Double loaded EO magnetic field probe working above 10 GHz**
E. Suzuki*, S. Arakawa*, H. Ota*, K. Arai*,** and R. Sato*, *Sendai EMC Research Center, **Tohoku University, Japan

Room C	June 1, Tuesday

1C5 Near-Field Probe and Sensor II
16:20-17:20 Chairperson: R.E. DuBroff
(University of Missouri-Rolla, USA)
Co-chairperson: N. Kuwabara
(Kyushu Institute of Technology, Japan)

1. **Measurement of electric near field distribution by optical electric field probe**
X. Li,*, H. Ota*, S. Arakawa*, K. Arai** and R. Sato*, *Sendai EMC Research Center, **Tohoku University, Japan
2. **Estimation of current distribution on antennas by near-field measurement**
M. Teramoto, M. Hangai, Q. Chen and K. Sawaya, Tohoku University, Japan
3. **Frequency domain compensation of probe induced disturbances in near field measurements**
J. Shi*, R.E. DuBroff*, M. Yamaguchi,** and K. Slattery***, *University of Missouri-Rolla, U.S.A., **Tohoku University, Japan, *** Intel Corporation, U.S.A.

Room D	June 1, Tuesday

1D1 Organized Session: JSPS Research for the Future Program -Reduction of Electromagnetic Noise Levels-
10:00-15:40 Organizer: Y. Nemoto
(Tohoku University, Japan)
10:00-11:00 Chairperson: Y. Nemoto
(Tohoku University, Japan)
11:20-12:00 Chairperson: A. Sugiura
(Tohoku University, Japan)
14:00-14:40 Chairperson: M. Shoyama
(Kyushu University, Japan)
15:00-15:40 Chairperson: Y. Kami
(The University of Electro-Communications, Japan)

1. **Radiation characteristics of a transmission line with a side plate**
T. Nakamura*, N. Takase* and R. Sato**, *Gifu University, **Sendai EMC Research Center, Japan

2. **The influence of the dielectric thickness upon transmission/radiation characteristics of MSL with a bend**
H. Endo H. Shoji and T. Shiokawa, Tohoku Gakuin University, Japan
3. **Radiation from a parallel-two-wire line covered with dielectric tube**
Y. Kuboyama* and R. Sato**, *Ashikaga Institute of Technology, **Tohoku University, Japan
4. **Radiated immunity/susceptibility test method using slowly rotating electromagnetic wave**
Y. Kami* F. Xiao*, K. Murano** and M. Tayarani***, *The University of Electro-Communications, **Tokai University, Japan, ***Iran University of Science and Technology, Iran
5. **The complex antenna factor and waveform reconstruction**
T. Iwasaki and L. Hamada, The University of Electro-Communications, Japan
6. **New technologies of harmonic suppression control in power system**
N. Matsui*, A. Kawamura**, T. Ohnishi***, T. Takeshita*, H. Ukai*, M. Saito*, K. Ohnishi**** and K. Nakamura*, *Nagoya Institute of Technology, **Yokohama National University, ***Tokushima University, ****Keio University, Japan
7. **Common-mode noise reduction techniques for switched-mode power converters**
T. Ninomiya*, M. Shoyama*, N. Mutoh** and H. Hayakawa***, *Kyushu University, **Tokyo Metropolitan Institute of Technology, ***Japan Aerospace Exploration Agency, Japan
8. **Control of unintentional electromagnetic waves from digital circuits: efficient EMC modeling of devices and PCBs**
R. Koga*, O. Wada*, Y. Toyota*, K. Fujimori*, T. Miyashita*, N. Kagawa**, T. Watanabe***, Z.L. Wang* and A. Namba*, *Okayama University, **Fukuyama University, ***Industrial Technology Center of Okayama Prefecture, Japan
9. **Quantitative evaluation of common-mode radiation from a PCB based on imbalance difference model**
T. Watanabe*, O. Wada**, A. Namba**, K. Fujimori**, S. Matsunaga** and R. Koga**, *Industrial Technology Center of Okayama Prefecture, **Okayama University, Japan

Room D	June 1, Tuesday

1D2 Transmission Lines and Field Coupling
16:00-17:20 Chairperson: Y. Kami
(The University of Electro-Communications, Japan)

1. **Radiation from elbow-shaped transmission line**
T. Yamada*, K. Murano**, F. Xiao*, Y. Kami* and J.L. Drewniak***, * The University of Electro-Communications, **Tokai University, Japan, ***University of Missouri-Rolla, USA
2. **Experimental studies on the electromagnetic fields around a two-wire parallel line**
H. Echigo and K. Sato, Tohoku Gakuin University, Japan

3. **A new method of field to two-wire transmission line coupling calculation**
   T. Liu and G. Li, Tsinghua University, China
4. **Evaluation of the coupling between the electromagnetic field and a printed circuit board trace in a metallic enclosure**
   G. Mu, Q. Wang and C. Shi, Tsinghua University, China

Room A	June 2, Wednesday

2A1 PCB and Circuit Design for EMI Control V
09:20-10:40 Chairperson: T.H. Hubing
(University of Missouri-Rolla, USA)
Co-chairperson: H. Inoue
(Akita University, Japan)

1. **Common-mode current due to trace and slit in ground plane and effect of guard band**
   M. Tanaka*, Y. Kayano*, J.L. Drewniak** and H. Inoue*, *Akita University, Japan, **University of Missouri-Rolla, USA
2. **Reduction of EMI from high-speed transmission line with narrow return trace using quasi-differential signaling**
   A. Namba*, M. Nishihara*, T. Watanabe**, Y. Toyota*, O. Wada* and R. Koga*, *Okayama University, **Industrial Technology Center of Okayama Prefecture, Japan
3. **Analysis of power/ground-reference planes for EMC & functionality**
   B. Archambeault and S. Connor, IBM, USA
4. **A consideration on far-field emission due to the ground bounce of practical CMOS-IC mounted PCB**
   K. Sasabe*, J. Wang** and O. Fujiwara**, *Matsushita Electric Works, Ltd, **Nagoya Institute of Technology, Japan

Room A	June 2, Wednesday

2A2 PCB and Circuit Design for EMI Control VI
11:00-12:20 Chairperson: T.H. Hubing
(University of Missouri-Rolla, USA)
Co-chairperson: H. Inoue
(Akita University, Japan)

1. **Using cavity-modes for modeling of via-connected power bus stacks in multilayer PCBs**
   Z.L. Wang*, O. Wada*, T. Yaguchi**, T. Miyashita*, Y. Toyota* and R. Koga*, Okayama University, **NEC Informatec Systems, Ltd, Japan
2. **Investigation of capacitor allocation to reduce EMI arising from a via-hole penetrating through power-distribution planes**
   T. Harada*, N. Kobayashi*, T. Yaguchi**, A. Wakui** and S. Eya**, *NEC Corporation, **NEC Informatec Systems, Japan

3. **Experimental evaluation of a low EMI multilayer PCB structure for high speed digital circuit**
   D. Iguchi, K. Ikeda and K. Araki, Fuji Xerox Co., Ltd., Japan
4. **A generation mechanism of electromagnetic noise on the circuit due to ground potential variation**
   A. Mutoh* and S. Nitta**, *Tokyo Fuji University, **Salesian Polytechnic, Japan

Room A	June 2, Wednesday

2A3 Chip and Package Level EMC I
14:00-15:00 Chairperson: A. van Deursen
(Technische Universiteit Eindhoven, The Netherlands)
Co-chairperson: R. Koga
(Okayama University, Japan)

1. **Prediction of EMI-induced distortion phenomena in CMOS opamps by a new large-signal model**
   F. Fiori and P.S. Crovetti, Politecnico di Torino, Italy
2. **Influence of technological constrains of HDI organic substrates on RF characteristics of embedded inductor component**
   G. Sommer, W. John and H. Reichl, FhG IZM, Germany
3. **Reduction properties of radiated harmonics for core and output circuits by on-chip decoupling capacitor**
   T. Sudo, J. Kudo, and K. Nakano, Association of Super-advanced Electronics Technologies (ASET), Japan

Room A	June 2, Wednesday

2A4 Chip and Package Level EMC II
15:20-16:20 Chairperson: A. van Deursen
(Technische Universiteit Eindhoven, The Netherlands)
Co-chairperson: R. Koga
(Okayama University, Japan)

1. **Modeling concept for susceptibility behavior in sensor microsystems**
   U. Sturmer*, W. John** and H. Reichl**, *FhG IZM/University of Paderborn, **Fraunhofer Institute for Reliability and Microintegration, Germany
2. **Abstract modeling of signal behaviour in interconnected integrated circuits based on black box approach and model order reduction**
   G. Lubkowski*, R. Piesiewicz* and W. John**, *FhG IZM/University of Paderborn, **Fraunhofer Institute for Reliability and Microintegration, Germany
3. **Modeling and simulation of conducted emission for VLSI ICs**
   M. Schmidt*, H. Kohne*, T. Steinecke**, W. John* and H. Reichl*, *Fraunhofer Institute for Reliability and Mikrointegration, **Infineon Technologies AG, Germany

Room A	June 2, Wednesday

2A5 Transmission Line and Crosstalk
16:40-17:40 Chairperson: T. Shiokawa
(Tohoku Gakuin University, Japan)

1. **Analysis of crosstalk between multiconductor transmission lines in arbitrary directions using a circuit-concept approach**
   S.W. Park, J.C. Ju, D.C. Park, Chungnam National University, Korea
2. **Long-line effects for multi-conductor lines embedded in an inhomogeneous medium**
   O. Makino, F. Xiao and Y. Kami, The University of Electro-Communications, Japan
3. **On the characterization and measurement of induced crosstalk in microstrip lines: A two line, 50 ohm, 1m case of study**
   V. Gonzalez, J. Martos, E. Sanchis, J. Soret, G. Torralba, J. Torres and A. Valero, University of Valencia, Spain

Room B	June 2, Wednesday

2B1 Organized Session: EMC Shields and Absorbers: Emerging Technologies
09:20-11:00 Organizer: Y. Kotsuka (Tokai University, Japan)
Chairperson: C. Christopoulos
(University of Nottingham, UK)
Co-chairperson: Y. Kotsuka
(Tokai University, Japan)

1. **Frequency selective shielding screen by the use of artificial media**
   T. Iwai* and K. Hatakeyama**, *Sumitomo Electric Industries Inc., **Himeji Institute of Technology, Japan
2. **Modelling techniques for the calculation of the shielding effectiveness of equipment cabinets**
   C. Christopoulos, J. D. Paul and V. Podlozny, University of Nottingham, UK
3. **Development of ingredients for electromagnetic wave absorbing pavement**
   T. Kunishima*, A. Saito** and T. Aoyagi***, *Takenaka Road Construction Co. Ltd., **Daido Steel Co. Ltd., ***Tokyo Institute of Technology, Japan
4. **A new EM-wave absorber using functional electro-magnetic cell material**
   Y. Kotsuka and M. Amano, Tokai University, Japan
5. **Development of a thin, wave-absorbing glass using divided conductive films**
   K. Yamanaka*, K. Harakawa*, M. Masakage**, M. Togashi*** and Y. Hashimoto****, *TAKENAKA Corporation, **Nippon Sheet Glass Co., Ltd., ***Nippon Sheet Glass Environment Amenity Co., Ltd., ****TDK Corporation, Japan

Room B	June 2, Wednesday

2B2 EM Absorber I
11:20-12:20 Chairperson: A.E. Sowa
(Wroclaw University of Technology, Poland)
Co-chairperson: O. Hashimoto
(Aoyama Gakuin University, Japan)

1. **GHz conducted noise suppressors using NiZn ferrite films plated at 90℃ directly onto printed circuit boards**
   K. Kondo*, T. Chiba*, H. Ono*, S. Yoshida*, Y. Shimada**, N. Matsushita*** and M. Abe***, *NEC Tokin Corporation, **Tohoku University, ***Tokyo Institute of Technology, Japan
2. **Development of composite Sr ferrite EM wave absorbers for GHz frequency**
   J.M. Song, S.J. Shin, S.H. Moon, Y. Yun and D.I. Kim, Korea Maritime University, Korea
3. **The use of new composite absorbing materials in the construction of grid absorbers**
   A.A. Vogt*, H.A. Kolodziej* and A.E. Sowa**, *University of Wroclaw, **Wroclaw University of Technology, Poland

Room B	June 2, Wednesday

2B3 EM Absorber II
14:00-15:00 Chairperson: A.E. Sowa
(Wroclaw University of Technology, Poland)
Co-chairperson: O. Hashimoto
(Aoyama Gakuin University, Japan)

1. **A method for measuring reflection distribution of the electromagnetic wave absorber by scalar inverse scattering**
   A. Kohmura*, T. Hasegawa** and T. Iwasaki*, *The University of Electro-Communications, **National Traffic Safety and Environment Laboratory, Japan
2. **Study on effectiveness of wave absorbers for 5.8 GHz DSRC applications on express highway**
   R.K. Pokharel*, M. Toyota** and O. Hashimoto*, *Aoyama Gakuin University, **Japan Highway Public Corporation, Japan
3. **Influence of a reference plate in evaluation of an electromagnetic wave absorber by free space method**
   T. Aoyagi*, A. Saito** and A. Nishikata*, *Tokyo Institute of Technology, **Daido Steel Co. Ltd., Japan
4. **Electromagnetic shielding characteristics by conducting elliptic cylinder coated with lossy absorber of complex permeability**
   Y. Miyazaki*, T. Masuda** and N. Goto***, *Aichi University of Technology, **Synclayer Inc., ***Toyohashi University of Technology, Japan

5. **RF integrated noise suppressor on CPW using ferromagnetic resonance and eddy current loss**
K.H. Kim*, S. Ohnuma** and M. Yamaguchi*, *Tohoku Univerisity, **The Research Institute for Electric and Magnetic Materials, Japan

Room B	June 2, Wednesday

2B4 Organized Session: EMI & EMC Relating to Interactions between Electric Medical Device and Radios
16:00-17:00 Organizer: T. Nojima (Hokkaido University, Japan)
Chairperson: T. Nojima (Hokkaido University, Japan)

1. **The test phantom for implantable medical device to estimate the impact from RF EMF**
K.Ohshita*, Y. Tarusawa*, S. Uebayashi* and T. Nojima**, *NTT DoCoMo, Inc., **Hokkaido University, Japan
2. **Medical electronic equipment safety in hospital environments with wireless communication systems**
E. Hanada* and T. Kudou**, *Shimane University Hospital, **Oita University, Japan
3. **Electromagnetic interference in implantable cardiac pacemaker and cardioverter defibrillator**
T. Toyoshima, Medtronic Japan

Room C	June 2, Wednesday

2C1 Organized Session: EMI Antenna and Measurement I
09:40-10:40 Organizer: A. Sugiura (Tohoku University, Japan)
Chairperson: M. Stecher (Rohde & Schwarz, Germany)

1. **Broadband calculable dipole antenna 25 MHz to 2.2 GHz**
M. Alexander, B. Loader and M. Salter, National Physical Laboratory, UK
2. **Calibration and application of wideband hybrid antennas**
M. Stecher and B. Klos, Rohde & Schwarz, Germany
3. **Calibration of EMI antennas in the VHF band with antenna impedance measurements**
K. Fujii*, S. Kaketa*, A. Sugiura*, Y. Matsumoto* and Y. Yamanaka**, *Tohoku University, **Communication Research Laboratory, Japan

Room C	June 2, Wednesday

2C2 Organized Session: EMI Antenna and Measurement II
11:00-12:00 Organizer: A. Sugiura (Tohoku University, Japan)
Chairperson: M. Alexander (National Physical Laboratory, UK)

1. **On de-embedding antenna baluns from site attenuation measurements**
Z. Chen, ETS-Lindgren, USA
2. **Calculation of the measurement uncertainty for the field strength measurement system Field Nose**
A. Kriz, W. Mullner and H. Garn, ARC Seibersdorf Research GmbH, Austria
3. **Development and traceability of metrological standards on radio frequency and EM field in NMIJ**
K. Komiyama, National Institute of Advanced Industrial Science and Technology, Japan

Room C	June 2, Wednesday

2C3 EM Source Location Estimation
14:00-15:40 Chairperson: Z. Chen (ETS-Lindgren, USA)
Co-chairperson: T. Iwasaki (The University of Electro-Communications, Japan)

1. **Estimation of multiple coherent source locations using signal subspace fitting technique combined with SPM method**
Y. Yoshimoto*, K.Taira*, K. Sawaya*,** and R. Sato*, *Sendai EMC Research Center, **Tohoku University, Japan
2. **Estimation of short range multiple coherent source locations by using MUSIC algorithm**
T. Kato*, K. Taira*, K. Sawaya***, R. Sato*, *Sendai EMC Research Center, **Tohoku University, Japan
3. **Estimation of source location of leakage field from transformer-type microwave oven**
K. Taira*, T. Kato*, K. Sawaya*,**, and R. Sato*, *Sendai EMC Research Center, **Tohoku University, Japan
4. **Localization and visualization of low-frequency electromagnetic sources**
K. Ishibana*, S. Yagitani*, I. Nagano*, M.Kawauchi*, Y. Yoshimura**, H. Hayakawa*** and K. Tsuruda***, *Kanazawa University, **Industrial Research Institute of Ishikawa, ***Japan Aerospace Exploration Agency, Japan
5. **Estimation of EM source location in urban area by using ray-tracing method and MUSIC algorithm**
T. Nogami, Q. Chen and K. Sawaya, Tohoku University, Japan

Room C	June 2, Wednesday

2C4 Field Measurement
16:00-17:40 Chairperson: W. Mullner
(ARC Seibersdorf Research GmbH, Austria)
Co-chairperson: T. Shinozuka(National Institute of Information and Communications Technology, Japan)

1. **Antenna near-field measurement with an optical RF field sensor**
   W. Liang*, W.-J. Tseng, W.-T. Shay and M.S. Huang, Industrial Technology Research Institute, Taiwan
2. **Numerical and experimental near field distributions in high-frequency planar circuits**
   T. Hiraoka*, Y. Neishi*, T. Anada*, M. Honjoh**, F. Eriguchi** and C. Christopoulos***, *Kanagawa University, **Nitto Electric Ltd., Japan, ***Nottingham University, UK
3. **Magnetic near-field distribution measurements above a patch antenna using an optical waveguide probe**
   M. Takahashi*, H. Ota*, K. Arai*,** and R. Sato*, *Sendai EMC Research Center, **Tohoku University, Japan
4. **Measuring the impact of in-vehicle-generated EMI on VHF radio reception in an unshielded environment**
   K. Chamberlin and M. Khankin, University of New Hampshire, USA
5. **Reconstruction of electric-field waveform radiated from UWB device by using the complex antenna factor**
   S. Ishigami and Y. Yamanaka, Communications Research Laboratory, Japan

Room D	June 2, Wednesday

2D1 Organized Session: ESD Measurement and Modeling
09:20-10:40 Organizer: O. Fujiwara
(Nagoya Institute of Technology, Japan)
Chairperson: O. Fujiwara
(Nagoya Institute of Technology, Japan)

1. **Characteristic measurement of transient current injected by air discharge of an ESD-gun**
   I. Mori*, O. Fujiwara*, S. Ishigami** and Y. Yamanaka**, *Nagoya Institute of Technology, **Communications Research Laboratory, Japan
2. **Uncertainty estimation by calibration of ESD simulators**
   J. Sroka, Schaffner EMC Ltd, Switzerland
3. **A model of electrostatic discharge as electromagnetic radiation source**
   L. Hamada, T. Sugiyama and T. Iwasaki, The University of Electro-Communications, Japan
4. **Characterization of fields radiated from structures excited by ESD using passive sensors**
   G. Cerri, R. De Leo, S. Pennesi, V. M. Primiani and P. Russo, Universita Politecnica delle Marche, Italy

Room D	June 2, Wednesday

2D2 ESD and Transient
11:00-12:20 Chairperson: J. Sroka
(Schaffner EMC Ltd, Switzerland)
Co-chairperson: S. Minegishi
(Tohoku Gakuin University, Japan)

1. **FDTD simulation of electromagnetic fields due to spark between charged metal bars with ferrite core attachment**
   S. Taira and O. Fujiwara, Nagoya Institute of Technology, Japan
2. **Reproducibility of the destruction effects in integrated circuits**
   M. Camp and H. Garbe, University of Hannover, Germany
3. **6GHz time domain measurement of transition duration due to small gap discharge as ESD**
   K. Kawamata*, S. Minegishi** and A. Haga**, *Hachinohe Institute of Technology, **Tohoku Gakuin University, Japan
4. **A new technique for increasing efficiency of cyclonic dust trap using electrostatic field**
   P. Kotchapoom*, W. Tasnangkura**, P. Kerdonfag**, S. Potivejkul*, W. Khan-ngern*, *King Mongkut's Institute of Technology Ladkrabang, **Mahanakorn University of Technology, Thailand

Room D	June 2, Wednesday

2D3 Organized Session: EMC of Railways Systems I
14:00-15:20 Organizer: S.A. Pignari (Polytechnic of Milan, Italy) and A. Gaggelli (Trenitalia S.p.A., Italy)
Chairperson: S.A. Pignari
(Polytechnic of Milan, Italy)
Co-chairperson: A. Gaggelli
(Trenitalia S.p.A., Italy)

1. **Prediction and mitigation of low frequency magnetic fields caused by electrified railway lines**
   D. Wurgler, ENOTRAC AG, Switzerland
2. **Overview of the introduction of a new traction power supply system in the Netherlands**
   G.-J. van Alphen, E. Smulders and M. Janssen, Holland Railconsult, The Netherlands
3. **Magnetic field measurement method for railway**
   T. Mizuma, National Traffic Safety and Environment Laboratory, Japan

4. **Some activities on EMC of railway in Japan**
   T. Watanabe and I. Watanabe, Railway Technical Research Institute, Japan

Room D	June 2, Wednesday
2D4	**Organized Session: EMC of Railways Systems II**
15:40-17:00	Organizer: S.A. Pignari (Polytechnic of Milan, Italy) and A. Gaggelli (Trenitalia S.p.A., Italy) Chairperson: S.A. Pignari (Polytechnic of Milan, Italy) Co-chairperson: A. Gaggelli (Trenitalia S.p.A., Italy)

1. **Experimental analysis of a uniform multi-conductor line above soil for modeling a railway line**
   A. Cozza*,**,*** F. Canavero*, B. Demoulin**, J.M. Bodson***, V. Sabate****, J.M. Vanzemberg*****, *Politecnico di Torino, Italy, **Universite des Sciences et Technologies de Lille, ***Alstom Transport, ****Consultant CEM for Alstom Transport, *****Centre d'Essai Ferroviaire, France
2. **Characterization of AT railway traction power supply, measurement system and results**
   A.P.J. van Deursen* , H.W.M. Smulders**, R.A.A. de Graaff***, J.B.M. van Waes**, *Technische Universiteit Eindhoven, **Holland Railconsult, ***Kema, Arnhem, The Netherlands
3. **Test activity to assess EMC between Italian 25 kV - 50 Hz and 3 kV DC lines**
   P. Betti, D. Carillo, P. Masini and E. Mingozzi, Trenitalia S.p.A., Italy
4. **Statistical characterization of rolling stock magnetic field emissions**
   D. Bellan*, A. Gaggelli** and S.A. Pignari*, *Polytechnic of Milan, **Trenitalia S.p.A., Italy

Room A	June 3, Thursday
3A1	**Organized Session: EMC Modeling of Semiconductor Devices**
09:20-11:00	Organizer: O. Wada (Okayama University, Japan) Chairperson: O. Wada (Okayama University, Japan)

1. **Microelectronic EMC system design for high density interconnect and high frequency environment**
   W. John, Fraunhofer Institute for Reliability and Micro-integration, Germany

2. **Three-wire analysis model to predict SI and EMC effects**
   E. Engin*, M. Coenen**, H. Koehne*, G. Sommer* and W. John*, *Fraunhofer Institute for Reliability and Microintegration, Germany, **Philips Digital Systems Laboratories Eindhoven, The Netherlands
3. **Radiation mechanisms for semiconductor devices and packages**
   T. Hubing, D. Beetner, S. Deng and X. Dong, University of Missouri-Rolla, USA
4. **EMC macro-model (LECCS-core) for multiple power-supply pin LSI**
   K. Nakamura*,**, T. Toyota**, O. Wada**, R. Koga** and N. Kagawa***, *Denso Corporation, ** Okayama University, ***Fukuyama University, Japan
5. **EMC macro-model with I/O (LECCS-I/O) for multi-bit drives**
   H. Osaka*,**, D. Tanaka**, O. Wada** and R. Koga**, *Hitachi Ltd., **Okayama University, Japan

Room A	June 3, Thursday
3A2	**Organized Session: Interconnect Modeling and Simulation I**
11:20-12:20	Organizer: F. Canavero (Politecnico di Torino, Italy) Chairperson: F. Canavero (Politecnico di Torino, Italy)

1. **Electromagnetic interference among cables and interconnections: approximations through hierarchical graphs**
   P. Besnier, Institute for Electronics and Telecommunications of Rennes (IETR), France
2. **Balanced TLM and coupling model for analysis of power/ground resonance, noise coupling, and edge radiation**
   J. S. Pak*, J. Park*, H. Kim*, H. Lee**, C.-S. Choi** and J. Kim, *KAIST, **Samsung Electronics, Korea
3. **Model order reduction techniques for simulation of electromagnetic systems with RLC circuits**
   T. Watanabe* and H. Asai**, *University of Shizuoka, **Shizuoka University, Japan

Room A	June 3, Thursday

3A3 Organized Session: Interconnect Modeling and Simulation II

14:00-15:40 Organizer: F. Canavero (Politecnico di Torino, Italy)
Chairperson: F. Canavero (Politecnico di Torino, Italy)
Co-chairperson: J. Kim (KAIST, Korea)

1. **The use of network-parameter-based identification techniques for reduced order EMC modeling**
   R. Neumayer*, A. Stelzer*, W. Eurskens** and R. Weigel***, *JK University Linz, Austria, **Infineon Technologies AG, ***Friedrich-Alexander University, Germany
2. **Coupling of open and shielded tracks on printed circuit boards**
   A. P.J. van Deursen and S. Kapora, Eindhoven University of Technology, The Netherlands
3. **Macromodeling of lossy and dispersive multiconductor transmission lines**
   F. Canavero and S. Grivet-Talocia, Politecnico di Torino, Italy
4. **A frequency-dependent transmission-line simulator using S-parameters**
   J. E.. Schutt-Aine, University of Illinois at Urbana-Champaign, USA
5. **Modeling techniques for the accurate simulation of interconnects**
   C. Christopoulos, P. Sewell and Y. K. Choong, University of Nottingham, UK

Room A	June 3, Thursday

3A4 Organized Session: Interconnect Modeling and Simulation III

16:00-17:20 Organizer: F. Canavero (Politecnico di Torino, Italy)
Chairperson: F. Canavero (Politecnico di Torino, Italy)
Co-chairperson: H. Asai (Shizuoka University, Japan)

1. **A comparison between radiation and ohmic losses in highly-conducting interconnects for high-speed applications**
   A. Maffucci*, G. Miano** and F. Villone*, *Universita di Cassino, **Universita di Napoli Federico II, Italy
2. **Transient analysis of differential interconnects by SPICE-like circuits accounting for frequency-dependent losses,**
   R. Araneo, S. Celozzi and F. Maradei, University of Rome "La Sapienza", Italy
3. **RF EM susceptibility analysis of high-speed circuits using MOM combining with circuit-based method,**
   W. Yuan and E. Li, Institute of High Performance Computing, Singapore
4. **Distributed modeling of on-chip power distribution networks using conformal mapping and FDTD method**
   J. Mao*, M. Swaminathan* and J. Libous**, *Georgia Institute of Technology, **IBM, USA

Room B	June 3, Thursday

3B1 Organized Session: Interaction of RF Energy with Humans and Medical Devices I

09:20-10:20 Organizer: O. Fujiwara (Nagoya Institute of Technology, Japan)
Chairperson: Y.M. Gimm (Dankook University, Korea)
Co-chairperson: J. Wang (Nagoya Institute of Technology, Japan)

1. **The process of evaluation of potential human health effects from radio frequency (RF) energy exposure**
   J. Morrissey and M. Swicord, Motorola Labs, USA
2. **Expected exposures and safety concerns from pervasive computing**
   N. Kuster and J. Frohlich, IT'IS Foundation and ETH Zurich, Switzerland
3. **Uncertainties of SAR-probe calibration and of SAR measurement for compliance tests of cellular phones**
   S. Watanabe*, Y. Miyota**, M. Takabe**, H. Asou**, Y. Ishii**, K. Satoh**, K. Fukunaga*, A. Suzuki*, I. Sugiyama*, I. Nishiyama*, T. Shinozuka* and Y. Yamanaka*, *Communications Research Laboratory, **NTT Advanced Technology Corporation, Japan

Room B	June 3, Thursday

3B2 Organized Session: Interaction of RF Energy with Humans and Medical Devices II

10:40-11:40 Organizer: O. Fujiwara (Nagoya Institute of Technology, Japan)
Chairperson: Y.M. Gimm (Dankook University, Korea)
Co-chairperson: J. Wang (Nagoya Institute of Technology, Japan)

1. **General method of formulating the human tissue simulant liquid for SAR measurement,**
   Y.M. Gimm, Dankook University, Korea
2. **A study on implantable cardiac pacemaker EMI from cellular radios in semi-echoic environments - FDTD analysis and experiments in actual train carriage,**
   T. Hikage*, T. Nojima*, S. Watanabe** and T. Shinozuka**, *Hokkaido University, **Communications Research Laboratory, Japan

3. **Microwave antenna for minimally invasive thermal therapy**
A. S. Mohan and H.M. Chiu, University of Technology, Sydney, Australia

Room B	June 3, Thursday

3B3 Biological Effects and Safety I
14:00-15:00 Chairperson: N. Kuster (IT'IS Foundation, Switzerland)
Co-chairperson: O. Fujiwara (Nagoya Institute of Technology, Japan)

1. **The influence of a phantom shell on SAR measurement in the higher frequency range (3-6GHz)**
T. Onishi and S. Uebayashi, NTT DoCoMo Inc., Japan
2. **A study on the solid phantoms for 3-6 GHz and evaluation of SAR distributions based on the thermographic method**
R. Ishido*, T. Onishi**, K. Saito*, S. Uebayashi** and K. Ito*, *Chiba University, **NTT DoCoMo, Inc., Japan
3. **A new method for realizing local exposure to young rat heads using electric flux concentration for bio-effect test of mobile telephones**
J. Wang and O. Fujiwara, Nagoya Institute of Technology, Japan

Room B	June 3, Thursday

3B4 Biological Effects and Safety II
15:20-16:20 Chairperson: N. Kuster (IT'IS Foundation, Switzerland)
Co-chairperson: O. Fujiwara (Nagoya Institute of Technology, Japan)

1. **Human body impedance for contact current measurement in Japan**
Y. Kamimura*, K. Komori*, M. Shoji*, Y. Yamada*, S. Watanabe**, and Y. Yamanaka**, *Utsunomiya University, **Communications Research Laboratory, Japan
2. **Thermal field analysis for in vitro exposure apparatus in rectangular waveguide with transversal slits**
R. Tokunaga, Y. Suzuki, T. Tanaka and M. Taki, Tokyo Metropolitan University, Japan
3. **Statistical measurement of radio-frequency electromagnetic fields in a fusion experimental facility**
J. Wang*, O. Fujiwara* and T. Uda**, *Nagoya Institute of Technology, **National Institute for Fusion Science, Japan

Room B	June 3, Thursday

3B5 Biological Effects and Safety III
16:20-17:20 Chairperson: S. Uebayashi (NTT DoCoMo, Japan)

1. **Novel specific absorption rate measurement method using flat-plane solid phantom -Absolute SAR value and arrayed probes-**
T. Iyama*, T. Onishi*, S. Uebayashi* and T. Nojima**, *NTT DoCoMo, Inc., **Hokkaido University, Japan
2. **Correlation of maximum temperature increase and peak SAR in the child and adult head models due to dipole antenna**
M. Fujimoto*, A. Hirata*, J. Wang**, O. Fujiwara** and T. Shiozawa*, *Osaka University, **Nagoya Institute of Technology, Japan
3. **Visualization of three-dimensional electromagnetic power absorption using gel containing capsulate liquid crystal**
M. Baba*, A. Ishii*, Y. Suzuki*, S. Watanabe** and M. Taki*, *Tokyo Metropolitan University, **Communications Research Laboratory, Japan

Room C	June 3, Thursday

3C1 Shielding Evaluation I
09:20-10:20 Chairperson: H. Garbe (University of Hannover, Germany)
Co-chairperson: K. Hatakeyama (Himeji Institute of Technology, Japan)

1. **Equivalent circuit expression of dual TEM cell apparatus for shielding material evaluation**
A. Nishikata*, R. Saito* and Y. Yamanaka**, *Tokyo Institute of Technology, **Communications Research Laboratory, Japan
2. **Calculating shielding loss due to a gap between radio wave shield concrete walls**
Y. Kasashima and T. Esaki, Kajima Technical Research Institute, Japan
3. **Screening attenuation of coaxial cables measured in GTEM-cells**
A. Knobloch and H. Garbe, University of Hannover, Germany

Room C	June 3, Thursday

3C2 Shielding Evaluation II
10:40-12:00 Chairperson: H. Garbe (University of Hannover, Germany)
Co-chairperson: K. Hatakeyama (Himeji Institute of Technology, Japan)

1. **Measurement technique for the shielding effectiveness of symmetric enclosures with the use of the image theory**
   U. Paoletti*, H. Garbe** and W. John***, *University of Paderborn, **University of Hanover, ***Fraunhofer IZM, Germany
2. **Measurement of electric parameters for thin materials**
   T. Tosaka*, I. Nagano*, S. Yagitani* and Y. Yoshimura**, *Kanazawa University, **Industrial Research Institute of Ishikawa, Japan
3. **Reduction characteristics of electromagnetic penetration through narrow slots in conducting screen by wire array loading**
   S.M. Lim, G.H. Jung and K.C. Kim, Yeungnam University, Korea
4. **Electromagnetic shielding evaluation of conductive O-rings**
   S. Yamamoto*, K. Hatakeyama*, K. Yamauchi* and T. Yamada**, *Himeji Institute of Technology, **NOK Corporation, Japan

Room C	June 3, Thursday

3C3 Measurement Techniques
14:00-15:20 Chairperson: A. Nishikata
(Tokyo Institute of Technology, Japan)

1. **CEM code validation using infrared thermograms**
   J. Norgard and R. Musselman, US Air Force Academy, USA
2. **Insertion loss measurement of EMI suppression ferrite cores**
   K. Fujii, Y. Dowaki, Y. Jito, Y. Matsumoto and A. Sugiura, Tohoku University, Japan
3. **Liquid material's complex permittivity measurement using a rectangular waveguide and a dielectric tube at 800 and 900MHz band**
   Y. Kuriyama*, N. Ueda*, A. Nishikata*, K. Fukunaga**, S. Watanabe** and Y. Yamanaka**, *Tokyo Institute of Technology, **Communications Research Laboratory, Japan
4. **A study on the estimation of the complex permittivity for interior building materials**
   K. Kimura* and O. Hashimoto**, *Fujita Corporation, **Aoyama Gakuin University, Japan

Room C	June 3, Thursday

3C4 Antennas
15:40-17:40 Chairperson: M. Alexander
(National Physical Laboratory, UK)
Co-chairperson: Q. Chen
(Tohoku University, Japan)

1. **A practical antenna calibration method in quasi-free space**
   A. Maeda*, S. Takeya*, S. Kobayashi**, R. Watanabe*, J. Kawano*, S. Ohtsu*** and T. Yamagajo***, *VCCI, **Akzo Nobel K.K, ***Fujitsu Limited, Japan
2. **Evaluation of uncertainty in free-space antenna factor calibration in CRL**
   M. Sakasai*, H. Masuzawa*, K. Koike** and T. Shinozuka*, *Communications Research Laboratory, **Telecom Engineering Center, Japan
3. **Estimation of radiated power of radio transmitters using a reverberation chamber**
   T. Sugiyama, T. Shinozuka, Y. Makita and K. Iwasaki, Communications Research Laboratory, Japan
4. **TDR analysis of radiation impedance for a monopole antenna**
   Y. Tanizawa*, J. Wang** and O. Fujiwara**, *Mie Science and Technology Promotion Center, **Nagoya Institute of Technology, Japan
5. **Development of the new characteristic impedance measurement method using the sinusoidal wave TDR**
   T. Takahashi, T. Sakusabe and N. Shibuya, Takushoku University, Japan
6. **Radiated electric field characteristics of a monopole antenna using the optical feeding method,**
   S. Nabekura, R. Amemiya, Y. Okano and M. Tokuda, Musashi Institute of Technology, Japan

Room D	June 3, Thursday

3D1 EM Wave Propagation and Scattering
09:20-10:40 Chairperson: Y. Gao
(Beijing University of Post and Telecommunication, China)
Co-chairperson: Q. Chen
(Tohoku University, Japan)

1. **Improved absorbing boundary condition for TEn0 multi-mode rectangular waveguide analysis using FDTD method**
   Y. Kusama, S. Ozaki and O. Hashimoto, Aoyama Gakuin University, Japan
2. **Analysis of broadband wireless communication using parallel FDTD simulations on urban areas**
   G. Rodriguez*, Y. Miyazaki** and N. Goto*, *Toyohashi University of Technology, **Aichi University of Technology, Japan
3. **3-D radar imaging by a passive electric field sensor**
   M. Sato and E. Igarashi, Tohoku University, Japan
4. **Antenna position optimal design for reducing interference**
   Y. Qiu, J. Yuan, J. Tian and Y.J. Xie, Xidian University, China

Room D	June 3, Thursday

3D2 Power System EMC I
11:00-12:20 Chairperson: W. Khan-ngern (King Mongkut's Institute of Technology Ladkrabang, Thailand)
Co-chairperson: S. Nitta (Salesian Polytechnic, Japan)

1. **Prediction and assessment on environments of urban high-power electromagnetic radiant point**
   P. Liu*, J. Wang*, Y. Xie*, F. Song**, R. Zang** and Y. Huang***, *Dalian University of Technology, **Center of Beijing Radiant Environment Management, China, ***University of Liverpool, UK
2. **Quantification of influential factor to ELF magnetic field distribution around electric power installation**
   K. Kato*, A. Matsumoto**, M. Shimizu** and H. Okubo*, *Nagoya University, **Chubu Electric Power Co., Ltd., Japan
3. **The EMI study of self-resonant frequency effect on a Cuk converter**
   P. Boonma*, V. Tarateeraseth*, W. Khan-ngern* and S. Nitta**, *King Mongkut's Institute of Technology Ladkrabang, Thailand, ** Salesian Polytechnice, Japan
4. **LEMP effects on control cables in high-voltage substations**
   A.W. Sowa and J. Wiater, Bialystok Technical University, Poland

Room D	June 3, Thursday

3D3 Power System EMC II
14:00-15:40 Chairperson: W. Khan-ngern (King Mongkut's Institute of Technology Ladkrabang, Thailand)
Co-chairperson: S. Nitta (Salesian Polytechnic, Japan)

1. **The preliminary analysis upon the movement behavior of electrons in pulsed vacuum arc**
   Y. Shen*, Y. Gao* and S. Chen**, *Beijing University of Post and Telecommunication, **Wuhan University, China
2. **Radiated electromagnetic field from a solar cell for CISPR radiated emission measurement method**
   T. Mori*, M. Shigenaga*, M. Tokuda*, S. Suenaga**, H. Igarashi** and K. Asami**, *Musashi Institute of Technology, **Japan Electrical Safety & Environment Technology Laboratories, Japan
3. **Output voltage ripple reduction of a high power factor mode operated isolated charge-pump AC/DC converter**
   M. Sippola, Schaffner electroferrum oy, Finland
4. **Conducted EMI circuits modeling during transient phenomena on three phase full-bridge PWM inverters**
   K. Karanun*, W. Khan-ngern** and S. Nitta***, *Electrical and Electronics Institute, **King Mongkut's Institute of Technology Ladkrabang, Thailand, ***Salesian Polytechnic, Japan
5. **Analysis of noise current cancellation mechanism in balanced boost switching converter**
   M. Shoyama, T. Tsumura, G. Li, and T. Ninomiya, Kyushu University, Japan

Room D	June 3, Thursday

3D4 Transmission Lines and Cables
16:00-17:00 Chairperson: H. Sone (Tohoku University, Japan)

1. **Electromagnetic topology technique for system interaction through small apertures**
   J. Agee*, P. Kirawanich**, R. Gunda**, N. Kranthi**, J. Kroenung** and N. Islam**, *Air Force Office of Scientific Research, **University of Missouri, USA
2. **Use of periodical and quasi-periodical structures for reducing electromagnetic disturbances**
   A.S. Adalev*, N.V. Korovkin** and M. Hayakawa*, *The University of Electro-Communications, Japan, **Otto-von-Guericke-University, Germany
3. **Optimization of EMC-properties of a symmetric multithread 3-phase cable**
   N.V. Korovkin*, A.A. Potienko** and M. Hayakawa***, *Otto-von-Guericke-University, Germany, **St-Petersburg State Polytechnical University, Russia, ***The University of Electro-Communications, Japan

Room E	June 3, Thursday

3E1 Organized Session: Seismo Electromagnetics I
09:20-10:20 Organizer: M. Hayakawa (The University of Electro-Communications, Japan)
Chairperson: M. Hayakawa (The University of Electro-Communications, Japan)

1. **ULF geomagnetic changes associated with crustal activity**
   K. Hattori*, M. Hayakawa**, K. Yumoto***, T. Nagao**** and S. Uyeda****, *Chiba University, **The University of Electro-Communications, ***Kyushu University, ****Tokai University, Japan
2. **Three-axial observation of ELF emissions and EM precursor of large-scale earthquakes in Japan**
   M. Hata, Chubu University, Japan
3. **Air bubble movements and animal behavior as responses to electromagnetic signals before earthquakes: network monitoring of catfish**
   M. Ikeya, Y. Emoto, H. Asahara and C. Yamanaka, Osaka University, Japan

Room E	June 3, Thursday

3E2 Organized Session: Seismo Electromagnetics II
10:40-11:40 Organizer: M. Hayakawa
(The University of Electro-Communications, Japan)
Chairperson: M. Hayakawa
(The University of Electro-Communications, Japan)

1. **Anomalous behavior of Schumann resonance, possibly associated with Taiwan earthquakes**
   K. Ohta*, S. Hara*, N. Watanabe*, and M. Hayakawa**, *Chubu University, **The University of Electro-Communications, Japan
2. **Ionospheric perturbation associated with earthquakes, as studied by subionospheric VLF/LF propagation**
   M. Hayakawa* and O. A. Molchanov**, *The University of Electro-Communications, Japan, **Institute of Physics of the Earth, Russia
3. **Propagation anomaly in oversea TV broadcasting waves possibly related to earthquakes**
   T. Takano, K. Sakai, S. Ujigawa, H. Higasa, I. Nagashima, H. Akaike, Y. Kawamura, H. Nakata and S. Shimakura, Chiba University, Japan

Room A	June 4, Friday

Workshop: Recent Topics on EMC Standardization
09:00-13:00 Chairperson: M. Tokuda
(Musashi Institute of Technology, Japan)

1. **The Advisory Committee on Electromagnetic Compatibility (ACEC) and its Role in the IEC**
   W.A. Radasky (Chairman of IEC/ACEC)
2. **CISPR Today EMC Standards - Moving Forwards**
   P.J. Kerry (Chairman of CISPR)
3. **Basic EMC Standards Coming from IEC TC77 EMC and Their Latest Developments**
   D.E.C. Moehr (Secretary of IEC/TC77)
4. **EMC Measurement Uncertainty**
   D.N. Heirman (Chairman of CISPR/A)

Room A	June 4, Friday

Tutorial Session: EMC Design for Multi-Layer Printed Circuit Boards
14:00-17:20 Chairperson: Y. Kami
(The University of Electro-Communications, Japan)

1. **PCB Power Integrity Design in Multilayer PCBs: Concepts, EMI and SI Implications, SMT Decoupling, and a SPICE-Based Modeling Tool**
   J.L. Drewniak (University of Missouri-Rolla)
2. **PCB ESD Design**
   D. Pommerenke (University of Missouri-Rolla)

3. **PCB EMI Design**
   T. Hubing (University of Missouri-Rolla)
4. **EMI/EMC Computational Modeling for Real-World Engineering Problems**
   B. Archambeault (IBM)

Room B	June 4, Friday

4B1 Organized Session: Biological Effects of ELF EM Field I
09:20-10:20 Organizer: K. Shimizu
(Hokkaido University, Japan)
Chairperson: K. Shimizu
(Hokkaido University, Japan)

1. **Biological and health effects of ELF electromagnetic field**
   T. Shigemitsu, Central Research Institute of Electric Power Industry, Japan
2. **Cellular and molecular effects of electromagnetic fields**
   J. Miyakoshi, Hirosaki University, Japan
3. **Effects of 50 Hz magnetic field exposure on the body color and the urine quantity of goldfish**
   Y. Sawaguchi, K. Kimura, K. Misawa and J. Arisawa, Hokkaido Institute of Technology, Japan

Room B	June 4, Friday

4B2 Organized Session: Biological Effects of ELF EM Field II
10:40-11:40 Organizer: K. Shimizu
(Hokkaido University, Japan)
Chairperson: K. Shimizu
(Hokkaido University, Japan)

1. **Effect of ELF electrostimulation on function of macrophage**
   T. Shimooka, I. Fujii, M. Kagawa, T. Tatebe and K. Shimizu, Hokkaido University, Japan
2. **Analysis of human perception of ELF electric field**
   H.O. Shimizu* and K. Shimizu**, *Hokkaido Institute of Technology, **Hokkaido University, Japan
3. **Research on biological responses related to the effects of extremely low frequency electric fields**
   K. Ohsaki* and A. Hara*,**, *Hakuju Institute for Health Science Co., Ltd., **The Japan Home Health Apparatus Industrial Association, Japan

Room B	June 4, Friday

4B3 Organized Session: Induced Current in a Human Body by Electric or Magnetic Fields

14:00-15:40 Organizer: T. Takuma (Tokyo Denki University, Japan)
Chairperson: T. Takuma (Tokyo Denki University, Japan)

1. **Equivalent dipole estimation for characterization of magnetic fields and induced currents near household appliances (ELF to 100 kHz)**
   K. Yamazaki, T. Kawamoto, H. Fujinami and T. Shigemitsu, Central Research Institute of Electric Power Industry, Japan
2. **Induced current inside of the human head in the vicinity of an electric shaver**
   Y. Kamimura*, T. Akutsu*, Y. Yamada* and K. Wake**, *Utsunomiya University, **Communications Research Laboratory, Japan
3. **Development of smart voxel models of whole human-bodies for numerical dosimetry**
   S. Watanabe*, N. Hirose**, T. Nagaoka***, N. Hatakenaka****, Y. Tanaka*,*****, M. Takahashi******, Y. Suzuki*******, M. Taki*******, J. Wang********, O. Fujiwara******** and Y. Yamanaka*, *National Institute of Information and Communications Technology, **System Answer Co., ***Kitasato University, ****Research Institute of Human Engineering for Quality Life, *****Tokyo University of Agriculture and Technology, ******Chiba University, *******Tokyo Metropolitan University, ********Nagoya Institute of Technology, Japan
4. **Numerical calculation of induced current densities in the human body due to intermediate frequency magnetic fields**
   Y. Suzuki*, K. Wake**, S. Watanabe*, M. Taki*, S. Watanabe** and Y.Yamanaka**, *Tokyo Metropolitan University, **Communications Research Laboratory, Japan
5. **Dielectric properties of liquid phantoms for evaluations of mobile phones**
   K. Fukunaga*, S. Watanabe*, Y. Yamanaka*, H. Asou**, Y. Ishii** and K. Sato**, *Communications Research Laboratory, **NTT Advanced Technology Corporation, Japan

Room C	June 4, Friday

4C1 Numerical Modeling I

09:20-10:20 Chairperson: Y. Kamimura (Utsunomiya University, Japan)

1. **Analysis of induced current density inside grounded and ungrounded human model exposed to electric field**
   A. Chiba*, K. Isaka**, K. Shoukura* and T. Matsumoto***, *Yonago National College of Technology, **The University of Tokushima, ***Anan College of Technology, Japan
2. **Analysis of the electromagnetic fields around a two-wire parallel line basing on distributed circuit theory**
   H. Echigo and A. Ishikawa, Tohoku Gakuin University, Japan
3. **Solution method of Weber function of special coordinate system in electric field**
   P. Liu*, Y. Gao** and Y. Wang*, *Dalian University of Technology, **Beijing University of Posts and Telecommunications, China

Room C	June 4, Friday

4C2 Numerical Modeling II

10:20-12:00 Chairperson: C. Christopoulos (University of Nottingham, UK)
Co-chairperson: A. Sakurai (IBM Japan, Japan)

1. **Comparison of FDTD and ray-tracing method for site attenuation analysis of compact anechoic chamber**
   M. Kawabata*, Y. Ishida*, K. Shimada**, A. Kitani*** and N. Kuwabara***, *Fukuoka Industrial Technology Center, **Riken Eletech Corporation, ***Kyushu Institute of Technology, Japan
2. **An analytical solution to the eddy current problem of a conducting bar**
   L.O. Fichte, M. Ehrich and S. Kurz, Universitat der Bundeswehr Hamburg, Germany
3. **The analysis of impedance mismatch on the conducted EMI emission**
   W. Thammasiriroj*, S. Ruayariyasub*, W. Khan-ngern* and S. Nitta**, *King Mongkut's Institute of Technology Ladkrabang, Thailand, **Salesian Polytechnic, Japan
4. **An analysis of the conducted EMI emission using the transient response model**
   S. Ruayariyasub*, W. Thammasiriroj*, W. Khan-ngern* and S. Nitta**, *King Mongkut's Institute of Technology Ladkrabang, Thailand, **Salesian Polytechnic, Japan

Room C	June 4, Friday

4C3 EMC in Power Line Communication

14:00-15:20 Chairperson: M. Tokuda (Musashi Institute of Technology, Japan)

1. **A study of PLC signal influence on VDSL system by induction between indoor power line and telecommunication line**
   Y. Shimoduma*, A.K. M. Mahbub Ar Rashid*, N. Kuwabara*, Y. Akiyama** and H. Yamane**, *Kyushu Institute of Technology, **NTT Energy and Environment Systems Laboratories, Japan

2. **Radiated emission from PLC and electrical unbalance of an artificial power distribution line**
   N. Oka*, A. Konemori*, Y. Sasaki*, H. Fukushima*, M. Kato* and S. Nitta**, *Mitsubishi Electric Corporation, **Salesian Polytechnic, Japan
3. **Electromagnetic field near power line for a power line communication system**
   Y. Watanabe , M. Shigenaga and M. Tokuda, Musashi Institute of Technology, Japan
4. **Two types of the LCL probe for measuring LCL on the power lines**
   Y. Ando, A. Konemori and N. Oka, Mitsubishi Electric Corporation, Japan

Room D	June 4, Friday

4D1 System Level EMC I
09:20-10:20 Chairperson: D. Pommerenke (University of Missouri-Rolla, USA)
Co-chairperson: H. Echigo (Tohoku Gakuin University, Japan)

1. **Measurement of static and ELF magnetic fields in a large magnetic fusion plasma experimental facility**
   T. Uda*, H. Obayashi*, H. Nakayoshi**, J. Wang*** and O. Fujiwara***, *National Institute for Fusion Science, **Nippon Kucho Service Co. Ltd., ***Nagoya Institute of Technology, Japan
2. **Characteristics of radiated-emission from slots on a personal computer above 1 GHz**
   K.B. Jung*, K.B. Ko*, S.M. Han**, Y.C. Chung*** and J.H. Choi*, *Hanyang University, **Advanced Materials & Integration Co., Ltd., ***Seokyeong University, Korea
3. **Controlling aperture resonance using novel coating techniques : theory, simulations and measurements**
   O.M. Ramahi and Lin Li, University of Maryland, USA

Room D	June 4, Friday

4D2 System Level EMC II
10:40-12:00 Chairperson: D. Pommerenke (University of Missouri-Rolla, USA)
Co-chairperson: H. Echigo (Tohoku Gakuin University, Japan)

1. **The relationship among damped oscillation, f-z characteristics and conducted EMI of an induction cooking**
   J. Arthitthang*, V. Tarateeraseth* W. Khan-ngern* and S. Nitta**, *King Mongkut's Institute of Technology Ladkrabang, Thailand, **Salesian Polytechnic, Japan
2. **Measurements of magnetic fields produced by induction cooking heaters**
   K. Kamata* and A. Haga**, *Kagoshima National College of Technology, **Tohoku Gakuin University, Japan
3. **The comparison of conducted EMI measurement between the small loop antenna and a conventional LISN**
   P. Khamphakdi*, J. Urabe**, W. Khan-ngern*, C. U-yaisom*, V. Tarateeraseth*, K. Fujii**, Y. Matsumoto** and A. Sugira**, *King Mongkut's Institute of Technology Ladkrabang, Thailand, **Tohoku University, Japan.
4. **Receiving characteristics of the electromagnetic interference on DC power supply line with inverter gate load**
   A. Yoshida*, T. Takahashi*, T. Sakusabe*, N. Shibuya*, A. Mutoh** and S. Nitta***, *Takushoku University, **Tokyo Fuji University, ***Salesian Polytechnic, Japan

Room D	June 4, Friday

4D3 Emerging Topics I
14:00-15:00 Chairperson: M. Taki (Tokyo Metropolitan University, Japan)

1. **The study of magnetic field intensity and time variation effect on the rice growth**
   P. Sungkhaphun*, W. Khan-ngern* and S. Nitta**, *King Mongkut Institute of Technology Ladkrabang, Thailand, **Salesian Polytechnic, Japan
2. **Electric field direction affects on the growth of bean sprouts**
   P. Kiatgamjorn*, W. Khan-ngern* and S. Nitta**, *King Mongkut's Institute of Technology Ladkrabang, Thailand, **Salesian Polytechic, Japan
3. **Measurement and analysis of EM propagation in air radiated from a source put in fresh water**
   T. Kasuga*, E. Jinba*, M. Denda** and H. Inoue*, *Akita University, **Public Works Research Institute, Japan

Room D	June 4, Friday

4D4 Emerging Topics II
15:20-16:20 Chairperson: M. Taki (Tokyo Metropolitan University, Japan)

1. **Electric field application: grass seed separation machine from broken milled rice by electric field technique**
   P. Kerdonfag*, C. Klinsa-ard**, S. Protivejkul** and W. Khan-ngern**, *Mahanakorn University of Technology, **King Mongkut's Institute of Technology Ladkrabang, Thailand
2. **Evaluation of damage in DNA molecules by very low frequency magnetic fields using bacterial cells with bioluminescence gene**
   A. Haga*, Y. Kumagai*, H. Matsuki** and G. Endo*, *Tohoku Gakuin University, **Tohoku University, Japan

3. **The study of bending effect on the growth of the primary root of rice caused by electric field**
T.Rotcharoen*, P. Kerdonfag**, W. Khan-ngern* and S. Nitta***, *King Mongkut's Institute of Technology Ladkrabang, **Mahanakron University of Technology, Thailand, ***Salesian Polytechnic, Japan

Room E	June 4, Friday

4E1 Organized Session: Lightning Physics and EM Noise I
09:20-10:20 Organizer: Z. Kawasaki (Osaka University, Japan)
Chairperson: Z. Kawasaki (Osaka University, Japan)

1. **Some lightning observation results obtained from broadband radio interferometers**
R. Mardiana*, Z. Kawasaki** and T. Ushio***, *Institut Teknologi Bandung, Indonesia, **Osaka University, ***Osaka Prefecture University, Japan
2. **Initiation and propagation characteristics of upward positive leaders**
D. Wang, N. Takagi and T. Watanabe, Gifu University, Japan
3. **The electric characteristics of thunderstorms and lightning discharges on the Tibetan Plateau**
X. Qie, Y. Xie, T. Zhang, G. Zhang, W. Wei, H. Wang, and Y. Zhang, Chinese Academy of Sciences, China

Room E	June 4, Friday

4E2 Organized Session: Lightning Physics and EM Noise II
10:40-11:40 Organizer: Z. Kawasaki (Osaka University, Japan)
Chairperson: Z. Kawasaki (Osaka University, Japan)

1. **New observations of transient luminous events from the space shuttle during the MEIDEX**
Y. Yair*, C. Price**, P. Israelevich**, A. Devir** and B. Ziv*, *The Open University of Israel, **Tel-Aviv University, Israel
2. **VHF broadband interferometer and lightning monitoring**
T. Morimoto and Z. Kawasaki, Osaka University, Japan
3. **FORTE satellite observations of VHF radiation from lightning discharges**
W. Junor, A.R. Jacobson, D. Suszcynsky, Los Alamos National Laboratory, USA

Room E	June 4, Friday

4E3 Lightning I
14:00-15:00 Chairperson: R.E. Zich (Politecnico di Milano, Italy)
Co-chairperson: T. Ideguchi (Kyushu Tokai University, Japan)

1. **Analysis of the interactions between the cloud to ground electric field and a simple aircraft model for lightning concerns**
M. Brenna, F. Martinelli and R.E. Zich, Politecnico di Milano, Italy
2. **Analysis of lightning discharge modeling in the Wavelet domain**
E.A. Grimaldi, S. Marchi and R.E. Zich, Politecnico di Milano, Italy
3. **Lightning stepped leader numerical simulation**
M. Andre da Frota Mattos, Okime Eletromagnetismo Aplicado, Brazil

Room E	June 4, Friday

4E4 Lightning II
15:20-16:20 Chairperson: R.E. Zich (Politecnico di Milano, Italy)
Co-chairperson: T. Ideguchi (Kyushu Tokai University, Japan)

1. **Effects of pulse noise propagation in electrical system**
A. Worshevsky, Saint-Petersburg Marine Technical University, Russia
2. **A novel DOA estimation scheme for ultra-wideband electromagnetic waves**
A. Hirata and Z. Kawasaki, Osaka University, Japan
3. **Measurement results of lightning surge current on AC mains line connected to access network equipment**
J. Kato, T. Tominaga, K. Murakawa and H. Yamane, NTT Energy and Environment Systems Labs., Japan