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## TUESDAY TECHNICAL PAPERS

**Tuesday, August 7, 2012**

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**Co-Chair:** Michael Evans, Student

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	* Nominated for Best Symposium Paper Award	
4:30 pm	<b>An Application of Utilizing the System-Efficient-ESD-Design (SEED) Concept to Analyze an LED Protection Circuit of a Cell Phone</b> .....	346
	Tianqi Li ( <i>Missouri University of Science and Technology, Rolla, MO, US</i> ); Junji Maeshima ( <i>Sony Corporation, Tokyo, JP</i> ); Hideki Shumiya ( <i>Sony Corporation, Tokyo, JP</i> ); David J. Pommerenke ( <i>Missouri University of Science and Technology, Rolla, MO, US</i> ); Takashi Yamada ( <i>Sony Corporation, Tokyo, JP</i> ); Kenji Araki ( <i>Sony Corporation, Tokyo, JP</i> )	
5:00 pm	<b>Electrostatic Field Distribution Measurement using Silicon Micro-Mirror Array</b> .....	351
	Toshihide Kuriyama ( <i>Kinki University, Kinokawa-shi, JP</i> ); Toshikazu Aoi ( <i>Kinki University, Kinokawa-shi, JP</i> ); Wataru Takatsuji ( <i>Industrial Technology Center of Wakayama Prefecture, Wakayama-shi, JP</i> ); Hiroshi Maeda ( <i>Industrial Technology Center of Wakayama Prefecture, Wakayama-shi, JP</i> ); Takaki Itoh ( <i>Industrial Technology Center of Wakayama Prefecture, Wakayama-shi, JP</i> ); Yoshifumi Ueno ( <i>Industrial Technology Center of Wakayama Prefecture, Wakayama-shi, JP</i> ); Toshiyuki Nakaie ( <i>Hanwa Electronic Ind. Co., Ltd., Wakayama-shi, JP</i> ); Jun Matsui ( <i>Hanwa Electronic Ind. Co., Ltd., Wakayama-shi, JP</i> ); Yoshiaki Miyamoto ( <i>Hanwa Electronic Ind. Co., Ltd., Wakayama-shi, JP</i> )	

## WEDNESDAY TECHNICAL PAPERS

Wednesday, August 8, 2012

### WED-AM-1 SC1 Smart Grid

Chair: Don Heirman, Don HEIRMAN Consultants

- 9:30 am **Corona Noise Considerations for Smart Grid Wireless Communication and Control Network Planning** ..... 357  
Dheena Moongilan (*Alcatel-Lucent, Murray Hill, NJ, US*)  
\* Nominated for Best Symposium Paper Award

### WED-AM-2 TC4 Emissions Prediction and Testing

Chair: Michael Evans, Student

Co-Chair: Philip Keebler, Electric Power Research Institute

- 8:30 am **Mode Conversion due to Asymmetric GND via Configuration** ..... 363  
Alma Jaze (*IBM Corporation, Poughkeepsie, NY, US*); Bruce Archambeault (*IBM Corporation, RTP, NC, US*); Samuel Connor (*IBM Corporation, RTP, NC, US*)
- 9:00 am **Optimal Placement for Partially Populated System EMI Testing** ..... 369  
Michael Cracraft (*IBM Systems & Technology Group, Poughkeepsie, NY, US*); Samuel Connor (*IBM Systems & Technology Group, RTP, NC, US*); Bruce Archambeault (*IBM Systems & Technology Group, RTP, NC, US*)
- 9:30 am **Prediction of Radiation-Induced Frequency Locking and Shifting in a Microwave Oscillator** ..... 375  
Nai-Chung Kuo (*Bureau of Standards, Metrology and Inspection (BSMI), Ministry of Economic Affairs, Taipei, TW*); Han-Chang Hsieh (*Bureau of Standards, Metrology and Inspection (BSMI), Ministry of Economic Affairs, Taipei, TW*); Jay-San Chen (*Bureau of Standards, Metrology and Inspection (BSMI), Ministry of Economic Affairs, Taipei, TW*); Cheng-Nan Chiu (*Da-Yeh University, Changhua, TW*); Ming-Shing Lin (*National Yunlin University of Science and Technology, Yunlin, TW*); Chun Hsiung Chen (*National Taiwan University, Taipei, TW*)

### WED-AM-3 TC9 Modeling of EM Pulses

Chair: Wen-Yan Yin, Shanghai Jiao Tong University

- 8:30 am **Characterization of Mutual Coupling Effects among Multi-Antennas Mounted on a Perfect Electrically Conducting (PEC) Tower Platform in the Presence of Intentional Electromagnetic Pulses (IEMPs)** ..... 380  
Wei Luo (*Shanghai Jiao Tong University, Shanghai, CN*); Wen-Yan Yin (*Zhejiang University / Shanghai Jiao Tong University, Hangzhou / Shanghai, CN*); Ming-Da Zhu (*Shanghai Jiao Tong University, Shanghai, CN*); Jun-Fa Mao (*Shanghai Jiao Tong University, Shanghai, CN*); Jian-Yao Zhao (*Zhejiang University, Hangzhou, CN*)  
\* Nominated for Best Symposium Paper Award

- 9:00 am **An Improved Leapfrog ADI-FDTD Method for Computing Surface Current Distributions of Complex Structures in the Presence of an Intentional Electromagnetic Pulse (IEMP)** ..... 385  
 Xiang-Hua Wang (*Zhejiang University / Tianjin University of Technology and Education, Hangzhou / Tianjin, CN*); Wen-Yan Yin (*Zhejiang University / Shanghai Jiao Tong University, Hangzhou / Shanghai, CN*); Jian Wang (*Shanghai Jiao Tong University, Shanghai, CN*)
- 9:30 am **Accurate and Stable Solution of TD-MFIE using Adaptive MOD Method for Transient Scattering Illuminated by an EMP** ..... 390  
 Ming-Da Zhu (*Shanghai Jiao Tong University, Shanghai, CN*); Xi-Lang Zhou (*Shanghai Jiao Tong University, Shanghai, CN*); Wen-Yan Yin (*Zhejiang University / Shanghai Jiao Tong University, Hangzhou / Shanghai, CN*)

### WED-AM-4 TC11 Nano Technology

**Chair:** Marina Koledintseva, Missouri University of Science and Technology

- 8:30 am **Formulation based on Percolation Theory to Model the Effective Conductivity of Carbon Nanotube Networks** ..... 396  
 Emmanuel Decrossas (*University of Arkansas, Fayetteville, AR, US*); Mahmoud A. El Sabbagh (*Syracuse University, Syracuse, NY, US*); Victor Fouad Hanna (*Université Pierre et Marie Curie - Paris 6, Paris, FR*); Samir M. El-Ghazaly (*University of Arkansas, Fayetteville, AR, US*)
- 9:00 am **EBG Structures on High Permittivity Substrate to Reduce Noise in Power Distribution Networks** ..... 401  
 O.V. Tereshchenko (*University of Twente, Enschede, AE, NL*); F.J.K. Buesink, (*University of Twente, Enschede, NL*); F.B.J. Leferink (*Thales Nederland B.V. / University of Twente, Hengelo / Enschede, NL*)
- 9:30 am **Simulation Geometry Rasterization for Applications Toward Graphene Interconnect Characterization** ..... 406  
 Brian J. Rautio (*Syracuse University, Syracuse, NY, US*); Qi Long (*Syracuse University, Syracuse, NY, US*); Amit Agrawal (*Syracuse University, Syracuse, NY, US*); Mahmoud A. El Sabbagh (*Syracuse University, Syracuse, NY, US*)

### WED-PM-1 SS TC 11 Nanotechnology for EMC

**Chair:** Marina Koledintseva, Missouri University of Science and Technology

**Co-Chair:** Alessio Tamburrano, Sapienza University of Rome

- 1:30 pm **Electromagnetic Properties of Metal Granular Composite Materials for EMC Applications** .... 411  
 Takanori Tsutaoka (*Hiroshima University, Higashi-Hiroshima, JP*); Aiko Tsurunaga (*Hiroshima University, Higashi-Hiroshima, JP*); Teruhiro Kasagi (*Tokuyama College of Technology, Shunan, Yamaguchi, JP*); Kenichi Hatakeyama (*University of Hyogo, Himeji, Hyogo, JP*); Marina Y. Koledintseva (*Missouri University of Science and Technology, Rolla, MO, US*)
- 2:00 pm **Design Method of EM Absorber and Shielding Screen using Wire Array Sheet** ..... 416  
 Shinichiro Yamamoto (*University of Hyogo, Himeji, Hyogo, JP*); Kenichi Hatakeyama (*University of Hyogo, Himeji, Hyogo, JP*)
- 2:30 pm **Analytical Representations for Frequency Dependences of Microwave Permeability** ..... 422  
 Konstantin N. Rozanov (*Institute for Theoretical and Applied Electromagnetics, Moscow, RU*); Marina Y. Koledintseva (*Missouri University of Science and Technology, Rolla, MO, US*)

3:00 pm	<b>Carbon Nanotubes for Electromagnetic Compatibility Applications</b> .....	428
	Emmanuel Decrossas ( <i>University of Arkansas, Fayetteville, AR, US</i> ); Mahmoud A. El Sabbagh ( <i>Syracuse University, Syracuse, NY, US</i> ); Victor Fouad Hanna ( <i>Université Pierre et Marie Curie - Paris 6, Paris, FR</i> ); Samir M. El-Ghazaly ( <i>University of Arkansas, Fayetteville, AR, US</i> )	
4:00 pm	<b>Bundles of Multiwall Carbon Nanotube Interconnects: RF Crosstalk Analysis by Equivalent Circuits</b> .....	434
	A. Tamburrano ( <i>Sapienza University of Rome, Rome, IT</i> ); A.G. D'Aloia ( <i>Sapienza University of Rome, Rome, IT</i> ); M.S. Sarto ( <i>Sapienza University of Rome, Rome, IT</i> )	
4:30 pm	<b>Analytical Models for the Frequency Response of Multi-Layer Graphene Nanoribbon Interconnects</b> .....	440
	Vachan Kumar ( <i>Georgia Institute of Technology, Atlanta, GA, US</i> ); Azad Naeemi ( <i>Georgia Institute of Technology, Atlanta, GA, US</i> )	

## WED-PM-2 TC2 Emissions Measurements

**Chair:** Don Heirman, Don HEIRMAN Consultants

**Co-Chair:** H. Robert Hofmann, Hofmann EMC Engineering

1:30 pm	<b>Enhance the Test Reproducibility of Radiated Emission by Defined Cable Termination</b> .....	446
	Bor-Lin Lee ( <i>Delta Electronics, Wujiang City, CN</i> ); Yi-Wei Wang ( <i>Delta Electronics, Wujiang City, CN</i> ); J-P Wang ( <i>Delta Electronics, Wujiang City, CN</i> )	
2:00 pm	<b>CISPR 32 vs. ANSI C63.4: Color Bars, Scrolling H Patterns, and the Quasi-Peak Detector</b> .....	451
	David Arnett ( <i>Hewlett-Packard Company, Vancouver, WA, US</i> )	
2:30 pm	<b>Opportunities for Improved 80%80% Statistical Methods with CISPR 32</b> .....	457
	Lowell Kolb ( <i>Hewlett-Packard Company, Fort Collins, CO, US</i> )	
3:00 pm	<b>A Novel Vector Near-Field Scanning System for Emission Measurements in Time-Domain</b> .....	462
	Johannes A. Russer ( <i>Technische Universität München, Munich, DE</i> ); Stephan Braun ( <i>Gauss Instruments GmbH, Munich, DE</i> ) * Nominated for Best Symposium Paper Award	
4:00 pm	<b>A Broadband, Low-Noise Time-Domain System for EMI Measurements through Ka-Band up to 40 GHz</b> .....	468
	Christian Hoffmann ( <i>Gauss Instruments GmbH, Munich, DE</i> ); Ayoub Sidhom ( <i>Technische Universität München, Munich, DE</i> ); Stephan Braun ( <i>Gauss Instruments GmbH, Munich, DE</i> ); Peter Russer ( <i>Technische Universität München, Munich, DE</i> )	
4:30 pm	<b>Experimental Assessment of Wireless Coexistence for 802.15.4 in the Presence of 802.11g/n</b> .....	473
	Nickolas J. LaSorte ( <i>University of Oklahoma, Tulsa, OK, US</i> ); Samer A. Rajab ( <i>University of Oklahoma, Tulsa, OK, US</i> ); Hazem H. Refai ( <i>University of Oklahoma, Tulsa, OK, US</i> )	
5:00 pm	<b>Emission Source for Compatibility Testing of Wireless Networks in the Below-Deck Environment on Ships</b> .....	480
	Carl Lins-Morstadt ( <i>General Dynamics Electric Boat, Groton, CT, US</i> ); Michael Slocum ( <i>Naval Surface Warfare Center Dahlgren, Dahlgren, VA, US</i> ); Gregory Tait ( <i>Naval Surface Warfare Center Dahlgren, Dahlgren, VA, US</i> )	

### WED-PM-3 TC9 Advances in Modeling Techniques

**Chair:** Albert Ruehli, Missouri University of Science and Technology

**Co-Chair:** Lijun Jiang, University of Hong Kong

1:30 pm	<b>Generation of Physical Equivalent Circuits using 3D Simulations</b> .....	486
	Felix Traub ( <i>Technische Universität Darmstadt / Robert Bosch GmbH, Darmstadt / Gerlingen, DE</i> ); Jan Hansen ( <i>Robert Bosch GmbH, Gerlingen, DE</i> ); Wolfgang Ackermann ( <i>Technische Universität Darmstadt, Darmstadt, DE</i> ); Thomas Weiland ( <i>Technische Universität Darmstadt, Darmstadt, DE</i> )	
2:00 pm	<b>Experimental Model Validation of Mode-Conversion Sources Introduced to Modal Equivalent Circuit</b> .....	492
	Kota Sejima ( <i>Okayama University, Okayama, JP</i> ); Yoshitaka Toyota ( <i>Okayama University, Okayama, JP</i> ); Kengo Iokibe ( <i>Okayama University, Okayama, JP</i> ); Liuji R. Koga ( <i>Okayama University, Okayama, JP</i> ); Tetsushi Watanabe ( <i>Industrial Technology Center of Okayama Prefecture, Okayama, JP</i> )	
2:30 pm	<b>Total-Field Scattered-Field Plane Wave Sources for FDTD Analysis of Stratified Lossy Dispersive Media</b> .....	498
	Penghui Chen ( <i>Beihang University, Beijing, China</i> ); Xiaojian Xu ( <i>Beihang University, Beijing, China</i> ); Qingsheng Zeng ( <i>University of Ottawa, Ottawa, ON, CA</i> ); Mustapha C.E. Yagoub ( <i>University of Ottawa, Ottawa, ON, CA</i> )	
3:00 pm	<b>Wavefront Topology System &amp; Finite Element Method Applied to Orthogonal Mesh Structures</b> .....	504
	Clayton G. Thomas, Jr. ( <i>Morgan State University, Baltimore, MD, US</i> ); Gregory M. Wilkins ( <i>Morgan State University, Baltimore, MD, US</i> )	
4:00 pm	<b>Speed-Up of PEEC EM/Ckt Solver using Rank-Reduced Waveform Relaxation</b> .....	509
	Giulio Antonini ( <i>Università degli Studi dell'Aquila, L'Aquila, IT</i> ); Albert E. Ruehli ( <i>Missouri University of Science and Technology, Rolla, MO, US</i> ) * Nominated for Best Symposium Paper Award	
4:30 pm	<b>Alternative AEFIE-EFIE Method for Broadband CEM Modeling</b> .....	515
	Jia Liu ( <i>University of Hong Kong / Beihang University, Hong Kong, HK</i> ); Li Jun Jiang ( <i>Beihang University, Beijing, CN</i> )	
5:00 pm	<b>Time Domain E-PMCHW Integral Equation Solved by Adaptive Marching-on-in-Order Procedure for Predicting Transient Responses of Some Composite Structures</b> .....	521
	Jian-Yao Zhao ( <i>Zhejiang University, Hangzhou, CN</i> ); Wen-Yan Yin ( <i>Zhejiang University / Shanghai Jiao Tong University, Hangzhou / Shanghai, CN</i> ); Ming-Da Zhu ( <i>Shanghai Jiao Tong University, Shanghai, CN</i> ); Wei Luo ( <i>Shanghai Jiao Tong University, Shanghai, CN</i> )	

### WED-PM-4 TC10 Signal Integrity

**Chair:** Francesco Ferranti, Ghent University

**Co-Chair:** Antonio Ciccomancini, CST of America

1:30 pm	<b>Optimum Geometrical Parameters for the EBG-Based Common Mode Filter Design</b> .....	526
	Muhammet Hilmi Nisanci ( <i>University of L'Aquila, L'Aquila, IT</i> ); Francesco de Paulis ( <i>University of L'Aquila, L'Aquila, IT</i> ); Antonio Orlandi ( <i>University of L'Aquila, L'Aquila, IT</i> ); Bruce Archambeault ( <i>IBM Corporation, RTP, NC, US</i> ); Sam Connor ( <i>IBM Corporation, RTP, NC, US</i> )	

2:00 pm	<b>Unintended Passive Resonant Structures in Interconnect Design for Multi-Gigabit Signaling</b> ..... 532 Kai Xiao ( <i>Intel Corporation, DuPont, WA, US</i> ); Joe Hock ( <i>Intel Corporation, DuPont, WA, US</i> ); Bill Bissonette ( <i>Intel Corporation, DuPont, WA, US</i> ); Xiaoning Ye ( <i>Intel Corporation, DuPont, WA, US</i> ) * Nominated for Best Symposium Paper Award	532
2:30 pm	<b>Effects of Critically Damped Total PDN Impedance in Chip-Package-Board Co-Design</b> ..... 538 Ryota Kobayashi ( <i>Shibaura Institute of Technology, Tokyo, JP</i> ); Genki Kubo ( <i>Shibaura Institute of Technology, Tokyo, JP</i> ); Hiroki Otsuka ( <i>Shibaura Institute of Technology, Tokyo, JP</i> ); Tatsuya Mido ( <i>Shibaura Institute of Technology, Tokyo, JP</i> ); Yoshinori Kobayashi ( <i>Shibaura Institute of Technology, Tokyo, JP</i> ); Hideyuki Fujii ( <i>Shibaura Institute of Technology, Tokyo, JP</i> ); Toshio Sudo ( <i>Shibaura Institute of Technology, Tokyo, JP</i> )	538
3:00 pm	<b>Protection of a Delay-Locked Loop from Simultaneous Switching Noise Coupling using an On-Chip Electromagnetic Bandgap Structure</b> ..... 544 Chulsoon Hwang ( <i>KAIST, Daejeon, KR</i> ); Kiyeong Kim ( <i>KAIST, Daejeon, KR</i> ); Jun So Pak ( <i>KAIST, Daejeon, KR</i> ); Joungho Kim ( <i>KAIST, Daejeon, KR</i> ) * Nominated for Best Symposium Paper Award	544
4:00 pm	<b>On-Chip Design Techniques for Reducing Power Supply Noise Effects on ADC with Chip-PCB Hierarchical Structure</b> ..... 549 Bumhee Bae ( <i>KAIST, Daejeon, KR</i> ); Jonghyun Cho ( <i>KAIST, Daejeon, KR</i> ); Joungho Kim ( <i>KAIST, Daejeon, KR</i> )	549
4:30 pm	<b>A Hybrid Stack-Up of Printed Circuit Board for High-Speed Networking Systems</b> ..... 554 Jianmin Zhang ( <i>Cisco Systems, Inc, San Jose, CA, US</i> ); Antonio Ciccimancini Scogna ( <i>CST of America, Framingham, MA, US</i> ); Jun Fan ( <i>Missouri University of Science and Technology, Rolla, MO, US</i> ); Bruce Archambeault ( <i>IBM Corporation, RTP, NC, US</i> ); James L. Drewniak ( <i>Missouri University of Science and Technology, Rolla, MO, US</i> ); Antonio Orlandi ( <i>University of L'Aquila, L'Aquila, IT</i> )	554
5:00 pm	<b>Switching-Current Measurement for Multiple ICs Sharing a Common Power Island Structure</b> ..... 560 Liang Li ( <i>Missouri University of Science and Technology, Rolla, MO, US</i> ); Chulsoon Hwang ( <i>KAIST, Daejeon, KR</i> ); Tao Wang ( <i>Missouri University of Science and Technology, Rolla, MO, US</i> ); Yuzo Takita ( <i>Sony Corporation, Tokyo, JP</i> ); Hayato Takeuchi ( <i>Sony Corporation, Tokyo, JP</i> ); Kenji Araki ( <i>Sony Corporation, Tokyo, JP</i> ); Jun Fan ( <i>Missouri University of Science and Technology, Rolla, MO, US</i> )	560

## THURSDAY TECHNICAL PAPERS

Thursday, August 9, 2012

### TH-AM-1 SS TC6 Evolving Trends in Spectrum Management and Engineering

Chair: Larry Cohen, Naval Research Laboratory

Co-Chair: Bob Johnk, Institute for Telecommunication Sciences (NTIA/ITS)

- 8:30 am **Specialized Algorithms for Spectrum Surveys** ..... 565  
Heather Ottke (*Institute for Telecommunication Sciences (NTIA/ITS), Boulder, CO, US*);  
Chriss Hammerschmidt (*Institute for Telecommunication Sciences (NTIA/ITS), Boulder, CO, US*)
- 9:00 am **Spectrum Attributes of Frequency-Steerable Phased Array Antennas** ..... 571  
Brian D. Cordill (*University of Kansas, Lawrence, KS, US*); Sarah A. Seguin (*University of Kansas, Lawrence, KS, US*); Lawrence Cohen (*Naval Research Laboratory, Washington, DC, US*);  
John de Graaf (*Naval Research Laboratory, Washington, DC, US*);  
Louis Parent (*University of Kansas, Lawrence, KS, US*)
- 9:30 am **A 3-Axis Antenna Array for Polarimetric Spectrum Surveys** ..... 575  
J. Wayde Allen (*Institute for Telecommunication Sciences (NTIA/ITS), Boulder, CO, US*)
- 10:30 am **Characterizing an S-Band Marine Radar Receiver in the Presence of Interference** ..... 579  
Mark A. McFarland (*Institute for Telecommunication Sciences (NTIA/ITS), Boulder, CO, US*);  
Robert T. Johnk (*Institute for Telecommunication Sciences (NTIA/ITS), Boulder, CO, US*)
- 11:00 am **A Fast-Fading Mobile Channel Measurement System** ..... 584  
Robert T. Johnk (*Institute for Telecommunication Sciences (NTIA/ITS), Boulder, CO, US*);  
Chriss A. Hammerschmidt (*Institute for Telecommunication Sciences (NTIA/ITS), Boulder, CO, US*);  
Mark A. McFarland (*Institute for Telecommunication Sciences (NTIA/ITS), Boulder, CO, US*);  
John J. Lemmon (*Institute for Telecommunication Sciences (NTIA/ITS), Boulder, CO, US*)

### TH-AM-2 TC9 Field Transformation

Chair: Alan Roden

- 8:30 am **Far-Field Prediction from Amplitude-Only Near-Field Measurements using Equivalent Electric Currents** ..... 590  
Wei-Jiang Zhao (*A\*Star, Singapore, SG*); Hark Byeong Park (*Samsung Electronics, Gyeonggi-do, KR*);  
Mark Tan (*A\*Star, Singapore, SG*); Hyun Ho Park (*Samsung Electronics, Gyeonggi-do, KR*);  
En-Xiao Liu (*A\*Star, Singapore, SG*); Eakhwan Song (*Samsung Electronics, Gyeonggi-do, KR*);  
Er-Ping Li (*A\*Star, Singapore, SG*)
- 9:00 am **Perturbation of Near-Field Scan from Connected Cables** ..... 594  
Morten Sørensen (*Aalborg University, Aalborg, DK*); Ondrej Franek (*Aalborg University, Aalborg, DK*);  
Gert Frølund Pedersen (*Aalborg University, Aalborg, DK*); Knud A. Baltsen (*Bang & Olufsen a/s, Struer, DK*); Hans Ebert (*Aalborg University, Aalborg, DK*)
- 9:30 am **Influence of Nearby Obstacles on the Feasibility of a Huygens Box as a Field Source** ..... 600  
Ondřej Franek (*Aalborg University, Aalborg, DK*); Morten Sørensen (*Aalborg University, Aalborg, DK*);  
Hans Ebert (*Aalborg University, Aalborg, DK*); Gert Frølund Pedersen (*Aalborg University, Aalborg, DK*)

10:30 am	<b>Numerical Evaluation of Near-Field to Far-Field Transformation Robustness for EMC</b> .....	605
	Andriy Radchenko ( <i>Missouri University of Science and Technology, Rolla, MO, US</i> ); Ji Zhang ( <i>Missouri University of Science and Technology, Rolla, MO, US</i> ); Keong Kam ( <i>Missouri University of Science and Technology, Rolla, MO, US</i> ); David Pommerenke ( <i>Missouri University of Science and Technology, Rolla, MO, US</i> ) * Nominated for Best Symposium Paper Award	
11:00 am	<b>Computational Study of External Fixation Devices Surface Heating in MRI RF Environment</b> .....	612
	Yan Liu ( <i>University of Houston, Houston, TX, US</i> ); Jianxiang Shen ( <i>University of Houston, Houston, TX, US</i> ); Wolfgang Kainz ( <i>U.S. Food and Drug Administration, Rockville, MD, US</i> ); Songsong Qian ( <i>Nanjing University of Science and Technology, Nanjing, CN</i> ); Wen Wu ( <i>Nanjing University of Science and Technology, Nanjing, CN</i> ); Ji Chen ( <i>University of Houston, Houston, TX, US</i> )	
11:30 am	<b>A Simplified Model of a Common Mode Choke Coil for 3D Field Simulators</b> .....	617
	Fujiyuki Nakamoto ( <i>Mitsubishi Electric Corporation, Kamakura-City Kanagawa-Pref, JP</i> ); Takeshi Uchida ( <i>Mitsubishi Electric Corporation, Kamakura-City Kanagawa-Pref, JP</i> ); Chiharu Miyazaki ( <i>Mitsubishi Electric Corporation, Kamakura-City Kanagawa-Pref, JP</i> ); Naoto Oka ( <i>Mitsubishi Electric Corporation, Kamakura-City Kanagawa-Pref, JP</i> ); Koichiro Misu ( <i>Mitsubishi Electric Corporation, Kamakura-City Kanagawa-Pref, JP</i> )	

### TH-AM-3 TC4 Shielding Analysis and Application

**Chair:** John Kraemer

**Co-Chair:** Phil Berger, John Deere Tractor Co.

8:30 am	<b>Planar and Bulk Resonant Periodic Screens against Plane-Wave and Electric-Dipole Excitations</b> .....	623
	Giampiero Lovat ( <i>Sapienza University of Rome, Roma, IT</i> ); Rodolfo Araneo ( <i>Sapienza University of Rome, Roma, IT</i> ); Salvatore Celozzi ( <i>Sapienza University of Rome, Roma, IT</i> )	
9:00 am	<b>An Approximate Theory of RF Shielded Enclosures</b> .....	629
	David C. Stallings ( <i>National Security Agency, Fort George G. Meade, MD, US</i> )	
9:30 am	<b>Novel Common-Mode Current Detector using Metamaterial CRLH Transmission-Line Structure</b> .....	635
	Da-jeong Eom ( <i>University of Incheon, Incheon, KR</i> ); Sungtek Kahng ( <i>University of Incheon, Incheon, KR</i> ); Boram Lee ( <i>University of Incheon, Incheon, KR</i> ); Se-gyoon Mok ( <i>University of Incheon, Incheon, KR</i> ); Seongryong Yoo ( <i>University of Incheon, Incheon, KR</i> ) * Nominated for Best Symposium Paper Award	
10:30 am	<b>Suppression of Leakage Magnetic Field from a Wireless Power Transfer System using Ferrimagnetic Material and Metallic Shielding</b> .....	640
	Hongseok Kim ( <i>KAIST, Daejeon, KR</i> ); Jonghyun Cho ( <i>KAIST, Daejeon, KR</i> ); Seungyoung Ahn ( <i>KAIST, Daejeon, KR</i> ); Jonghoon Kim ( <i>KAIST, Daejeon, KR</i> ); Joungho Kim ( <i>KAIST, Daejeon, KR</i> )	



- 11:00 am **EMI Reduction Evaluation with Flexible Absorbing Materials and Ferrite Cores Applied on Cables** ..... 646  
 Jing Li (*Missouri University of Science and Technology, Rolla, MO, US*); Yao-Jiang Zhang (*Missouri University of Science and Technology, Rolla, MO, US*); Aleksandr Gafarov (*Missouri University of Science and Technology, Rolla, MO, US*); Soumya De (*Missouri University of Science and Technology, Rolla, MO, US*); Marina Y. Koledintseva (*Missouri University of Science and Technology, Rolla, MO, US*); Joel Marchand (*ARC Technologies, Amesbury, MA, US*); David Hess (*ARC Technologies, Amesbury, MA, US*); Todd Durant (*ARC Technologies, Amesbury, MA, US*); Eric Nickerson (*ARC Technologies, Amesbury, MA, US*); James L. Drewniak (*Missouri University of Science and Technology, Rolla, MO, US*); Jun Fan (*Missouri University of Science and Technology, Rolla, MO, US*)

## TH-AM-4 TC2 Shielding

**Chair:** Bill Radasky, Metatech Corporation

- 8:30 am **Shielding Effectiveness Estimation of Physically Small Electrically Large Enclosures through Dimensional Scaling** ..... 652  
 Rob Armstrong (*University of York, York, UK*); Andrew C. Marvin (*University of York, York, UK*); John F. Dawson (*University of York, York, UK*)
- 9:00 am **Swept CW Testing of Shielded Systems** ..... 657  
 William D. Prather (*Air Force Research Laboratory, Kirtland AFB, NM, US*); Michael R. Rooney (*Defense Threat Reduction Agency, Ft. Belvoir, VA, US*); Jory Cafferky (*EG&G/URS, Albuquerque, NM, US*); Timothy M. Rynne (*Northrop Grumman, Palmdale CA, US*); Leonard Ortiz (*Oklahoma City Air Logistics Center, Tinker AFB, OK, US*); Garland Anderson (*Oklahoma City Air Logistics Center, Tinker AFB, OK, US*)
- 9:30 am **Three Methods for Measuring the Shielding Effectiveness of Shielding Materials: A Comparison** ..... 663  
 Mario Pocaï (*EMC Consultant, Pisa, IT*); Ivan Dotto (*CISAM, San Piero a Grado, IT*); Domenico Festa (*IBD, Chiari, IT*)
- 10:00 am **Expanding the Stripline Measuring Setup for the Characterisation of Conductive Gaskets Up To 40 GHz** ..... 669  
 Johan Catrysse (*MICAS/ESAT, KULeuven, Heverlee-Leuven, BE*); Filip Vanhee (*KHBO, Flanders Mechatronics Engineering Center, Oostende, BE*); Davy Pissoort (*KHBO, Flanders Mechatronics Engineering Center, Oostende, BE*); Christian Brull (*SEM Schlegel Electronic Materials, Leffinge, BE*); Patrick Reynaert (*MICAS/ESAT, KULeuven, Heverlee-Leuven, BE*)

## TH-PM-1 SS TC9 Model Validation with FSV

**Chair:** Jianmin Zhang, Cisco Systems, Inc

**Co-Chair:** Bruce Archambeault, IBM Corporation

- 2:30 pm **Development of Next Generation FSV Tools and Standards** ..... 674  
 Andrew L. Drozd (*ANDRO Computational Solutions, LLC, Rome, NY, US*); Bruce Archambeault (*IBM, RTP, NC, US*); Alistair Duffy (*De Montfort University, Leicester, UK*); Irina Kasperovich (*ANDRO Computational Solutions, LLC, Rome, NY, US*)
- 3:00 pm **FSV versus Human Subjective Data Evaluation; an Informal Survey** ..... 679  
 Michael R. Johnson (*USAF, Eglin AFB, FL, US*)

- 4:00 pm **The Use of Probability Density Functions to Improve the Interpretation of FSV Results** ..... 685  
 Zhang Gang (*Harbin Institute of Technology, Harbin, China*); Alistair Duffy (*De Montfort University, Leicester, UK*); Hugh Sasse (*De Montfort University, Leicester, UK*);  
 Wang Lixin (*Harbin Institute of Technology, Harbin, China*)
- 4:30 pm **Using FSV in High-Speed Channel Characterization and Correlation** ..... 690  
 Ji Zhang (*Missouri University of Science and Technology, Rolla, MO, US*); Jianmin Zhang (*Cisco Systems, Inc., San Jose, CA, US*); Jane Lim (*Cisco Systems, Inc., San Jose, CA, US*); Kelvin Qiu (*Cisco Systems, Inc., San Jose, CA, US*); Rick Brooks (*Cisco Systems, Inc., San Jose, CA, US*); Bill Chen (*Yangtze Delta Region Institute of Tsinghua University, Zhejiang Province, CN*)
- 5:00 pm **Using FSV for Far-Field Patterns** ..... 696  
 Michael R. Johnson (*USAF, Eglin AFB, FL, US*);  
 Edgar L. Coffey, III (*Applied Research Associates, Inc., Belcamp, MD, US*)

## TH-PM-2 TC2 Antennas

**Chair:** Dave Arnett, Hewlett Packard

**Co-Chair:** H. Robert Hofmann, Hofmann EMC Engineering

- 2:30 pm **Uncertainty Analysis for Three Antenna Method and Standard Antenna Method** ..... 702  
 Katsumi Fujii (*National Institute of Information and Communications Technology, Tokyo, JP*);  
 Martin Alexander (*National Physical Laboratory, Middlesex, UK*); Akira Sugiura (*National Institute of Information and Communications Technology, Tokyo, JP*)
- 3:00 pm **Equivalent Capacitance Substitution Method for Monopole Antenna Calibration** ..... 708  
 Akira Sugiura (*National Institute of Information and Communications Technology, Tokyo, JP*);  
 Martin Alexander (*National Physical Laboratory, Middlesex, UK*); David Knight (*National Physical Laboratory, Middlesex, UK*); Katsumi Fujii (*National Institute of Information and Communications Technology, Tokyo, JP*)
- 4:00 pm **Measurement-Based Modeling of Dual Loop Magnetic Near-Field Probe** ..... 714  
 Hiroki Funato (*Hitachi, Ltd. / Tokyo Metropolitan University, Yokohama / Hachioji, JP*); Takashi Suga (*Hitachi, Ltd., Yokohama, JP*); Michihiko Suhara (*Tokyo Metropolitan University, Hachioji, JP*)  
 \* Nominated for Best Symposium Paper Award
- 4:30 pm **An Inductive Probe for the Measurement of Common Mode Currents on Differential Traces** ..... 720  
 Victor Khilkevich (*Missouri University of Science and Technology, Rolla, MO, US*);  
 David Pommerenke (*Missouri University of Science and Technology, Rolla, MO, US*);  
 Li Gang (*Huawei Technologies Co. Ltd., Shenzhen, CN*);  
 Xu Shuai (*Huawei Technologies Co. Ltd., Shenzhen, CN*)
- 5:00 pm **An Updated EMC Standard for NASA's Goddard Space Flight Center** ..... 725  
 John McCloskey (*NASA/GSFC, Greenbelt, MD, US*); Ken Javor (*EMC Compliance, Huntsville, AL, US*)

## TH-PM-3 TC3 EM Environment

**Chair:** Fred Heather

- 2:30 pm **Detecting Man-Made Noise by using its Wideband Characteristic** ..... 731  
 Pablo Torio (*Universidad de Vigo, Vigo, ES*); Manuel G. Sanchez (*Universidad de Vigo, Vigo, ES*)

3:00 pm	<b>Characterization of Baseband Demodulated Man-Made Noise</b> .....	734
	Pablo Torio ( <i>Universidad de Vigo, Vigo, ES</i> ); Manuel G. Sanchez ( <i>Universidad de Vigo, Vigo, ES</i> )	
4:00 pm	<b>Study on the Radiation from SmartMeters</b> .....	738
	Jin Bai ( <i>Mission San Jose High School &amp; SIEMIC Testing and Certification Services, Fremont &amp; San Jose, CA, US</i> ); David Zhang ( <i>SIEMIC Testing and Certification Services, San Jose, CA, US</i> )	
4:30 pm	<b>Eliminating Man-Made Noise from PLC Systems by Taking Advantage of the Masked Tones</b> .....	744
	Pablo Torio ( <i>Universidad de Vigo, Vigo, ES</i> ); Manuel G. Sanchez ( <i>Universidad de Vigo, Vigo, ES</i> )	
5:00 pm	<b>Human Exposure in Arc-Welding Processes: Current versus Previous ICNIRP Basic Restrictions</b> .....	749
	Flavia Grassi ( <i>Politecnico di Milano, Milan, IT</i> ); Giordano Spadacini ( <i>Politecnico di Milano, Milan, IT</i> ); Sergio A. Pignari ( <i>Politecnico di Milano, Milan, IT</i> )	

#### **TH-PM-4 TC7 Low Frequency EMC Methods and Applications Including Power Quality**

**Chair:** Magnus Olofsson, Elforsk - Swedish Electrical Utilities' R & D Company

**Co-Chair:** Dave Thomas, University of Nottingham

2:30 pm	<b>Voltage Quality in Urban and Rural Areas</b> .....	755
	R.B. Timens ( <i>University of Twente, Enschede, NL</i> ); F.J.K. Buesink ( <i>University of Twente, Enschede, NL</i> ); F.B.J. Leferink ( <i>University of Twente / Thales Nederland B.V., Enschede / Hengelo, NL</i> )	
3:00 pm	<b>Are DC Currents in an AC Power Distribution the Root Cause for some Abnormalities in AU?</b> .....	760
	L. Gertmar ( <i>Lund University, Västerås, SE</i> ); R. Eide ( <i>Eureka VI, Melbourne, AU</i> ); M. Baxter ( <i>Eureka VI, Melbourne, AU</i> )	
4:00 pm	<b>Improved Wavelet-Based Techniques for Power Quality Evaluation in Three-Phase Systems</b> ..	766
	Ileana-Diana Nicolae ( <i>University of Craiova, Craiova, RO</i> ); Petre-Marian Nicolae ( <i>University of Craiova, Craiova, RO</i> ); Marian-Stefan Nicolae ( <i>University of Craiova, Craiova, RO</i> )	
4:30 pm	<b>Design of Coupled Resonators for Wireless Power Transfer to Mobile Devices using Magnetic Field Shaping</b> .....	772
	Woojin Ahn ( <i>System LSI Samsung Electronics Co. Ltd., Yongin, KR</i> ); Sungkwan Jung ( <i>KAIST, Daejeon, KR</i> ); Wonkyum Lee ( <i>KAIST, Daejeon, KR</i> ); Sangsik Kim ( <i>KAIST, Daejeon, KR</i> ); Junseok Park ( <i>KAIST, Daejeon, KR</i> ); Jaegue Shin ( <i>KAIST, Daejeon, KR</i> ); Hongseok Kim ( <i>KAIST, Daejeon, KR</i> ); Kyoungchoul Koo ( <i>KAIST, Daejeon, KR</i> )	
5:00 pm	<b>Effective Length Study of Grounding Electrodes Reached by Lightning based on Transmission Line Modelling Method</b> .....	777
	Daniel S. Gazzana ( <i>UFRGS University, Porto Alegre, BR</i> ); Arturo S. Bretas ( <i>UFRGS University, Porto Alegre, BR</i> ); Guilherme A.D. Dias ( <i>UFRGS University, Porto Alegre, BR</i> ); Marcos Telló ( <i>State Company of Electrical Energy – CEEE D, Porto Alegre, BR</i> ); Dave W.P. Thomas ( <i>University of Nottingham, Nottingham, UK</i> ); Christos Christopoulos ( <i>University of Nottingham, Nottingham, UK</i> )	

## TH-PM-5 TC5 Information Leakage

**Chair:** Yuichi Hayashi, Tohoku University

**Co-Chair:** William Price, Boeing

- 2:30 pm **Feasibility of Fault Analysis based on Intentional Electromagnetic Interference** ..... 782  
Junko Takahashi (*Nippon Telegraph and Telephone Corporation, Tokyo, JP*); Yu-ichi Hayashi (*Tohoku University, Sendai, JP*); Naofumi Homma (*Tohoku University, Sendai, JP*); Hitoshi Fuji (*Nippon Telegraph and Telephone Corporation, Tokyo, JP*); Takafumi Aoki (*Tohoku University, Sendai, JP*)
- 3:00 pm **A Fault Model for Conducted Intentional ElectroMagnetic Interferences** ..... 788  
Laurent Sauvage (*Telecom ParisTech, Paris, FR*); Sylvain Guilley (*Telecom ParisTech, Paris, FR*); Jean-Luc Danger (*Telecom ParisTech, Paris, FR*); Naofumi Homma (*Tohoku University, Sendai, JP*); Yu-ichi Hayashi (*Tohoku University, Sendai, JP*)
- 4:00 pm **Efficient Mapping of EM Radiation Associated with Information Leakage for Cryptographic Devices** ..... 794  
Haruki Shimada (*Tohoku University, Sendai, JP*); Yu-ichi Hayashi (*Tohoku University, Sendai, JP*); Naofumi Homma (*Tohoku University, Sendai, JP*); Takaaki Mizuki (*Tohoku University, Sendai, JP*); Takafumi Aoki (*Tohoku University, Sendai, JP*); Hideaki Sone (*Tohoku University, Sendai, JP*); Laurent Sauvage (*Telecom ParisTech, Paris, FR*); Jean-Luc Danger (*Telecom ParisTech, Paris, FR*)  
\* Nominated for Best Symposium Paper Award
- 4:30 pm **An Efficient Method for Estimating the Area of Information Propagation through Electromagnetic Radiation** ..... 800  
Yu-ichi Hayashi (*Tohoku University, Sendai, JP*); Naofumi Homma (*Tohoku University, Sendai, JP*); Taishi Ikematsu (*Tohoku University, Sendai, JP*); Takaaki Mizuki (*Tohoku University, Sendai, JP*); Takafumi Aoki (*Tohoku University, Sendai, JP*); Hideaki Sone (*Tohoku University, Sendai, JP*); Jean-Luc Danger (*Telecom ParisTech, Paris, FR*)
- 5:00 pm **Equivalent Current Source of Side-Channel Signal for Countermeasure Design with Analog Circuit Simulator** ..... 806  
Tetsuo Amano (*Okayama University, Okayama, JP*); Kengo Iokibe (*Okayama University, Okayama, JP*); Yoshitaka Toyota (*Okayama University, Okayama, JP*)