Tuesday, August 5, 2014

TU-AM-1 TC2 EMC Measurements
Chair: H. Robert Hofmann, Hofmann EMC Engineering, Naperville, IL, USA

10:30 am  A System to Measure Out-of-Band Noise of IEEE 802.11b/g/a/n/ac Transmitter Signals in Cellular Frequency Bands with Noise Calibration ................................................................. 1
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TU-AM-2 TC6 Spectrum Management
Chair: Karen Dyberg, Raytheon Integrated Defense Systems, Sudbury, MA, USA

Gregory B. Tait (Naval Surface Warfare Center Dahlgren, Dahlgren, VA, USA);
Carl Hager (Naval Surface Warfare Center Dahlgren, Dahlgren, VA, USA)
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TU-AM-5-SIPI SI/PI Design and Modeling for 3D Integration
Chair: Antonio Orlandi, University of L'Aquila, L'Aquila, Italy
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A. Orlandi (University of L'Aquila, L'Aquila, Italy)

TU-AM-6-SIPI SI/PI Advanced Noise/Jitter Modeling and Analysis
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Co-Chair: Jim Nadolny, Samtec, Inc., New Albany, IN, USA

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Co-Chair: Venkatesh Seetharam, Avago Technologies, San Jose, CA, USA

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Alpesh Bhobe (Cisco Systems, Inc., San Jose, CA, USA); Jing Li (Missouri University of Science and Technology, Rolla, MO, USA);
Xiao Li (Missouri University of Science and Technology, Rolla, MO, USA); David Pommerenke (Missouri University of Science and Technology, Rolla, MO, USA);
James Drewniak (Missouri University of Science and Technology, Rolla, MO, USA);
Hamed Kajbaf (Amber Precision Instruments, Sunnyvale, CA, USA);
Jin Min (Amber Precision Instruments, Sunnyvale, CA, USA);

TU-PM-3 Special Session: SC4 Radio-Frequency Interference and Wireless EMC
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Co-Chair: Yihong Qi, DBJ Technologies, Zhuhai, China

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Young-il Kim (ENERCONSTech. Co., Ltd., Seoul, South Korea); Joungho Kim (KAIST, Daejeon, South Korea)

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Co-Chair: Emmanuel Decrossas, California Institute of Technology, Pasadena, CA, USA

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Chair: Albert Rhueli, Missouri University of Science and Technology, Rolla, MO, USA
Co-Chair: Giulio Antonini, Università degli Studi dell'Aquila, L'Aquila, Italy
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TU-PM-6-SIPI SI/PI High Speed Interconnect Design and Analysis I
Chair: Antonio Orlandi, University of L’Aquila, L’Aquila, Italy
Co-Chair: Francesco de Paulis, University of L’Aquila, L’Aquila, Italy

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**WEDNESDAY TECHNICAL PAPERS**

**Wednesday, August 6, 2014**

**WED-AM-1 TC4 Cables and Connectors**
**Chair:** Phil Berger, Missouri University of Science and Technology, Rolla, MO, USA

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**WED-AM-2 TC2 Measurement – Immunity**
**Chair:** Tom Fagan, Raytheon, Tucson, AZ, USA

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Co-Chair: Andy Drozd, ANDRO Computational Solutions, LLC, Rome, NY, USA

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WED-AM-4 TC7 Low Frequency EMC
Chair: Magnus Olofsson, Elforsk - Swedish Electrical Utilities' R&D Company, Stockholm, Sweden
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WED-AM-5-SIPI SI/PI GHz Power Integrity Design
Chair: A. Ege Engin, San Diego State University, San Diego, CA, USA
Co-Chair: Zhiping Yang, Apple Inc., Cupertino, CA, USA

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WED-AM-6-SIPI SI/PI Co-Design and Co-Simulations
Chair:  Antonio Ciccomancini, CST of America, Framingham, MA, USA
Co-Chair:  Qing He, Oracle Corporation USA, Santa Clara, CA, USA

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WEDNESDAY POSTER PAPERS

Wednesday, August 6, 2014

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Finalist for Best Student SI/PI Paper Award
A Novel Microwave Network Analysis Method on Transient Response of Power Delivery Network
Chunlei Guo (Intel Corporation, Folsom, CA, USA)
Jiangqi He (Intel Corporation, Chandler, AZ, USA)

Noise Transfer from Receiver to Transmitter Circuits of Transceivers through Power Supply Network (PDN)
Janani Chandrasekhar (Altera Corporation, San Jose, CA, USA)
Yujeong Shim (Altera Corporation, San Jose, CA, USA)

On the Optimization of the Return Current Paths of Signal Vias in High-Speed Interposers and PCBs using the M3-Approach
Ivan Ndip (Fraunhofer IZM and Technische Universität Berlin, Berlin, Germany)
Kai Löbbicke (Rohde & Schwarz GmbH & Co. KG, Teisnach, Germany)
Christian Tschoban (Fraunhofer IZM and Technische Universität Berlin, Berlin, Germany)
Christian Ranzinger (Contag AG, Berlin, Germany)
Karim Richlowski (Contag AG, Berlin, Germany)
Andreas Contag (Contag AG, Berlin, Germany)
Klaus-Dieter Lang (Fraunhofer IZM and Technische Universität Berlin, Berlin, Germany)
Christian Ranzinger (Contag AG, Berlin, Germany)
Herbert Reichl (Fraunhofer IZM and Technische Universität Berlin, Berlin, Germany)
Heino Henke (Technische Universität Berlin, Berlin, Germany)

Evaluation of Radiated Emissions from Multi-Port Integrated Connector Modules (ICM) by S-Parameters
Hongmei Fan (Cisco Systems R&D Co., Ltd., Shanghai, China)
Jianquan Lou (Cisco Systems R&D Co., Ltd., Shanghai, China)
Hailong Zhang (Cisco Systems R&D Co., Ltd., Shanghai, China)
Jinghan Yu (Cisco Systems R&D Co., Ltd., Shanghai, China)
Alpesh Bhobe (Cisco Systems, Inc., San Jose, CA, USA)
Feng Ji (Cisco Systems R&D Co., Ltd., Shanghai, China)
Dewen Xu (Cisco Systems R&D Co., Ltd., Shanghai, China)
Wenbin Ma (Cisco Systems R&D Co., Ltd., Shanghai, China)
Xinyi Hu (Cisco Systems R&D Co., Ltd., Shanghai, China)

Complex Valued Neural Network Modelling of the Balun of a Biconical Antenna
Alessio Bonci (Università degli Studi di Firenze, Firenze, Italy)
Carlo Carobbi (Università degli Studi di Firenze, Firenze, Italy)
Antonio Luchetta (Università degli Studi di Firenze, Firenze, Italy)

WEDNESDAY TECHNICAL PAPERS

Wednesday, August 6, 2014

WED-PM-2 TC4 PCB EMC
Chair: John Kraemer, Rockwell Collins, Cedar Rapids, IA, USA

1:30 pm Modulation of 1 MHz Clock with Low Frequency (LF) Signals to Analyze Common-Mode Radiation from Printed Circuit Boards
Cyrus Rostamzadeh (Robert Bosch LLC, Plymouth, MI, USA)
Mark Steffka (General Motors, Milford, MI, USA)

2:00 pm Impact of Clock Net Routing on EMC Emissions Performance of Automotive Electronic Modules
S. Filipov (Johnson Controls, Sofia, Bulgaria)
A. Hadzhikrasteva (Johnson Controls, Sofia, Bulgaria)
C. Nandyala (Johnson Controls, Pune, India)
S. Mee (Johnson Controls, Holland, MI, USA)
K. Russa (Johnson Controls, Holland, MI, USA)
A. Lutz (Johnson Controls, Holland, MI, USA)
2:30 pm  A Method for Compensating Imbalance Component of Asymmetrical Differential-Paired Lines Due to Turnoff Point for SI and EMI Performances ................................. 519
Yoshiki Kayano (Akita University, Akita, Japan); Masashi Ohkoshi (Akita University, Akita, Japan); Hiroshi Inoue (The Open University of Japan, Akita, Japan)

3:30 pm  Investigating a Guard Trace Ring to Suppress the Crosstalk due to a Clock Trace on a Power Electronics DSP Control Board .................................................. 525
Jun Xu (University of Texas at San Antonio, San Antonio, TX, USA); Shuo Wang (University of Texas at San Antonio, San Antonio, TX, USA)

4:00 pm  PCB Structures for Common Mode Suppression on Differential Microstrip Lines .......................... 533
Qian Liu (Missouri University of Science and Technology, Rolla, MO, USA); Shuai Xu (Huawei Technologies Co., Ltd., Shenzhen, China); David Pommerenke (Missouri University of Science and Technology, Rolla, MO, USA)
Finalist for Best Student EMC Paper Award

WED-PM-3 TC5 High Power EM Including Intentional EMI, ESD and Lightning
Chair: William Radasky, Metatech Corporation, Goleta, CA, USA
Co-Chair: Michael McInerney, US Army Corp of Engineers, Champaign, IL, USA

1:30 pm  AC Harmonics Effects on Small External Power Supplies (Wall Warts) ................................. 538
Edward Savage (Metatech Corporation, Goleta, CA, USA); William Radasky (Metatech Corporation, Goleta, CA, USA); Michael Madrid (Metatech Corporation, Goleta, CA, USA)

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Matthias Kreitlow (Bundeswehr Research Institute for Protective Technologies and NBC Protection, Munster, Germany); Heyno Garbe (Leibniz Universität Hannover, Hannover, Germany); Frank Sabath (Bundeswehr Research Institute for Protective Technologies and NBC Protection, Munster, Germany)

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Chair: Alpesh Bhobe, Cisco Systems, Inc., San Jose, CA, USA
Co-Chair: Wilson Wu, Shenzhen Sunway Communication Co., Ltd., Shenzhen, China

1:30 pm  Radiation Physics and EMI Coupling Path Determination for Optical Links .................... 576
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4:30 pm  Physical Layer Phase Encryption for Combating the Traffic Analysis Attack .................. 604
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3:30 pm **Impedance Transparency Design for PCI-Express Gen 3 SerDes Channel on HDI PCBs** ...... 631
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Christian W. Baks (IBM Thomas J. Watson Research Center, Yorktown Heights, NY, USA);
Sebastian Müller (Technische Universität Hamburg-Harburg, Hamburg, Germany);
Christian Schuster (Technische Universität Hamburg-Harburg, Hamburg, Germany)

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Richard Mellitz (Intel Corporation, Columbia, SC, USA)
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<td>1:30 pm</td>
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<td>Changwook Yoon (Missouri University of Science and Technology, Rolla, MO, USA); Mikheil Tsiklauri (Missouri University of Science and Technology, Rolla, MO, USA); Mikhail Zvonkin (Missouri University of Science and Technology, Rolla, MO, USA); Jun Fan (Missouri University of Science and Technology, Rolla, MO, USA); James L. Drewniak (Missouri University of Science and Technology, Rolla, MO, USA); Jingook Kim (Ulsan National Institute of Science and Technology, Ulsan, South Korea); Alexander Razmadze (Altera Corporation, San Jose, CA, USA); Aman Aflaki (Altera Corporation, San Jose, CA, USA); Qinghua Bill Chen (Yangtze Delta Region Institute of Tsinghua University, Jiaxing, China)</td>
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<td>2:00 pm</td>
<td>De-Embedding Techniques for Transmission Lines: An Application to Measurements of On-Chip Coplanar Traces</td>
<td>Nicholas Erickson (Missouri University of Science and Technology, Rolla, MO, USA); Jun Fan (Missouri University of Science and Technology, Rolla, MO, USA); Xu Gao (Missouri University of Science and Technology, Rolla, MO, USA); Brice Achkir (Cisco Systems, Inc., San Jose, CA, USA); Siming Pan (Cisco Systems, Inc., San Jose, CA, USA)</td>
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<td>High-Speed Differential IO Crosstalk – The Impact of Phase, Bit Rate, Jitter and Equalization</td>
<td>Chunfei Ye (Intel Corporation, DuPont, WA, USA); Xiaoning Ye (Intel Corporation, DuPont, WA, USA); Brian Wang (Intel Corporation, DuPont, WA, USA); Juan Robledo (Intel Tecnologia de Mexico SA de CV, Jalisco, Mexico)</td>
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<td>Impact on Signal Integrity of Interconnect Variabilities</td>
<td>Paolo Manfredi (Politecnico di Torino, Torino, Italy); Dries Vande Ginste (Ghent University, Gent, Belgium); Daniël De Zutter (Ghent University, Gent, Belgium); Flavio G. Canavero (Politecnico di Torino, Torino, Italy)</td>
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<td>DC Blocking Capacitor Design and Optimization for High Speed Signalling</td>
<td>Weifeng Shu (Intel Asia Pacific Research and Development Ltd., Shanghai, China); Chunfei Ye (Intel Corporation, DuPont, WA, USA); Dan Liu (Intel Asia Pacific Research and Development Ltd., Shanghai, China); Xiaoning Ye (Intel Corporation, DuPont, WA, USA); Enrique Lopez (Intel Corporation, Tlaquepaque, Mexico); Xinjun Zhang (Intel Asia Pacific Research and Development Ltd., Shanghai, China)</td>
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<td>Stochastic Modeling of a High-Speed Signal Channel by Polynomial Chaos Method</td>
<td>Yansheng Wang (Missouri University of Science and Technology, Rolla, MO, USA); Alexander Razmadze (Altera Corporation, San Jose, CA, USA); Timothy Lu (Altera Corporation, San Jose, CA, USA); YaoJiang Zhang (Missouri University of Science and Technology, Rolla, MO, USA); Ji Chen (University of Houston, Houston, TX, USA); Jun Fan (Missouri University of Science and Technology, Rolla, MO, USA)</td>
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Thursday, August 7, 2014

TH-AM-1 TC2 Antennas
Chair: Don Heirman, Don HEIRMAN Consultants, Lincroft, NJ, USA

8:30 am  A Substitution Method for Antenna Calibration by the use of Broadband Antenna (30 to 1000 MHz) .......................................................... 691
Mitsunobu Samoto (Liberty Labs Asia, Inc., Yokohama, Japan); Nobuhito Samoto (Liberty Labs Asia, Inc., Yokohama, Japan); Hiroyuki Shimano (Liberty Labs Asia, Inc., Yokohama, Japan); Ikuo Makino (Liberty Labs Asia, Inc., Yokohama, Japan); Kazuo Shimada (ETS-Lindgren Japan, Edogawa-ku, Japan)

9:00 am  Optical Tracking based EM-field Probing System for EMC Near Field Manual Scanning ..... 697
Hui He (Missouri University of Science and Technology, Rolla, MO, USA); Pratik Maheshwari (Missouri University of Science and Technology, Rolla, MO, USA); David Pommerenke (Missouri University of Science and Technology, Rolla, MO, USA)

9:30 am  Broadband Measurement of Near-Fields for Predicting Far-Fields for EMC Applications ...... 702
Prasanna Padmanabhan (University of Kentucky, Lexington, KY, USA); Keith Hardin (Lexmark International, Inc., Lexington, KY, USA); William Smith (University of Kentucky, Lexington, KY, USA)

10:30 am  Coupling Path Visualization using a Movable Scatterer ...................................................... 707
Sen Yang (Missouri University of Science and Technology, Rolla, MO, USA); Pratik Maheshwari (Missouri University of Science and Technology, Rolla, MO, USA); Victor Khilkevich (Missouri University of Science and Technology, Rolla, MO, USA); David J. Pommerenke (Missouri University of Science and Technology, Rolla, MO, USA)

TH-AM-2 Special Session: TC9 and TC10 Large Scale Modeling for Signal and Power Integrity
Chair: Kai Xiao, Intel Corporation, DuPont, WA, USA
Co-Chair: Duo Chen, Intel Corporation, Santa Clara, CA, USA

8:30 am  Checking PCB Design Electrically for PI/SI Issues ................................................................. 712
Kai Xiao (Intel Corporation, DuPont, WA, USA); Thonas Su (Intel Corporation, Taipei, Taiwan); Jimmy Hsu (Intel Corporation, Taipei, Taiwan); Weifeng Shu (Intel Corporation, Shanghai, China); Xiaoning Ye (Intel Corporation, Hillsboro, OR, USA); Yuan-liang Li (Intel Corporation, Taipei, Taiwan)

9:00 am  Mobile-Oriented CPS (Chip-Package-System) Integrated Power Integrity Techniques at Early Chip Design Stage ......................................................... 717
Youngsoo Lee (Samsung Electronics, Seoul, South Korea); Kyoungchoul Koo (Samsung Electronics, Yong-in, South Korea); Woncheol Baek (Samsung Electronics, Yong-in, South Korea)

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Bangda Zhou (Purdue University, West Lafayette, IN, USA); Dan Jiao (Purdue University, West Lafayette, IN, USA)
10:30 am  Post-Layout PCB Check and Simulations for Signal Integrity ................................................. 727
Jiang Li (Cadence Design Systems, San Jose, CA, USA);
Yingzhi Wu (Cadence Design Systems, San Jose, CA, USA)

11:00 am  Wavelet Compression for Signal Integrity Analysis ................................................................. 732
Jianfang Zhu (Intel Corporation, Hillsboro, OR, USA);
Adam J. Norman (Intel Corporation, Hillsboro, OR, USA)

TH-AM-3 Special Session: TC5 Recent Research and Education in EM Information Security
Chair: Yu-ichi Hayashi, Tohoku University, Sendai, Japan
Co-Chair: William Radasky, Metatech Corporation, Goleta, CA, USA
Co-Chair: William Price, Boeing, Seattle, WA, USA

8:30 am  Precisely Timed IEMI Fault Injection Synchronized with EM Information Leakage ........... 738
Yu-ichi Hayashi (Tohoku University, Sendai, Japan); Naofumi Homma (Tohoku University, Sendai, Japan);
Takaaki Mizuki (Tohoku University, Sendai, Japan); Takafuli Aoki (Tohoku University, Sendai, Japan);
Hideaki Sone (Tohoku University, Sendai, Japan)

9:00 am  Investigation in Burst Pulse Injection Method for Fault based Cryptanalysis ...................... 743
Kengo Iokibe (Okayama University, Okayama, Japan); Kazuhiro Maeshima (Okayama University, Okayama, Japan);
Hiroti Kagotani (Okayama University, Okayama, Japan); Yasuyuki Nogami (Okayama University, Okayama, Japan);
Yoshitaka Toyota (Okayama University, Okayama, Japan); Tetsushi Watanabe (Industrial Technology Center of Okayama Prefecture, Okayama, Japan)

9:30 am  Integrated-Circuit Countermeasures against Information Leakage through EM Radiation ................................................................. 748
Noriyuki Miura (Kobe University, Kobe, Japan); Daisuke Fujimoto (Kobe University, Kobe, Japan);
Yu-ichi Hayashi (Tohoku University, Sendai, Japan); Naofumi Homma (Tohoku University, Sendai, Japan);
Takafuli Aoki (Tohoku University, Sendai, Japan); Makoto Nagata (Kobe University, Kobe, Japan)

10:30 am  Software and Hardware Co-Verification for Privacy-Enhanced Passive UHF RFID Tag ..... 752
Yang Li (The University of Electro-Communications, Tokyo, Japan); Toshiki Nakasone (The University of Electro-Communications, Tokyo, Japan); Kazuo Sakiyama (The University of Electro-Communications, Tokyo, Japan)

11:00 am  Hardware/Software Co-Design Flavors of Elliptic Curve Scalar Multiplication ............... 758
Josep Balasch (KU Leuven, ESAT/COSIC and iMinds, Leuven, Belgium); Benedikt Gierlichs (KU Leuven, ESAT/COSIC and iMinds, Leuven, Belgium); Kimmo Jarvinen (Aalto University, Espoo, Finland); Ingrid Verbauwhede (KU Leuven, ESAT/COSIC and iMinds, Leuven, Belgium)

11:30 am  Development of Human Resources in Hardware Security through Practical Information Technology Education Program ......................................................... 764
Naofumi Homma (Tohoku University, Sendai, Japan); Yu-ichi Hayashi (Tohoku University, Sendai, Japan); Toshihiro Katashita (AIST, Tsukuba, Japan); Hideaki Sone (Tohoku University, Sendai, Japan)
TH-AM-4 TC9 Reverb Chambers and Complex Cavities

Chair: Vignesh Rajamani, Oklahoma State University, Stillwater, OK, USA
Co-Chair: James West, Oklahoma State University, Stillwater, OK, USA

8:30 am  A Hybrid Approach to Calculate Mean Response and Variance in a Reverberant Environment ................................................................. 768
Robin S. Langley (University of Cambridge, Cambridge, United Kingdom);
Andrea Barbarulo (University of Cambridge, Cambridge, United Kingdom);
Louis Kovalevsky (University of Cambridge, Cambridge, United Kingdom)

9:00 am  Dependence of Reverberation Chamber Performance on Distributed Losses: A Numerical Study ................................................................. 775
Gabriele Gradoni (The University of Nottingham, Nottingham, United Kingdom);
Valter Mariani Primiani (Università Politecnica delle Marche, Ancona, Italy);
Franco Moglie (Università Politecnica delle Marche, Ancona, Italy)

9:30 am  Simulation of Stirred Fields within a Reverberation Chamber using a Refined Spectral-Domain-Factorization Moment Method ................................................................. 781
James C. West (Oklahoma State University, Stillwater, OK, USA);
Vignesh Rajamani (Oklahoma State University, Stillwater, OK, USA);
Charles F. Bunting (Oklahoma State University, Stillwater, OK, USA)

10:30 am  Search for Limits of Complex Cavity Model by Progressive Simplification ................................................................. 787
F. Todeschini (AIRBUS Defense & Space, Les Mureaux, France);
A. Bertrand (AIRBUS Defense & Space, Les Mureaux, France);
M. Ramos (AIRBUS Defense & Space, Les Mureaux, France)

11:00 am  Random Coupling Model for Interconnected Wireless Environments ................................................................. 792
Gabriele Gradoni (University of Maryland, College Park, MD, USA);
Thomas M. Antonsen Jr. (University of Maryland, College Park, MD, USA);
Steven M. Anlage (University of Maryland, College Park, MD, USA);
Edward Ott (University of Maryland, College Park, MD, USA)

TH-AM-5A-SIPI SI/PI Package/PCB Material Characterization

Chair: Xiaoning Ye, Intel Corporation, Hillsboro, OR, USA
Co-Chair: Brice Achkir, Cisco Systems Inc., San Jose, CA, USA

8:30 am  Effective Roughness Dielectric in a PCB: Measurement and Full-Wave Simulation Verification ................................................................. 798
Tracey Vincent (CST of America, Framingham, MA, USA);
Marina Koledintseva (Missouri University of Science and Technology, Rolla, MO, USA);
Antonio Ciccomancini (CST of America, Framingham, MA, USA);
Scott Hinaga (Cisco Systems Inc., San Jose, CA, USA)
Finalist for Best SI/PI Paper Award

9:00 am  Modelling Jitter Induced by Fibre Weave Effect in PCB Dielectrics ................................................................. 803
Yuriy Shlepnev (Simberian Inc., Las Vegas, NV, USA);
Chudy Nwachukwu (Isola Group USA, Chandler, AZ, USA)
9:30 am Characterization of PCB Dielectric Properties using Two Striplines on the Same Board .......................... 809
Lei Hua (Missouri University of Science and Technology, Rolla, MO, USA); Bichen Chen (Missouri University of Science and Technology, Rolla, MO, USA); Shuai Jin (Missouri University of Science and Technology, Rolla, MO, USA); Marina Kolelintageva (Missouri University of Science and Technology, Rolla, MO, USA); Jane Lim (Cisco Systems, Inc., San Jose, CA, USA); Kelvin Qiu (Cisco Systems, Inc., San Jose, CA, USA); Rick Brooks (Cisco Systems, Inc., San Jose, CA, USA); Ji Zhang (Cisco Systems, Inc., San Jose, CA, USA); Ketan Shringarpure (Missouri University of Science and Technology, Rolla, MO, USA); Jun Fan (Missouri University of Science and Technology, Rolla, MO, USA)

TH-AM-5B-SIPI SI/PI High Speed Interconnect Design and Analysis III
Chair: Brice Achkir, Cisco Systems, Inc., San Jose, CA, USA
Co-Chair: Dan Oh, Altera Corporation, San Jose, CA, USA

10:30 am An Accurate, Robust and Intuitive Technique to Detect Causality Violations in Broadband Frequency Measurements .............................................................................................................................. 815
Piero Triverio (University of Toronto, Toronto, ON, Canada)
Finalist for Best SI/PI Paper Award

11:00 am SI-PI Cosimulation Analysis of Dual Referencing and VSS-Referencing Memory Bus .............. 821
Mauro Lai (Intel Corporation, DuPont, WA, USA); Krishna Srinivasan (Intel Corporation, DuPont, WA, USA); Ritochit Chakraborty (Intel Corporation, DuPont, WA, USA); Madhumitha Seshadhri (Intel Corporation, DuPont, WA, USA)

11:30 am A Jitter Equalization Technique for Minimizing Supply Noise Induced Jitter in High Speed Serial Links .............................................................................................................................. 827
Yujeong Shim (Altera Corporation, San Jose, CA, USA); Dan Oh (Altera Corporation, San Jose, CA, USA); Tim Hoang (Altera Corporation, San Jose, CA, USA); Yanjing Ke (Altera Corporation, San Jose, CA, USA)

TH-AM-6-SIPI SI/PI On-Chip and Off-Chip Power Integrity Issues and Design
Chair: Dale Becker, IBM, Poughkeepsie, NY, USA
Co-Chair: Young Kwark, IBM Research, Yorktown Heights, NY, USA

8:30 am Power Integrity Analysis for Core Timing Models .................................................................................. 833
Dan Oh (Altera Corporation, San Jose, CA, USA);
Yujeong Shim (Altera Corporation, San Jose, CA, USA)
Finalist for Best SI/PI Paper Award

9:00 am Effect of Narrow Power Fills on PCB PDN Noise .................................................................................. 839
Ketan Shringarpure (Missouri University of Science and Technology, Rolla, MO, USA); Biyao Zhao (Missouri University of Science and Technology, Rolla, MO, USA); Bruce Archambeault (IBM Corporation, Durham, NC, USA); Albert Ruehli (Missouri University of Science and Technology, Rolla, MO, USA); Jun Fan (Missouri University of Science and Technology, Rolla, MO, USA); James Drewniak (Missouri University of Science and Technology, Rolla, MO, USA)

9:30 am Optimization of PCB PDN Design using Enhanced VRM Model .................................................... 845
Guang Chen (Altera Corporation, San Jose, CA, USA); Ahmed Abou-Alfotouh (Altera Corporation, San Jose, CA, USA); Zhiwei Liu (Altera Corporation, San Jose, CA, USA); Mostafa Shabban (Altera Corporation, San Jose, CA, USA); Dan Oh (Altera Corporation, San Jose, CA, USA)
10:30 am  Electrical Characterization of Bump-Less High Speed Channel on Silicon, Organic and Glass Interposer ......................................................... 850
Hyunsuk Lee (KAIST, Daejeon, South Korea); Heegon Kim (KAIST, Daejeon, South Korea); Kiiyong Kim (KAIST, Daejeon, South Korea); Daniel H. Jung (KAIST, Daejeon, South Korea); Jonghoon J. Kim (KAIST, Daejeon, South Korea); Sumin Choi (KAIST, Daejeon, South Korea); Jaemin Lim (KAIST, Daejeon, South Korea); Joungho Kim (KAIST, Daejeon, South Korea); Hyungsoo Kim (SK Hynix Semiconductor Inc., Icheon, South Korea); Kunwoo Park (SK Hynix Semiconductor Inc., Icheon, South Korea)

11:00 am  Switching Voltage Regulator Modeling and its Applications in Power Delivery Design ............................................................. 855
Wei Xu (Intel Corporation, Chandler, AZ, USA); Jin Fang (Intel Corporation, DuPont, WA, USA); Jiangqi He (Intel Corporation, Chandler, AZ, USA); Tae Kim (Intel Corporation, Chandler, AZ, USA)

11:30 am  Accelerating the Large-Scale Simulation of Power Distribution Networks by using the Multi-GPU LIM ..................................................... 861
Yuta Inoue (Shizuoka University, Hamamatsu, Japan); Hideki Asai (Shizuoka University, Hamamatsu, Japan)

TH-PM-1 TC9 Numerical Modeling Approaches
Chair: Alan Roden, Aerospace Corporation, Chantilly, VA, USA
Co-Chair: Albert E. Ruehli, Missouri University of Science and Technology, Rolla, MO, USA

2:30 pm  Parallel Power Grid Analysis using Distributed Direct Linear Solver ......................................................... 866
Qing He (Oracle Corporation USA, Santa Clara, CA, USA); William Au (Oracle Corporation USA, Santa Clara, CA, USA); Alexander Korobkov (Oracle Corporation USA, Santa Clara, CA, USA); Subramanian Venkateswaran (Oracle Corporation USA, Santa Clara, CA, USA)

3:00 pm  Uncertainty Quantification of EM-Circuit Systems using Stochastic Polynomial Chaos Method ......................................................... 872
Ping Li (The University of Hong Kong, Hong Kong, China); Li Jun Jiang (The University of Hong Kong, Hong Kong, China)

Finalist for Best Student EMC Paper Award

4:00 pm  An Active Thevenin Equivalent Network Approach to EMI/EMC Problems ......................................................... 878
Jeffery T. Williams (Sandia National Laboratories, Albuquerque, NM, USA); Larry D. Bacon (Sandia National Laboratories, Albuquerque, NM, USA); Michael J. Walker (Sandia National Laboratories, Albuquerque, NM, USA); Erik C. Zeek (Sandia National Laboratories, Albuquerque, NM, USA)

4:30 pm  A Wigner Function Approach for Describing the Radiation of Complex Sources ......................................................... 882
Gabriele Gradoni (University of Nottingham, Nottingham, United Kingdom); Stephen C. Creagh (University of Nottingham, Nottingham, United Kingdom); Gregor Tanner (University of Nottingham, Nottingham, United Kingdom)

5:00 pm  Locally Stabilized Explicit Method for Fast Transient Analysis of Inhomogeneously-Meshed Plane Structures ......................................................... 888
Tadatoshi Sekine (Shizuoka University, Hamamatsu-shi, Japan); Hideki Asai (Shizuoka University, Hamamatsu-shi, Japan)
TH-PM-2 TC2 TEM and Reverb Measurements
Chair: Galen Koepke, National Institute of Standards and Technology, Boulder, CO, USA

2:30 pm  A Methodology to Generate a Time-varying Adjustable Wave Impedance inside a TEM Cell ................................................................. 894
Guanghua Li (Missouri University of Science and Technology, Rolla, MO, USA); V.A.K. Prabhala (Missouri University of Science and Technology, Rolla, MO, USA); Abhinav Saxena (Missouri University of Science and Technology, Rolla, MO, USA); Qian Wang (Missouri University of Science and Technology, Rolla, MO, USA); Pratik Maheshwari (Missouri University of Science and Technology, Rolla, MO, USA); David Pommerenke (Missouri University of Science and Technology, Rolla, MO, USA)
Finalist for Best Student EMC Paper Award

3:00 pm  Enhanced Estimates of Field Distribution's Uncertainty Contribution for TEM Waveguides ............................................................. 899
David Hamann (Leibniz Universität Hannover, Hannover, Germany);
Heyno Garbe (Leibniz Universität Hannover, Hannover, Germany)

4:00 pm  Over-the-Air Performance Testing of a Real 4G LTE base Station in a Reverberation Chamber ................................................................. 903
Massimo Barazzetta (Nokia Solutions and Networks Italia, Cassina de' Pecchi, Italy); Davide Micheli (TELECOM Italia, Rome, Italy); Franco Moglie (Università Politecnica delle Marche, Ancona, Italy); Valter Mariani Primiani (Università Politecnica delle Marche, Ancona, Italy)

4:30 pm  Effectiveness of Absorbing Materials on Reducing Electromagnetic Emissions from Cavities Measured using a Nested Reverberation Chamber Approach ................................................. 909
Logan J. Washbourne (Oklahoma State University, Stillwater, OK, USA); Vignesh Rajamani (Oklahoma State University, Stillwater, OK, USA); Charles F. Bunting (Oklahoma State University, Stillwater, OK, USA); James C. West (Oklahoma State University, Stillwater, OK, USA);
Bruce Archambeault (IBM Corporation, Durham, NC, USA); Samuel Connor (IBM Corporation, Durham, NC, USA)
Finalist for Best Student EMC Paper Award

TH-PM-3 TC1 Business and Management Concerns in EMC
Chair: Doug Kramer, ETS-Lindgren, Cedar Park, TX, USA

2:30 pm  ITE EMC Requirements in BRIC Countries ................................................................. 913
Mark Maynard (SIEMIC, Inc., Milpitas, CA, USA)

3:00 pm  Demographics of Bench Level Automotive Electrical and Electromagnetic Compatibility Validation Test Laboratories ................................................. 919
Lawrence Banasky Jr. (Ford Motor Company, Dearborn, MI, USA)

4:00 pm  Part 2: Dealing with Complexities of Worldwide Regulatory Compliance; Beginning with EMC ................................................................. 924
David Staggs (Regulatory Consultant, Hunt, TX, USA)

4:30 pm  Why Few (if any) Medical Devices Comply with their EMC Standard, and What Can be Done About It ................................................................. 929
Keith Armstrong (Cherry Clough Consultants Ltd., Stafford, United Kingdom)
5:00 pm **Size of Devices to be Measured at 3m** ................................................................. 935
Andy Griffin (*Cisco Systems Inc., San Jose, CA, USA*)

*Finalist for Best EMC Paper Award*

**TH-PM-5-SIPI SI/PI Channel Emulation**

**Chair:** Zhiping Yang, Apple Inc., Cupertino, CA, USA  
**Co-Chair:** Michael Cracraft, IBM Corporation, Poughkeepsie, NY, USA

2:30 pm **Electro-Mechanical Structures for Channel Emulation** ............................................. 939
Satyajeet Shinde (*Missouri University of Science and Technology, Rolla, MO, USA*); Sen Yang (*Missouri University of Science and Technology, Rolla, MO, USA*); Nicholas Ericson (*Missouri University of Science and Technology, Rolla, MO, USA*); David Pommerenke (*Missouri University of Science and Technology, Rolla, MO, USA*); Chong Ding (*Cisco Systems, Inc., Durham, NC, USA*); Douglas White (*Cisco Systems, Inc., Durham, NC, USA*); Stephen Scearce (*Cisco Systems, Inc., Durham, NC, USA*); Yaochao Yang (*Cisco Systems, Inc., San Jose, CA, USA*)

3:00 pm **Emulation of Lossy Channels using a Low Loss Microstrip Trace with added Lossy Materials** ................................................................. 945
Wei Qian (*Missouri University of Science and Technology, Rolla, MO, USA*); Guanghua Li (*Missouri University of Science and Technology, Rolla, MO, USA*); Pratik Maheshwari (*Missouri University of Science and Technology, Rolla, MO, USA*); Victor Khilkevich (*Missouri University of Science and Technology, Rolla, MO, 65401, USA*); David Pommerenke (*Missouri University of Science and Technology, Rolla, MO, USA*); Chong Ding (*Cisco Systems, Inc., Durham, NC, USA*); Douglas White (*Cisco Systems, Inc., Durham, NC, USA*); Stephen Scearce (*Cisco Systems, Inc., Durham, NC, USA*); Yaochao Yang (*Cisco Systems, Inc., San Jose, CA, USA*)

4:00 pm **Implementation of a 18 GHz Bandwidth Channel Emulator using FIR Filter** ................. 950
Abhishek Patnaik (*Missouri University of Science and Technology, Rolla, MO, USA*); Atieh Talebzadeh (*Missouri University of Science and Technology, Rolla, MO, USA*); Mikheil Tsiklauri (*Missouri University of Science and Technology, Rolla, MO, USA*); David Pommerenke (*Missouri University of Science and Technology, Rolla, MO, USA*); Chong Ding (*Cisco Systems, Inc., San Jose, CA, USA*); Douglas White (*Cisco Systems, Inc., San Jose, CA, USA*); Stephen Scearce (*Cisco Systems, Inc., San Jose, CA, USA*); Yaochao Yang (*Cisco Systems, Inc., San Jose, CA, USA*)

4:30 pm **Designing a 3D Printing based Channel Emulator** .......................................................... 956
Xiangyang Jiao (*Missouri University of Science and Technology, Rolla, MO, USA*); Hui He (*Missouri University of Science and Technology, Rolla, MO, USA*); Guanghua Li (*Missouri University of Science and Technology, Rolla, MO, USA*); Wei Qian (*Missouri University of Science and Technology, Rolla, MO, USA*); Guangyao Shen (*Missouri University of Science and Technology, Rolla, MO, USA*); David Pommerenke (*Missouri University of Science and Technology, Rolla, MO, USA*); Chong Ding (*Cisco Systems, Inc., San Jose, CA, USA*); Douglas White (*Cisco Systems, Inc., San Jose, CA, USA*); Stephen Scearce (*Cisco Systems, Inc., San Jose, CA, USA*); Yaochao Yang (*Cisco Systems, Inc., San Jose, CA, USA*)

*Finalist for Best Student SI/PI Paper Award*  
*Finalist for Best SI/PI Paper Award*
2:30 pm  Causality and Delay and Physics in Real Systems .......................................................... 961
Mikheil Tsiklauri (Missouri University of Science and Technology, Rolla, MO, USA);
Mikhail Zvonkin (Missouri University of Science and Technology, Rolla, MO, USA); Jun Fan
(Missouri University of Science and Technology, Rolla, MO, USA); James Drewniak (Missouri
University of Science and Technology, Rolla, MO, USA); Qinghua Bill Chen (Yangtze Delta Region
Institute of Tsinghua University and Peking University, Tiaxing / Beijing, China);
Alexander Razmadze (Altera Corporation, San Jose, CA, USA)

3:00 pm  Signal Integrity Optimization by Suppressing Resonance of Multi-Port
Transfer Function in Multi-Interconnect Systems ................................................................. 967
Xing-Ming Li (Beijing Institute of Technology, Beijing, China); Shan-Qing Hu (Beijing Institute of
Technology, Beijing, China); Kye-Yak See (Nanyang Technological University, Singapore,
Singapore); Yi Deng (Virginia Polytechnic Institute and State University, Arlington, VA, USA)

4:00 pm  Simulation Models for Signal Integrity Analyses Extracted from Computed
Tomography Scans – A Case Study for High-Speed Interconnects ....................................... 973
Sven Simon (University of Stuttgart, Stuttgart, Germany); Jürgen Hillebrand (University of Stuttgart,
Stuttgart, Germany); Steffen Kieß (University of Stuttgart, Stuttgart, Germany)

4:30 pm  NEXT and FEXT Characteristics and Suppressions in Dense 25Gbps+ Backplane Vias ...... 979
Peerouz Amleshi (Molex Inc., Lisle, IL, USA); Cong Gao (Molex Inc., Lisle, IL, USA)