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¹Schaffner Group, Luterbach, Switzerland; ²Politecnico di Milano, Milan, Italy

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Best SIPI Student Paper Finalist and Best SIPI Paper Finalist

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¹*Missouri University of Science and Technology, Rolla, MO, USA;*
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Co-Chair: Pablo Narvaez, National Aeronautics and Space Administration (NASA)/
Jet Propulsion Laboratory (JPL), Pasadena, CA, USA

Co-Chair: Jen Dimov, National Aeronautics and Space Administration (NASA),
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¹Robust Physics, Del Mar, CA, USA; ²NASA Kennedy Space Center, Cape Canaveral, FL, USA;
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Siqi Bai ¹ ; Chenxi Huang ¹ ; James Drewniak ¹ ; Tao Wang ² ; Gerardo Romo Luevano ² ; Tim Michalka ² ¹ Missouri University of Science and Technology, Rolla, MO, USA; ² Qualcomm Technologies, Inc., San Diego, CA, USA	
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M.M. Tomilin Moscow Aviation Institute, Moscow, Russia	
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Scalable Package-Level RFI Filter for Digital Clock Noise Mitigation in 5-GHz and Future 6-GHz WiFi Applications	427
Jaejin Lee ¹ ; Hao-Han Hsu ¹ ; Ying-Ern Ho ²	
¹ Intel Corporation, Hillsboro, OR, USA; ² Intel Corporation, Panang, Malaysia	
An Integer Programming Application for PCB Stack-Up Arrangement	432
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¹ Missouri University of Science and Technology, Rolla, MO, USA; ² University of Texas at Austin, Austin, TX, USA; ³ Dell Inc., Round Rock, TX, USA	

THURSDAY TECHNICAL PAPERS

Thursday, July 25, 2019

TH-AM-1 Emerging Wireless Technologies (Sponsored by TC-12)

8:30 am - 12:00 pm

Chair: Zhiping Yang, Google LLC, Mountain View, CA, USA

Co-Chair: Lie Liu, General Test Systems, Shenzhen, China

10:30 am	Wireless Coexistence Testing in the 5 GHz Band with LTE-LAA Signals	437
Mohamad Omar Al Kalaa; Seth J. Seidman		
<i>FDA, Silver Spring, MD, USA</i>		

TH-AM-2 Current Challenges in Spectrum Engineering (Sponsored by TC-6)

8:30 am - 12:00 pm

Chair: Robert Johnk, National Telecommunications and Information Administration, Boulder, CO, USA

Co-Chair: Sarah Seguin, Resonant Frequency, Maple Grove, MN, USA

8:30 am	Spectrum Considerations for Satellites and Ramifications for RF Interference	443
Thomas J. Fagan; David G. Lubar		
<i>The Aerospace Corporation, El Segundo, CA, USA</i>		

9:00 am	Real-Time Circuit Reconfiguration for a Cognitive Software-Defined Radar Transmission: A New Paradigm in Spectrum Sharing	448
Charles Baylis ¹ ; Austin Egbert ¹ ; Jose Alcalá-Medel ¹ ; Angélique Dockendorf ¹ ; Anthony Martone ² ; Robert J. Marks II ¹		
¹ Baylor University, Waco, TX, USA; ² Army Research Laboratory, Adelphi, MD, USA		

9:30 am	Radar Waveform Design for Spectrum Sharing using the Antenna Fidelity Pattern	451
Sarah A. Seguin; Brian D. Cordill		
<i>Resonant Frequency, Maple Grove, MN, USA</i>		

10:30 am	Site Specific Propagation Model Development	457
Chriss Hammerschmidt; Robert T. Johnk		
<i>National Telecommunications and Information Administration, Boulder, CO, USA</i>		

11:00 am **Mobile Channel Sounder Validations Carried Out at the ITS Table Mountain Field Site** 463
Robert Johnk; Erik Hill; Chriss Hammerschmidt; Anna Paulson; Ronald Carey; Savio Tran; Mike Chang
National Telecommunications and Information Administration, Boulder, CO, USA

11:30 am **Precision Geolocation of Propagation Data using GPS and Data Fusion** 469
Anna E. Paulson
National Telecommunications and Information Administration, Boulder, CO, USA

TH-AM-3 Signal Propagation – 2 (Sponsored by TC-10) 8:30 am - 12:00 pm

Chair: Tao Wang, Qualcomm Technologies, Inc., San Diego, CA, USA

Co-Chair: Yunhui Chu, Intel Co., Hillsboro, OR, USA

8:30 am **Modeling and Analysis of Nonlinear High-Speed Link** 475
Xiuqin Chu¹; Wenwu Wang¹; Jun Wang¹; Yushan Li¹; Hank Wu²
¹Xidian University, Xi'an, China; ²Intel Corporation, Shanghai, China

TH-AM-4 Computational EM (Sponsored by TC-9) 8:30 am - 12:00 pm

Chair: Matthias Tröscher, Dassault Systemes Deutschland GmbH, Munich, Germany

Co-Chair: Scott Piper, General Motors, Milford, MI, USA

8:30 am **On the Validity of Time Domain Methods for the Calculation of Cavity Calibration Factors** 481
Michael R. Johnson
USAF, Eglin AFB, FL, USA
Best EMC Paper Finalist

9:00 am **Estimating Electromagnetic Interference from Solar Panels for Space Vehicles** 487
David Norte
Ball Aerospace, Boulder, CO, USA

9:30 am **System Level EMC for Multiple EMI Sources** 493
Javad Meiguni¹; Morten Soerensen¹; Wei Zhang¹; David Pommerenke¹; Kaustav Ghosh²;
Philippe Sochoux²; Jacques Rollin²; Angela Li²
¹Missouri University of Science and Technology, Rolla, MO, USA; ²Juniper Networks, Inc., Sunnyvale, CA, USA

10:30 am **A Novel Statistical Model for the Electromagnetic Coupling to Electronics inside Enclosures** 499
Shen Lin¹; Zhen Peng¹; Edl Schamiloglu¹; Zachary B. Drikas²; Thomas Antonsen³
¹University of New Mexico, Albuquerque, NM, USA; ²Naval Research Laboratory, Washington DC, USA; ³University of Maryland, College Park, MD, USA
Best EMC Student Paper Finalist and Best EMC Paper Finalist

TH-AM-5 Multiphysics (Sponsored by TC-9 and TC-10) 8:30 am - 12:00 pm

Chair: Shaowu Huang, Marvell Semiconductor Inc., Santa Clara, CA, USA

Co-Chair: Kevin Pham, ational Aeronautics and Space Administration-Jet Propulsion Laboratory,
Pasadena, CA, USA

8:30 am **Measurement Investigation on Acoustic Noise caused by “Singing” Capacitors on Mobile Devices** 505
Yin Sun¹; Jianmin Zhang²; Zhiping Yang²; Chulsoon Hwang¹; Songping Wu²
¹Missouri University of Science and Technology, Rolla, MO, USA; ²Google LLC, Mountain View, CA, USA
Best SIPI Student Paper Finalist

9:00 am	Decoupling Capacitor Derating Study under DC Bias and Cooling Environment	511
	Baolong Li <i>ANSYS, Inc., San Jose, CA, USA</i>	
9:30 am	Causality Analyzing for Transmission Line with Surface Roughness	516
	Xinglin Sun ¹ ; Yuandong Guo ² ; Yin Sun ² ; Kaichen Song ¹ ; Lingyun Ye ¹ ; Xiaoning Ye ³ ; James L. Drewniak ² ; Jun Fan ² ¹ <i>Zhejiang University, Hangzhou, China</i> ; ² <i>Missouri University of Science and Technology, Rolla, MO, USA</i> ; ³ <i>Intel Corporation, Hillsboro, OR, USA</i> <i>Best SIPI Paper Finalist</i>	
10:30 am	Simulation and Characterization of Singing Capacitors in Consumer Electronics	522
	Tianjian Lu ¹ ; Mingyao Ding ² ; Ken Wu ¹ ¹ <i>Google LLC, Mountain View, CA, USA</i> ; ² <i>Singularity Engineering LLC, San Jose, CA, USA</i>	
11:00 am	A Novel Data-Driven Analysis Method for Nonlinear Electromagnetic Radiations based on Dynamic Mode Decomposition	527
	Yanming Zhang; Lijun Jiang <i>The University of Hong Kong, Hong Kong, China</i>	
11:30 am	Characterization of On-Die Interconnects Exhibiting Slow-Wave Propagation	532
	Gerardo Romo L. ¹ ; Adan Sanchez ¹ ; Vinit Sonawane ¹ ; Scott Powers ¹ ; Tim Michalka ¹ ; Bogdan Nae ² ; Yasaman Shadrokh ² ; Jimmy Johansson ² ; Peter Robinson ² ¹ <i>Qualcomm Technologies, Inc., San Diego, CA, USA</i> ; ² <i>Qualcomm Technologies International Ltd., Cambridge, United Kingdom</i>	

TH-AM-6 EMC Standards Measurements (Sponsored by TC-2) 8:30 am - 12:00 pm

Chair: Don Heirman, Don HEIRMAN Consultants, Lincroft, NJ, USA

Co-Chair: Ghery Pettit, Ghery Pettit, Pettit EMC Consultants, Olympia, WA, USA

8:30 am	A Detailed Numerical Analysis of the Electric Field Distribution in Rod Antenna Radiated Emission Setups	537
	Renzo Azaro ¹ ; Alessandro Gandolfo ² ¹ <i>EMC S.r.l., Genova, Italy</i> ; ² <i>Narda Safety Test Solutions S.r.l., Cisano sul Neva (SV), Italy</i>	
9:00 am	A Multi-Mode Noise Reference Source for Verifying Different Conducted Emission Setups	543
	Wei Zhang ¹ ; Rui Mi ¹ ; Javad Meiguni ¹ ; Shubhankar Marathe ¹ ; Kaustav Ghosh ² ; Angela Li ² ; Qian Liu ² ; Jacques Rollin ² ; Philippe Sochoux ² ; David Pommerenke ¹ ¹ <i>Missouri University of Science and Technology, Rolla, MO, USA</i> ; ² <i>Juniper Networks, Inc., Sunnyvale, CA, USA</i> <i>Best EMC Student Paper Finalist</i>	
9:30 am	On the Alleged Inconsistency in CISPR 16-1-1 Performance Tests for Disturbance Analyzers	549
	Carlo Carobbi ¹ ; Franco Milan ² ; Nicolangelo Palermo ³ ¹ <i>Università degli Studi di Firenze, Firenze, Italy</i> ; ² <i>ELAD s.r.l., Pordenone, Italy</i> ; ³ <i>Microtelecom s.r.l., Udine, Italy</i>	
10:30 am	Resonance Free Operation of the Rod Antenna for 1 m Distance Testing up to 30 MHz	554
	Carlo Carobbi <i>Università degli Studi di Firenze, Firenze, Italy</i>	

11:00 am **Evaluation of Radiated Emission from Mains Cable with the Different Terminating Conditions and Disturbance Sources** 560
Kunihiro Osabe¹; Nobuo Kuwabara²; Shinichi Okuyama⁰; Hidenori Muramatsu¹
¹VCCI Council, Tokyo, Japan; ²Kyushu Institute of Technology, Kitakyushu, Japan;
³NEC Platforms, Ltd., Tokyo, Japan

11:30 am **Uncertainty Calculation for AMN Impedance Contribution using the Monte Carlo Method** 565
Alexander Kriz
Seibersdorf Laboratories, Seibersdorf, Austria

TH-PM-1 Channel Modeling (Sponsored by TC-10) 2:30 pm - 5:30 pm

Chair: Hanfeng Wang, Google LLC, Mountain View, CA, USA

Co-Chair: Xiuqin Chu, Xi Dian University, Xi'An, China

3:00 pm **Fast Transmitter and Receiver Eye Diagrams Acquisition in the MIPI D-PHY Interface** 570
Bichen Chen; Srinath Penugonda; Jingdong Sun; Jun Fan
Missouri University of Science and Technology, Rolla, MO, USA

4:00 pm **Analysis of Channel Crosstalk Decomposition Methods** 575
Yang Wu; Xinjun Zhang
Intel Asia-Pacific Research and Development Ltd., Shanghai, China

TH-PM-2 Radiation Source Modeling (Sponsored by TC-12) 2:30 pm - 5:30 pm

Chair: Jianmin Zhang, Google LLC, Mountain View, CA, USA

Co-Chair: Hongseok Kim, Missouri University of Science and Technology, Rolla, MO, USA

2:30 pm **A Method to Extract Physical Dipoles for Radiating Source Characterization and Near Field Coupling Estimation** 580
Chunyu Wu¹; Ze Sun¹; Qiaolei Huang¹; Yansheng Wang¹; Jun Fan¹; Jing Zhou²
¹Missouri University of Science and Technology, Rolla, MO, USA;
²Huawei Technologies Co., Ltd., Shanghai, China

3:00 pm **Source Reconstruction in Near Field Scanning using Inverse MoM for RFI Application** 584
Hossein Rezaei; Javad Meiguni; Morten Sorensen; Jun Fan; David Pommerenke
Missouri University of Science and Technology, Rolla, MO, USA
Best EMC Student Paper Finalist and Best EMC Paper Finalist

4:00 pm **Reciprocity Theorem based RFI Estimation for Heatsink Emission** 590
Qiaolei Huang¹; Yang Zhong¹; Ze Sun¹; Takashi Enomoto²; Shingo Seto²; Kenji Araki²;
Jun Fan¹; Chulsoon Hwang¹
¹Missouri University of Science and Technology, Rolla, MO, USA; ²Sony Global Manufacturing and Operations Corporation, Tokyo, Japan

4:30 pm **Accurate Prediction and Mitigation of EMI from High-Speed Noise Sources using Full Wave Solver** 595
Qiaolei Huang¹; Deepak Pai²; Krishna Rao²; Akshay Mohan²; Jaswanth Vutukury²;
Chien-Ming Nieh²; Jun Fan¹; Jagan Rajagopalan²
¹Missouri University of Science and Technology, Rolla, MO, USA; ²Amazon, Sunnyvale, CA, USA

TH-PM-3 HPEM (Sponsored by TC-5)**2:30 pm - 5:30 pm****Chair:** William Radasky, Metatech Corporation, Goleta, CA, USA**Co-Chair:** Michael McInerney, U.S. Army Construction Engineering Research Laboratory,
Champaign, IL, USA

- 2:30 pm **Efficient Automotive Simulation using Reciprocity for Intentional Electromagnetic Interference** 600
Yang Zhong¹; Woncheol Song¹; Cheolhan Kim²; Changyul Park³; Chulsoon Hwang¹
¹Missouri University of Science and Technology, Rolla, MO, USA; ²Hyundai Motor Company, Hwaseong-si, Korea, Republic of (South); ³Korea Testing Laboratory, Jinju-si, Korea, Republic of (South)
Best EMC Student Paper Finalist
- 4:00 pm **E1 HEMP Tests of Gas Discharge Tube Surge Protectors for HF Radios** 605
Edward B. Savage; William A. Radasky
Metatech Corporation, Goleta, CA, USA

TH-PM-4 Machine Learning (Sponsored by TC-9 and TC-10)**2:30 pm - 5:30 pm****Chair:** Yansheng Wang, Google LLC, Mountain View, CA, USA**Co-Chair:** Ying Cao, Apple, Cupertino, CA, USA

- 2:30 pm **Deep Learning Method for Prediction of Planar Radiating Sources from Near-Field Intensity Data** 610
Hanzhi Ma¹; Er-Ping Li¹; Jose Schutt-Aine²; Andreas C. Cangellaris²
¹Zhejiang University, Hangzhou, China; ²University of Illinois at Urbana-Champaign, Urbana, IL, USA
- 3:00 pm **Decoupling Capacitor Selection Algorithm for PDN based on Deep Reinforcement Learning** 616
Ling Zhang¹; Zhongyang Zhang¹; Chenxi Huang¹; Han Deng¹; Hank Lin²; Bin-Chyi Tseng²; James Drewniak¹; Chulsoon Hwang¹
¹Missouri University of Science and Technology, Rolla, MO, USA; ²ASUSTek Computer Inc., Taipei, Taiwan
- 4:00 pm **Fast and Accurate Current Prediction in Packages using Neural Networks** 621
Yanan Liu¹; Tianjian Lu²; Jin Y. Kim²; Ken Wu²; Jian-Ming Jin¹
¹University of Illinois at Urbana Champaign, Urbana, IL, USA; ²Google LLC, Mountain View, CA, USA
- 4:30 pm **Equalization with Neural Network Circuitry for High-Speed Signal Link** 625
Yunhui Chu; Fan Chen; John Lang; Beomtaek Lee
Intel Corporation, Hillsboro, OR, USA
- 5:00 pm **Bayesian Optimization for Stack-Up Design** 629
Zurab Kiguradze¹; Jiayi He¹; Bhyrav Mutnury²; Arun Chada²; James Drewniak¹
¹Missouri University of Science and Technology, Rolla, MO, USA; ²Dell Inc., Round Rock, TX, USA
Best SIPI Paper Finalist

TH-PM-5 Electromagnetic Compatibility of Wireless Power Transfer Systems (Sponsored by SC-5)

2:30 pm - 5:30 pm

Chair: Shuo Wang, University of Florida, Gainesville, FL, USA

Co-Chair: Fang Luo, University of Arkansas, Fayetteville, AK, USA

- 2:30 pm **Resonant Frequency Selection Method for Wireless Power Transfer System Considering Electromagnetic Interference Reduction** 635
Jaehyoung Park; Yujun Shin; Jongwook Kim; Bumjin Park; Hyunwoong Kim; Seungyoung Ahn
Korean Advanced Institute of Science and Technology, Daejeon, Korea, Republic of (South)
- 3:00 pm **Design and Analysis of Double-Eight Shaped Shielding Coil for Solenoid Coil in Loosely-Coupled Wireless Power Transfer System** 639
Boogyo Sim¹; Seungtaek Jeong¹; Seongsoo Lee¹; Seokwoo Hong¹; Hongseok Kim²; Joungho Kim¹
¹*Korean Advanced Institute of Science and Technology, Daejeon, Korea, Republic of (South);*
²*Missouri University of Science and Technology, Rolla, MO, USA*
- 4:00 pm **A Dual Resonance Near Field Communication Coil for EMF Reduction in Near Field Communication and Wireless Power Transfer Dual Coil System** 644
Seokwoo Hong¹; Seungtaek Jeong¹; Seongsoo Lee¹; Boogyo Sim¹; Hongseok Kim²; Joungho Kim¹
¹*Korean Advanced Institute of Science and Technology, Daejeon, Korea, Republic of (South);*
²*Missouri University of Science and Technology, Rolla, MO, USA*
- 4:30 pm **Analytical Expressions of Differential-Mode Harmonics in Loosely-Coupled Series-Resonant Wireless Power Transfer System** 648
Hongseok Kim¹; Jun Fan¹; Seongsoo Lee²; Seokwoo Hong²; Boogyo Sim²; Joungho Kim²
¹*Missouri University of Science and Technology, Rolla, MO, USA;* ²*Korean Advanced Institute of Science and Technology, Daejeon, Korea, Republic of (South)*

TH-PM-6 Reverberation Chambers (Sponsored by TC-2)

2:30 pm - 5:30 pm

Chair: Vignesh Rajamani, Exponent, Phoenix, AZ, USA

Co-Chair: Tom Braxton, Shure Inc., Niles, IL, USA

- 2:30 pm **Measurement of the Total Radiated Power Contributions in a Reverberation Tent** 654
Yuanzhuo Liu; Ruijie He; Jiangshuai Li; Victor Khilkevich
Missouri University of Science and Technology, Rolla, MO, USA
- 3:00 pm **Analytical Expressions for Uncertainties in Measured Reverberation Chamber Field Strengths** 658
James C. West; Charles F. Bunting
Oklahoma State University, Stillwater, OK, USA
- 4:30 pm **Time Reversal in Reverberation Chambers: Application to Lossy Media** 664
A.T. Frisco; L. Bastianelli; F. Moglie; V. Mariani Primiani
Università Politecnica delle Marche, Ancona, Italy