

APEMC 2017

2017 Asia-Pacific International Symposium on Electromagnetic
Compatibility (APEMC)

20-23 June, 2017 / The Commons, Yonsei University, Seoul, Korea

Preliminary Program

Organized by

Yonsei University

Korea Advanced Institute of Science and Technology (KAIST)

Korean Institute of Electromagnetic Engineering and Science (KIEES)

Technical Program at a Glance

| Data | Time | IBK Hall | JH Kwak Hall | Helinox Hall | Muak Rotary Hall | Exhibition |
|--------------------------------|-------------|--|--|--|--|------------|
| 20 June (Tuesday) | 09:00~17:00 | Registration (Lobby) | | | | |
| | 10:00~11:50 | TU-AM-1: Introduction to “EMC Made Simple” – Printed Circuit Board and System Design | TU-AM-2: SI/PI/EMI Modeling, Simulation and Design | | | |
| | 11:50~13:00 | Lunch Break | | | | |
| | 13:00~14:50 | TU-PM-1A: Electromagnetic Compatibility of Switched-Mode Power Supplies (I) | TU-PM-2A: The Role of the IEC Advisory Committee on EMC (ACEC) in Coordinating IEC EMC Activities (I) | TU-PM-3: How to Publish a Paper in the EMC Transactions | | |
| | 14:50~15:10 | Afternoon Break | | | | |
| | 15:10~17:00 | TU-PM-1B: Electromagnetic Compatibility of Switched-Mode Power Supplies (II) | TU-PM-2B: The Role of the IEC Advisory Committee on EMC (ACEC) in Coordinating IEC EMC Activities (II) | TU-PM-4: Metamaterials, Periodic Structures and EBG in EMC/Wave Problems/BioEM | | |
| | 18:30~21:00 | Welcome Reception | | | | |
| 21 June (Wednesday) | 08:00~18:00 | Registration (Lobby) | | | | |
| | 09:00~10:20 | WE-AM-1: EMC Measurements (I) | WE-AM-2: Wireless Power Transfer | WE-AM-3: EMC of Integrated Circuits (I) | WE-AM-4: EMC Materials | |
| | 10:20~10:40 | Morning Break | | | | Open |
| | 10:40~12:20 | Opening Ceremony (Venue : Kumho Art Hall) Keynote Speech I : Keynote Speech II : | | | | |
| | 12:20~13:30 | Lunch Break | | | | |
| | 13:30~14:50 | WE-PM-1: EMC Measurements (II) | WE-PM-2: EMC Management and Standards | WE-PM-3: EMC of Integrated Circuits (II) | WE-PM-4: ESD and Transient EMC | |
| | 14:50~15:10 | Afternoon Break | | | | |
| | 15:10~16:50 | WE-PM-5: Transport and Aerospace EMC | WE-PM-6: EMC Issues on Wireless Power Transfer | WE-PM-7: Hardware Security for Information/Communication Devices | WE-PM-8: Hot Issues Antenna & Wave Propagation | |
| | 17:00~18:00 | WE-PM-9: Poster Session (I) (Venue : Lobby) | | | | |

| Data | Time | IBK Hall | JH Kwak Hall | Helinox Hall | Muak Rotary Hall | Exhibition |
|-------------------------------|-------------|---|---|---|---|------------|
| 22 June (Thursday) | 08:00~18:00 | Registration (Lobby) | | | | |
| | 09:00~10:20 | TH-AM-1: System-level EMC | TH-AM-2: Modeling and Simulation Techniques for EMC, SI and PI (I) | TH-AM-3: Near Field Scanning Technology for EMC (I) | TH-AM-4: EMC Issues Related to Common-mode Noise (I) | Open |
| | 10:20~10:40 | Morning Break | | | | |
| | 10:40~12:20 | TH-AM-5: Signal Integrity and Power Integrity | TH-AM-6: Electromagnetic Environment and High Power EMC | TH-AM-7: Radio-Frequency Interference | TH-AM-8: Biological Effects of EMC | |
| | 12:20~13:30 | Lunch Break | | | | |
| | 13:30~14:30 | TH-PM-1: Electronic Packaging EMC | TH-PM-2: Modeling and Simulation Techniques for EMC, SI and PI (II) | TH-PM-3: Near Field Scanning Technology for EMC (II) | TH-PM-4: EMC Issues Related to Common-mode Noise (II) | |
| | 14:30~14:50 | Afternoon Break | | | | |
| | 14:50~16:50 | TH-PM-5: Antenna and Wave propagation | TH-PM-6: Computational Electromagnetics and Multiphysics methods for Simulating Complex Electromagnetic Environment Effects | TH-PM-7: EMC & Antenna Design for Wireless Communication Systems | TH-PM-8: Power Electronics Related EMC | |
| | 17:00~18:00 | TH-PM-9: Poster Session (II) (Venue : Lobby) | | | | |
| | 18:30~21:00 | Banquet (Venue : Grand Ballroom) | | | | |
| 23 June (Friday) | 09:00~17:00 | Registration (Lobby) | | | | |
| | 10:00~11:50 | FR-AM-1: Testing of Wireless Devices in the Modern World | FR-AM-2: Development of Time-Domain Computational Electromagnetics Methods for Fast Characterizing Complex Electromagnetic Environment Effects | FR-AM-3: Current Activity in the CISPR 16 Series of EMC Standards | | |
| | 11:50~13:00 | Lunch Break | | | | |
| | 13:00~14:50 | FR-PM-1A: Advances in Automotive EMC Test and Measurement | FR-PM-2A: Protection of the Electric Power System from High-altitude Electromagnetic Pulse (HEMP) and Intentional Electromagnetic Interference (IEMI) | FR-PM-3: Practical Aspects of a Comprehensive Space Charging Analysis | | |
| | 14:50~15:10 | Afternoon Break | | | | |
| | 15:10~17:00 | FR-PM-1B: Advances in Automotive EMC Test and Measurement | FR-PM-2B: Protection of the Electric Power System from High-altitude Electromagnetic Pulse (HEMP) and Intentional Electromagnetic Interference (IEMI) | FR-PM-4: EMC Standard Measurement in Japanese Industry – Efforts to Improve the Accuracy of Measurement | | |

Tutorials and Workshops

Tutorials (Tuesday, 20 June)

TU-AM-1: Introduction to “EMC Made Simple” – Printed Circuit Board and System Design

Time 10:00 – 11:50, Tuesday, 20 June
Room IBK Hall
Chair(s) Mark Montrose (Montrose Compliance Services, Inc., Santa Clara, CA, USA)

Abstract

This tutorial presents applied, hands-on content associated with both the design of printed circuit boards and integration into an enclosure to create a functional system that meets any EMC requirement, both emissions and immunity at an introductory level. The target audience is everyone regardless of expertise level who would like to [re]learn electromagnetic theory in a unique non-academic manner “without the math”. Electrical engineering involves understanding transmission line theory thinking in the time domain. An electromagnetic field propagates between a source and load using a transmission line; radiated field or conducted current. Any propagated electromagnetic energy loss that occurs within the transmission line creates undesired common-mode current. To make Maxwell Equations Made Simple, a subset of EMC Made Simple, a visualization approach is taken that allows attendees to understand what Maxwell tells us, converting his four equations conceptually into five simple algebraic equations to solve almost any EMC problem in minutes, using only a calculator. If we understand electromagnetic theory at the circuit or component level, designing anything electrical becomes simple.

- **Introduction to “EMC Made Simple” – Printed Circuit Board and System Design**
Mark Montrose (Montrose Compliance Services, Inc., Santa Clara, CA, USA)

TU-AM-2: SI/PI/EMI Modeling, Simulation and Design

Time 10:00 – 11:50, Tuesday, 20 June
Room JH Kwak Hall
Chair(s) Hideki Asai (Shizuoka University, Hamamatsu, Japan)

Abstract

Recently, with the progress of the electrical and electronic equipment, some kind or another novel methodologies have been demanded for verification of the design. Therefore, a variety of electromagnetic (EM) simulation techniques have attracted attention very much for the efficient SI/PI/EMI (Signal Integrity/ Power integrity/ Electromagnetic Interference) design. In this session, we discuss several kinds of numerical techniques and their applications to efficient electronic design. [\(To be updated\)](#)

- **Signal Integrity (SI) Design and Analysis of Heterogeneous Integration Using Embedded Multi-die Interconnect Bridge (EMIB) Technology for High Bandwidth Memory (HBM)**
Kyungjun Cho (KAIST, Daejeon, Korea)
- **Advanced SI/PI/EMI Simulation Technology for Automotive ECU Design**
Hideki Asai (Shizuoka University, Hamamatsu, Japan)
- **Fast evaluation of transmission characteristics of wiring harnesses using the RLGC parameters**
Fengchao Xiao (The University of Electro-Communications, Tokyo, Japan)
- **Circuit interpretation of mode conversion in differential-line interconnects under the assumption of weak imbalance**
Flavia Grassi (Politecnico di Milano, Milan, Italy)

TU-PM-1A & 1B: Electromagnetic Compatibility of Switched-Mode Power Supplies

Time 13:00 – 17:00, Tuesday, 20 June (14:50 – 15:10 Coffee Break)
Room IBK Hall
Chair(s) Gunter Keller (Deggendorf Institute of Technology, Deggendorf, Germany)

Abstract

The tutorial is subdivided into six parts: Terminology and legal requirements, EMC tests (emissions and immunity), coupling mechanisms and countermeasures, types of interferences and their characteristics, origin of electromagnetic interferences in switched-mode power supplies and practical aspects of EMC design of switched-mode power supplies (SMPS).

After an overview of international standards and test procedures the coupling mechanisms are explained in theory and in SMPS applications with a number of worked examples. Signals are classified into differential and common mode and discussed in terms of Fourier analysis.

The origin of interferences are discussed in terms of normal operating mode of SMPS in low, medium and high frequency range, common-mode and differential-mode and due to parasitics of active and passive components.

Main part (half of the time) is the EMC design, including power factor correction, EMC filter, shielding, hard and soft-switching converters, suitable active and passive components, general and specific layout recommendations, examples: buck converter, flyback converter, immunity. Many recommendations are confirmed by measurements or simulations. Other characteristics as efficiency and life time are also taken into account.

- **Electromagnetic Compatibility of Switched-Mode Power Supplies**
Gunter Keller (Deggendorf Institute of Technology, Deggendorf, Germany)

TU-PM-2A & 2B: The Role of the IEC Advisory Committee on EMC (ACEC) in Coordinating IEC EMC Activities

Time 13:00 – 17:00, Tuesday, 20 June (14:50 – 15:10 Coffee Break)
Room JH Kwak Hall
Chair(s) Donald Heirman (Don HEIRMAN Consultants, Lincroft, NJ, USA)
William Radasky (Metatech Corporation, Goleta, CA, USA)

Abstract

This Tutorial continues to update researchers in the field of EMC of the coordination of EMC standards and activities in the International Electrotechnical Commission (IEC) by the IEC Advisory Committee on EMC known as ACEC. The members of this committee include representatives of IEC technical committees that produce EMC basic standards for measurement instrumentation/measurements and also product committees that apply the basic standards along with specific test levels, performance criteria, and emission limits.

- **What is ACEC**
William Radasky (Metatech Corporation, Goleta, CA, USA)
- **Recent Trends in CISPR and its Subcommittees**
Donald Heirman (Don HEIRMAN Consultants, Lincroft, NJ, USA)
- **Recent Trends in TC77 and its Subcommittees**
William Radasky (Metatech Corporation, Goleta, CA, USA)
- **Emission Standardization in the 2 kHz to 150 kHz Frequency Band**
William Radasky (Metatech Corporation, Goleta, CA, USA)
- **EMC for E-mobility**
William Radasky (Metatech Corporation, Goleta, CA, USA)
- **Recent Topics in IEC TC62 (Electrical Equipment in Medical Practice) and its Subcommittees**
Donald Heirman (Don HEIRMAN Consultants, Lincroft, NJ, USA)

- **TC106 Overview: Assessment of Human Exposure to EMF**
Donald Heirman (Don HEIRMAN Consultants, Lincroft, NJ, USA)

TU-PM-3: How to Publish a Paper in the EMC Transactions

Time 13:00 – 14:50, Tuesday, 20 June
Room Helinox Hall
Chair(s) John Norgard (NASA/JSC EMI/EMC E3 Lab, Houston, USA)

Abstract

This tutorial is on the IEEE Transactions on Electromagnetic Compatibility (EMCT).
Presentations on EMCT include:

- i) How to publish a paper in the EMCT.
- ii) How to prepare and write a good technical paper for the EMCT.

The presentation for part i), by Prof. Nordgaard, entitled “Publishing a Paper in the EMCT”, will cover the initial paper preparation process (topic & text), the submission process, the review cycle (Reviewers, Associate Editors, and the Editor-in-Chief), and final paper publication procedures for the IEEE Transactions on EMC. In addition, acceptance criteria are covered, along with style guides, on-line web support and help-aids, and proper paper organization.

The presentation for part ii), by Dr. Wilson, entitled “Writing a Good EMCT Paper: My Perspective” will cover aspects of writing a good paper for submission to the IEEE Transactions on EMC. Covered will be goals, hints, and dos and don'ts for the abstract, index terms, main text, and conclusions of a paper. The material is very much from the personal perspective of the presenter based on his experience as both a reviewer and a former Editor-in-Chief of the Transactions.

This EMCT tutorial is intended for anyone and everyone interested in publishing a paper in the EMCT, especially for the first time.

- **How to Publish a Paper in the EMC Transactions**
John Norgard (NASA/JSC EMI/EMC E3 Lab, Houston, USA)

TU-PM-4: Metamaterials, Periodic Structures and EBG in EMC/Wave Problems/BioEM

Time 15:10 – 17:00, Tuesday, 20 June
Room Helinox Hall
Chair(s) Sungtek Kahng (Incheon National University, Incheon, Korea)

Abstract

As the operating frequency goes higher and the demands on complex architectures of electronics and new materials increase, the classic guide lines and design rules on EMC and RF device designs are facing the challenges and limitations in meeting the requirements

In response to the need to find the alternatives, periodic structures such as FSS are adopted or hybridized with the conventional practices to stop the radiated/conducted noise and unwanted resonance more effectively. Especially, the photonic bandgap design as the periodic structures with perfect or imperfect periodicity is revisited and becomes the EBG by being adapted to RF frequency from optics.

With a different motivation, metamaterial is researched that when permittivity and permeability the constitutive parameters of a material are given unusual or usual values, they possibly result in phenomena interpreted meaningful to overcome the limitations above in EMC, microwave engineering and Bio EM problems. Particularly, the left-handedness and the infinite wavelength are introduced by negative permittivity and negative permeability and zero refractive index, respectively, and they are used to change the direction or phase of wave propagation. The dispersion engineering stemming from the metamaterials has drawn attention in that it is helpful to reduce the volume of a structure and form a bandgap free from the resonance condition of the conventional periodic structure approach. So, in this session, the analysis and design methods of FSS, DNG/SNG/AMC and EBG are dealt with as well as advanced applications to EMC/antenna/RF designs/Bio EM & Human-EM Interaction. Also, we discuss the slow-wave effects of a periodic geometry and the resonant slots(non-metamaterial) of DGS and SRR/CSRR. Last but not least, a number of electromagnetic computational methods are shown to efficiently and accurately predict the scattering and radiation of the

aforementioned structures. (To be updated)

- **Introduction to Metamaterials and the Advanced Technologies in EMC and RF Passive Components/Antennas**
Sungtek Kahng (Incheon National University, Incheon, Korea)
- **Advanced Technologies in RF Active Components**
Hongjoon Kim (Kyungpook National University, Daegu, Korea)
- **Advanced Technologies in BioEM problems**
Hyeonseok Yoo (University of Ulsan, Ulsan, Korea)

Workshops (Friday, 23 June)

FR-AM-1: Testing of Wireless Devices in the Modern World

Time 10:00 – 11:50, Friday, 23 June
Room IBK Hall
Chair(s) Janet O’Neil (ETS-Lindgren, Cedar Park, TX, USA)
Yulung Tang (ETS-Lindgren, Taipei, Taiwan)

Abstract

With the continuous development of wireless technologies and their tight integration with various electronic/computer/communication devices, EMC issues, at both the system and the intra-system levels, become increasingly important. This tutorial will begin with a general overview on IoT and the new IEEE IoT Initiative, of which the IEEE EMC Society is a member. The tutorial provide an overview and primer on testing wireless devices, the biggest challenges the test labs face with testing wireless devices and their techniques for addressing those challenges. We will look at the increasing concern of IEMI effects on wireless communication. The tutorial will conclude with a review of the growing wireless activity at the National Institute of Standards and Technology, the US Government metrology lab of the USA.

- **Internet of Things: IoT, M2M, 5G & EMC**
Mike Violette (Washington Labs, Gaithersburg, MD, USA)
- **Test Challenges of Smart Antenna Systems**
Yulung Tang (ETS-Lindgren, Taipei, Taiwan)
- **Assessing the Vulnerability of Wireless Systems to (Intentional) EMI**
Frank Leferink (University of Twente Enschede, The Netherlands; Thales Netherlands Hengelo, The Netherlands)
- **An Overview of Wireless Research at the National Institute of Standards and Technology**
Perry Wilson (National Institute of Standards and Technology, Boulder, CO, USA)

FR-AM-2: Development of Time-Domain Computational Electromagnetics Methods for Fast Characterizing Complex Electromagnetic Environment Effects

Time 10:00 – 11:50, Friday, 23 June
Room JH Kwak Hall
Chair(s) Wen-Yan Yin (Zhejiang University, Hangzhou, China)

Abstract

In this workshop, new research progresses in the development of computational time-domain electromagnetics methods will be addressed for fast solving and characterizing various complex

electromagnetic environment effects in the presence of high-power electromagnetic pulse (HP-EMP) or intentional electromagnetic interferences (IEMI). These methods mainly include hybrid finite difference time domain (FDTD), time-domain integral equation (TDIE), adaptive integration method (AIM) together with time-domain physics optics approximation, etc. Some typical numerical examples will be shown to demonstrate their capability for accurately predicting 3-D current and field distributions over missile, aircraft and warship platforms for different incident EMP strengths, directions, and polarization states.

Speakers: Wen-Yan Yin (Zhejiang University, Hangzhou, China)
Jian Wang (Ningbo University, Ningbo, China)

FR-AM-3: Current Activity in the CISPR 16 Series of EMC Standards

Time 10:00 – 11:50, Friday, 23 June
Room Helinox Hall
Chair(s) Janet O’Neil (ETS-Lindgren, Cedar Park, TX, USA)
Martin Wiles (ETS-Lindgren, Stevenage, United Kingdom)

Abstract

The CISPR 16 series is an important basic standard in EMC and continues to be updated by CISPR Sub Committee A. Important changes to this standard continue below 30 MHz, above 1 GHz and in the areas of equipment calibration.

Our speakers include experts active in the CISPR Subcommittee A and in the ANSI C63 committee on EMC. Speaker Martin Wiles is the recent recipient of the IEC 1906 award for his considerable technical contributions on antenna pattern measurements above 1 GHz, on the development of receive antenna pattern criterion and on radiated emission measurements above 1 GHz.” This work has been used in amendments of CISPR 16-1-4 (Specification for radio disturbance and immunity measuring apparatus and methods - Part 1-4: - Antennas and test sites for radiated disturbance measurements), CISPR 16-1-5 (Specification for radio disturbance and immunity measuring apparatus and methods - Part 1-5: - Antenna calibration sites and reference test sites for 5 MHz to 18 GHz) and CISPR 16-1-6 (Specification for radio disturbance and immunity measuring apparatus and methods - Part 1-6: - EMC antenna calibration).

- **Recent Developments in CISPR 16 Series on Measurements below 30 MHz**
Wolfgang Muellner (Seibersdorf Laboratories, Siebersdorf, Austria)
- **New Methods of Measurement above 1 GHz per CISPR 16 Standard Series**
Martin Wiles, (ETS-Lindgren, United Kingdom)
- **Understanding the Importance of EMI Compliance Receiver Calibration Measurements**
Mark Terrien, (Keysight Technologies, Santa Rosa, CA, USA)
- **CISPR 16 Measurement Instrumentation Uncertainties from Site Contribution for Radiated Emissions Measurements above 1 GHz**
Zhong Chen, (ETS-Lindgren, Cedar Park, TX, USA)

FR-PM-1A & 1B: Advances in Automotive EMC Test and Measurement

Time 13:00 – 17:00, Friday, 23 June (14:50 – 15:10 Coffee Break)
Room IBK Hall
Chair(s) Janet O’Neil (ETS-Lindgren, Cedar Park, TX, USA)
Yulung Tang (ETS-Lindgren, Taipei, Taiwan)

Abstract

Vehicle platforms continue to become increasingly more complex with propulsion, entertainment and safety related systems all having to function reliably without impacting safety or the legacy communications infrastructure. In this workshop, industry experts will share their latest research in automotive EMC test and measurement. They will address current and future requirements brought on by the increasing use of

electronic components as well as the increased demand for electric and hybrid vehicles. This has driven the need for ever increasing permutations of system operation, operating frequency ranges and immunity levels. This will be discussed in light of current EMC test chamber design and test challenges. We will also look at RF absorber evaluation in light of the growing requirements for anti-collision radar capabilities on all vehicles.

- **An Update on Global Automotive EMC Standards and Testing**
Jaekon Shin (Korea Automobile Testing & Research Institute, Hwaseong, Korea)
- **New Developments in Automotive EMC Test Systems for Full Vehicles and Components**
Yulung Tang, (ETS-Lindgren, Taipei, Taiwan)
- **Novel and Simplified Immunity Testing Methods for Automotive Applications**
Flavia Grassi, (Politecnico di Milano, Milan, Italy)
- **Common RF Absorbers Evaluations in the W Band (75-110 GHz)**
Zhong Chen, (ETS-Lindgren, Cedar Park, Texas, TX, USA)
- **Suppression of Power/Ground Noise on Power Window Control System in Automotive**
Karam Hwang, KAIST (KAIST, Daejeon, Korea)

FR-PM-2A & 2B: Protection of the Electric Power System from High-altitude Electromagnetic Pulse (HEMP) and Intentional Electromagnetic Interference (IEMI)

Time 13:00 – 17:00, Friday, 23 June (14:50 – 15:10 Coffee Break)
Room JH Kwak Hall
Chair(s) William A. Radasky (Metatech Corporation, Goleta, CA, USA)

Abstract

Over the past 25 years the International Electrotechnical Commission (IEC) has written 22 standards and reports dealing with the environments and protection of civil electronic systems from HEMP and IEMI. Because it has become clear that the electric power system is the most important critical infrastructure in advanced economies throughout the world, it is important that these standards be applied to protect the basic building blocks of the high voltage power system: substations and control centers. This tutorial will present how the IEC standards can be used to provide the necessary levels of protection against these two security threats.

- **Description of the radiated and conducted environments associated with HEMP and IEMI**
William Radasky (Metatech Corporation, Goleta, CA, USA)
- **Description of the vulnerability of electronic equipment to HEMP and IEMI**
William Radasky (Metatech Corporation, Goleta, CA, USA)
- **Approach to the hardening of power substations and control centers to HEMP and IEMI**
William Radasky (Metatech Corporation, Goleta, CA, USA)

FR-PM-3: Practical Aspects of a Comprehensive Space Charging Analysis

Time 13:00 – 14:30, Friday, 23 June
Room Helinox Hall
Chair(s) Bryon Neufeld (Electro Magnetic Applications, Lakewood, CO, USA)

Abstract

Space charging presents a significant safety and reliability risk for many space platforms. Proper design strategy can mitigate or greatly reduce the risks associated with space charging. It is often not feasible or is even impossible to perform full vehicle testing for space charging, and testing does not offer the possibility to

quickly and inexpensively check the effectiveness of design permutations. This makes numerical analysis an important part of developing an effective design strategy against space charging risks. In this presentation, we focus on some of the practical steps and issues involved with performing a comprehensive space charging analysis. We will discuss the model geometry development, materials characterization, simulation and processing that go into numerically assessing charging risks. We will also discuss how aspects of the space environment, including different plasma environments, sunlight illumination, and plume and wake effects, impact the charging analysis.

- **Surface Charging, Geometry Development and Meshing**
Bryon Neufeld (Electro Magnetic Applications, Lakewood, CO, USA)
- **Plume Modeling, Internal Charging**
Tim McDonald (Electro Magnetic Applications, Lakewood, CO, USA)
- **Programmatic Considerations**
Bob Scully (NASA, Houston, TX, USA)

FR-PM-4: EMC Standard Measurement in Japanese Industry – Efforts to Improve the Accuracy of Measurement

Time 15:10 – 17:00, Friday, 23 June
Room Helinox Hall
Chair(s) Osami Wada (Kyoto University, Kyoto, Japan)

Abstract

In the Technical Working Groups in Expert Committee on EMC in KEC (KEC Electronic Industry Development Center) in Japan, practical research activities on EMC measurement technology related to EMC standard measurement have been conducted. The experts will explain important notes on ensuring measurement accuracy and measurement reliability in conducting measurement conforming to the EMC standard.

The topics in this workshop include; influence of measurement environment in radiated and conducted emission tests and influence of measurement system difference which have been clarified in a series of round robin tests; possibility of antenna calibration in an anechoic chamber and verification of its accuracy; important points on magnetic field measurement in radiated emission test below 30 MHz; and EMC measurement of automotive electronic devices. In addition, we will introduce the current status and future prospects of EMC test standards in Japan, particularly in comparison with US / European / Asian standards.

- **Workshop Overview**
Osami Wada (Kyoto University, Kyoto, Japan)
- **Radiated Emission Test - Influence of Measurement Environment**
Hisashi Ninomiya, (Roland Corporation, Hamamatsu, Japan)
- **Conducted Emission Test - Influence of Measurement System Difference**
Yassushi Asaji (Murata Manufacturing Co., Ltd., Nagaokakyo, Japan)
- **Verification of Accuracy and Validity of Antenna Calibration in Anechoic Chamber**
Yujiro Seki (IPS Corporation, Nagano, Japan)
- **Important Points on Magnetic Field Measurement in Radiation Emission Test Below 30 MHz**
Yukio Kajita (Kitagawa Industries Co., Ltd., Tokyo, Japan)
- **Japanese EMC Test Standards - Comparison with US / European / Asian Standards and Future Perspective**
Takuya Nakamori (Panasonic Corporation, Osaka, Japan)

Technical Sessions

Wednesday, 21 June

09:00 – 10:20

WE-AM-1: EMC Measurements (I)

Time 09:00 – 10:20, Wednesday, 21 June

Room IBK Hall

Chairs [TBD](#)

09:00 In-Circuit Common-Mode Impedance Measurement for Motor Drive System

Fei Fan, Kye Yak See and Kangrong Li (Nanyang Technological University, Singapore); Xiong Liu, Michael Zagrodnik and Amit Gupta (Rolls-Royce Singapore Pte. Ltd., Singapore)

09:20 Study on Electrical Performance and Reliability Assessment of HEMP Protection Filters Applied in Communication Facilities

Hyo Sik Choi (Korea Testing Laboratory, Korea); Jang Tae-Heon (Korea Testing Laboratory, Korea); Won-seo Cho (Korea Testing Laboratory, Korea)

09:40 Design of an Bi-static C-band Radar for Characterization of Wind Turbine Plants

Karsten Schubert and Jens Werner (Jade University of Applied Science, Germany); Fabian Schwartau (Technische Universität Braunschweig, Germany)

10:00 The Noise Source Modulation Technique

Umberto Paoletti (Hitachi, Ltd., Japan)

WE-AM-2: Wireless Power Transfer

Time 09:00 – 10:20, Wednesday, 21 June

Room JH Kwak Hall

Chairs [TBD](#)

09:00 Analytic RF Multi Beam Synthesis Method considering Active Element Pattern of Array Antenna

Sang Wook Chi and Jeong Hae Lee (Hongik University, Korea)

09:20 Leakage Magnetic Field Suppression Effects of Expanded Graphite in LF-WPT System

In Gon Lee, Ic Pyo Hong and Kee-Sun Lee (Kongju National University, Korea)

09:40 Novel Concepts in the Design of Near-Field Antenna for Short-Distance Wireless Power Transmission With High Transfer Efficiency

Ding-Bing Lin (National Taiwan University of Science and Technology, Taiwan); Hsi-Tseng Chou and Jui-Hung Chou (National Taiwan University, Taiwan); Yu-Lin Cheng (National Taipei University of Technology, Taiwan)

10:00 Static and Dynamic Magnetic Fields Scattering on a Mini Magneto-static Flux Manipulator for Wireless Power Transfer

Teti Zubaidah, Bulkis Kanata, Paniran Paniran and Ahmad Yani (University of Mataram, Indonesia)

WE-AM-3: EMC of Integrated Circuits (I)

Time 09:00 – 10:20, Wednesday, 21 June

Room Helinox Hall

Chairs So Young Kim (Sungkyunkwan University, Korea)

09:00 **Temperature Compensated Low EMI Relaxation Oscillator**

Sung-Jin Kim, Seung Il Huh, SungHun Cho and Kang-Yoon Lee (Sungkyunkwan University, Korea)

09:20 **Design and Analysis of Chip-level Wireless Power Transfer Using Magnetic-field Resonance Coupling and 0.18 um CMOS Technology**

Jinwook Song, Seungtaek Jeong, Shinyoung Park and JoungHo Kim (KAIST, Korea)

09:40 **Hierarchical Power Distribution Network Design in Fanout Wafer Level Package based Mobile AP-GPU**

Youngwoo Kim, Kyungjun Cho, Gapyeol Park, Subin Kim and JoungHo Kim (KAIST, Korea)

10:00 **Capacitor-less LDO Regulator Design Methods for High PSR Performance**

Soyeon Joo and Soyoun Kim (Sungkyunkwan University, Korea)

WE-AM-4: EMC Materials

Time 09:00 – 10:20, Wednesday, 21 June

Room Muak Rotary Hall

Chairs Kyung Sub Lee (Sungkyunkwan University, Korea)
Sang-Woo Kim (KIST, Korea)

09:00 **Performance of Flexible Noise Suppressor for IoT Devices Made Only of Meltblown Non-Woven Fabric**

Masahiro Yamaguchi and Jiang Fu (Tohoku University, Japan); Sho Muroga (National Institute of Technology, Toyota College, Japan); Tomoya Tanaka, Chie Okamura, Lumina Obi and Kazufumi Kato (Asahi Kasei Fibers Corporation, Japan)

09:20 **Electromagnetic Shielding Efficiency of Transparent Film Fabricated by Nano-Imprinting Technology**

Hyunseok Choi, Kyungsub Lee and Sujeong Suh (Sungkyunkwan University, Korea)

09:40 **Guideline for Improvement of Signal Loss With Using Noise Suppression Materials for FPCB**

Young-Min Im (Korea Electronics Technology Institute, Korea)

10:00 **Electromagnetic Wave Absorbing Properties of Magnetic Particles and Carbon Nanomaterials Reinforced composites**

Sangbok Lee, Jae Ryung Choi, Byung Mun Jung, Seungchan Cho and Sang-Kwan Lee (Korea Institute of Materials Science, Korea); Ki Hyeon Kim (Yeungnam University, Korea)

13:30 – 14:50

WE-PM-1: EMC Measurements (II)

Time 13:30 – 14:50, Wednesday, 21 June

Room IBK Hall

Chairs TBD

- 13:30 **Investigation Into the Influence of Ground Plane Insulation Thickness on Radiated Emission From Mains Cable of EUT**
Shinichi Okuyama (VCCI Council / NEC Platforms, Japan); Nobuo Kuwabara (Kyushu Institute of Technology, Japan); Kuniyuki Miyata (Fujitsu, Ltd, Japan); Kunihiro Osabe (VCCI Council, Japan)
- 13:50 **Comparison of Configurations for Conducted Emission Measurement Specified in CISPR 32 and CISPR 13**
Nozomi Miyake (NEC Corporation, Japan); Koichi Kakuda (NTT Advanced Technology Corporation, Japan); Yoshiaki Hiratsuka (FUJITSU Advanced Technologies Limited, Japan); Hidenori Muramatsu (VCCI Council, Japan)
- 14:10 **Use of FFT-based Measuring Receivers for EMI Compliance Measurements Against CISPR 32**
Jens Medler (Rohde & Schwarz GmbH & Co. KG, Germany)
- 14:30 **Comparison of Test Standards for Immunity Testing in Reverberation Chambers**
Soydan Cakir and Caglar Aslan (TUBITAK UME, Turkey); Frank Leferink (University of Twente, The Netherlands)

WE-PM-2: EMC Management and Standards

Time 13:30 – 14:30, Wednesday, 21 June

Room JH Kwak Hall

Chairs [TBD](#)

- 13:30 **A-Smarter Concepts for Future EMI Standards**
Iwan Setiawan, Cees Keyer and Frank Leferink (University of Twente, The Netherlands)
- 13:50 **The Systematic Design of Integrated Busbar EMI Filter Considering the Coupling Characteristics of Multi-physical Fields**
Qianceng Lou (Nanjing University of Aeronautics and Astronautics, China); Xinxin Gao and Shishan Wang (Nanjing University of Aeronautics and Astronautics, China); Wei Yan (Nanjing Normal University, China)
- 14:10 **Robustness Analysis of Crosstalk-Based Hardware Trojans and Relevant Algorithms to Nonideal Positioning**
Keliang Yuan (Tsinghua University, China); Flavia Grassi, Giordano Spadacini and Sergio A Pignari (Politecnico di Milano, Milan, Italy)

WE-PM-3: EMC of Integrated Circuits (II)

Time 13:30 – 14:30, Wednesday, 21 June

Room Helinox Hall

Chairs So Young Kim (Sungkyunkwan University, Korea)

- 13:30 **Embedded Bandstop Filter in Package to Enhance the Susceptibility of Integrated Circuits**
Bo Pu (Samsung Electronics, Korea); Soyung Kim and Wansoo Nah (Sungkyunkwan University, Korea)
- 13:50 **Application of EMC Qualification Methodology to Semicustom Digital Design**
Au Hai Huynh and Soyung Kim (Sungkyunkwan University, Korea)
- 14:10 **Exploring the Impact of Multi-Frequency Clocking and GALS Design on Power Supply Noises**
Toan Van Nguyen, Tung Minh Dam and Jeong-Gun Lee (Hallym University, Korea)

WE-PM-4: ESD and Transient EMC

Time 13:30 – 14:50, Wednesday, 21 June

Room Muak Rotary Hall

Chairs Shinobu Ishigami (Tohoku Gakuin University, Japan)
Ken Kawamata (Tohoku Gakuin University, Japan)

13:30 **Measurement of Electric Field Waveform Caused by Micro Gap ESD in a Pair of Spherical Electrodes**

Shinobu Ishigami, Ken Kawamata and Shigeki Minegishi (Tohoku Gakuin University, Japan);
Osamu Fujiwara (Nagoya Institute of Technology, Japan)

13:50 **A Study on Response Characteristics Modeling Method for ESD Protection Device by Vector Network Analyzer**

Nobuhiro Kimura and Takahiro Yoshida (Tokyo University of Science, Japan)

14:10 **Time Domain Measurement of Discharge Phenomenon Using Optical E-Field Sensor**

Takayoshi Ohtsu, Norihiro Ogishima, Haruki Tashiro and Kohei Obara (National Institute of Technology, Numazu College, Japan); Ryuji Osawa (Seikoh, Giken Co., Ltd., Japan)

14:30 **System-level ESD Noise Induced by Secondary Discharges at Voltage Suppressor Devices in a Mobile Product**

Junsik Park (Ulsan National Institute of Science and Technology, Korea); Jongsung Lee, Cheolgu Jo and Byongsu Seol (Samsung Electronics, Korea); Jinguok Kim (Ulsan National Institute of Science and Technology, Korea)

15:10 – 16:50

WE-PM-5: Transport and Aerospace EMC

Time 15:10 – 16:50, Wednesday, 21 June

Room IBK Hall

Chairs TBD

15:10 **High Frequency Model of Power Autotransformer for Adjustable Speed Drive System**

Chuang Bi, Yingzhe Wu, Chuan Li and Hui Li (University of Electronic Science and Technology of China, China); Yongjian Zhi (CSR Zhuzhou Institute Co Ltd, China)

15:30 **Mitigation of Current Oscillations in the DC link of Electric Vehicles**

Kelin Jia (Volvo CE, Sweden); Chuang Bi and Hui Li (University of Electronic Science and Technology of China, China)

15:50 **A Development of 146/156 MHz Folded Dipole Antenna in an Immunity Test of Portable Transmitters on Road Vehicle Components**

Hyok Lee (Korea Automotive Technology Institute, Korea); Myogeun Yang (IVIEW, Korea); Jonghyun Lee (Korea Automotive Technology Institute, Korea); Jaehoon Choi (Hanyang University, Korea)

16:10 **Harmonics and Common Mode Voltage Analysis With Different Power Converter Configurations in Aerospace Applications**

Yong Liu and Kye Yak See (Nanyang Technological University, Singapore)

16:30 **Research on EMI Control Technology of Airborne Power Electronic Equipments**

Xu Ping, Jiahe Mei and Tao Jiang (Harbin Engineering University, China)

WE-PM-6: EMC Issues on Wireless Power Transfer

Time 15:10 – 16:50, Wednesday, 21 June

Room JH Kwak Hall

Chairs Seungyoung Ahn (KAIST, Korea)
Hiroshi Hirayama (Nagoya Institute of Technology, Japan)

- 15:10 **Design Formula of a Small Circular Coil With Circular Cross-section for Maximum Q-factor**
Do-Hyeon Kim (University of Science and Technology; Korea Electrotechnology Research Institute, Korea); Young-Jin Park (Korea Electrotechnology Research Institute; University of Science and Technology, Korea)
- 15:30 **Suppression of Common-mode Radiation Using Folded-spiral Antenna for Wireless Power Transfer**
Hiroshi Hirayama, Masanori Ando and Toshihito Sonobe (Nagoya Institute of Technology, Japan)
- 15:50 **Active Implantable Medical Device EMI Estimation for EV-Charging WPT System Based on 3D Full-wave Analysis**
Takashi Hikage, Masakazu Yamagishi, Kazuki Shindo and Toshio Nojima (Hokkaido University, Japan)
- 16:10 **Reduction of Electromagnetic Interference for Wireless Power Transfer Coils in Mobile Devices**
Jaehyoung Park and Seungyoung Ahn (KAIST, Korea)
- 16:30 **A Study of Electromagnetic Emission From Evanescent Mode WPT System Through Metal Sheets**
Nak-Young Ko, Franklin Bien and Woojin Park (Ulsan National Institute of Science and Technology, Korea); Jagannath Malik (Ulsan National Institute of Science and Technology; Indian Institute of Technology Roorkee, India); Bonyoung Lee and Seoktae Seo (Ulsan National Institute of Science and Technology, Korea)

WE-PM-7: Hardware Security for Information/Communication Devices

Time 15:10 – 16:50, Wednesday, 21 June

Room Helinox Hall

Chairs Jong-Gwan Yook (Yonsei University, Korea)
Yuichi Hayashi (Tohoku Gakuin University, Japan)

- 15:10 **Hardware Security for Information/Communication Devices**
Yuichi Hayashi (Tohoku Gakuin University, Japan); Jong-Gwan Yook (Yonsei University, Korea); William Radasky (Metatech Corporation, USA)
- 15:30 **Signal-to-Noise Ratio Measurements of Side-Channel Traces for Establishing Low-Cost Countermeasure Design**
Yusuke Yano, Toshiaki Teshima, Kengo Iokibe and Yoshitaka Toyota (Okayama University, Japan)
- 15:50 **A Threat of Malicious Hardware Using On-chip Voltmeter**
Daisuke Fujimoto (Yokohama National University, Japan)
- 16:10 **Hardware Trojan Threats After IT Device Manufacturing**
Masahiro Kinugawa (National Institute of Technology, Sendai College, Japan); Yuichi Hayashi (Tohoku Gakuin University, Japan)
- 16:30 **Estimate of the Effect of Concrete Wall for Information Leakage From LCD Monitor**
Ho seong Lee and Jong-Gwan Yook (Yonsei University, Korea)

WE-PM-8: Hot Issues Antenna & Wave Propagation

Time 15:10 – 16:50, Wednesday, 21 June

Room Muak Rotary Hall

Chairs Wonbin Hong (Pohang University of Science and Technology, Korea)

15:10 **An Electrically Small, 3D Printed Folded Spherical Meander Antenna**

Myeongjun Kong, Geonyeong Shin, Suhyeon Lee and Ick-Jae Yoon (Chungnam National University, Korea)

15:30 **Analysis of Transparent Coplanar Waveguide With Few Microns - Grid Width**

Seung Yoon Lee, Dooseok Choi and Wonbin Hong (Pohang University of Science and Technology, Korea)

15:50 **Dual-Polarized Vivaldi Antenna With Quarter-Wave Balun Feeding**

Philip Dzagbletey, Jae Yeon Shim, Jin Young Jeong and Jae-Young Chung (Seoul National University of Science and Technology, Korea)

16:10 **Exploitation of Millimeter Wave Polarization for Ultrathin Metasurface**

Jungsuek Oh (Inha University, Korea)

16:30 **Photonic-assisted Imaging System for mm-wave Horn Antenna Near-Field Characterization**

Young-Pyo Hong, Hyunji Koo and Dong-Joon Lee (Korea Research Institute of Standards and Science, Korea)

17:00 – 18:00

WE-PM-9: Poster Session (I)

Time 17:00 – 18:00, Wednesday, 21 June

Room Lobby

Chairs [TBD](#)

PS1-01 **Study on Measurement Method of Shield Continuity for Shielded Cable with Drain Wire**

Hongje Jang (Korea Testing Laboratory, Korea); Taesung Song (Korea Testing Laboratory; Choongnam National University, Korea); Tae-hyeob Song (Korea Institute of Civil Engineering and Building Technology, Korea)

PS1-02 **Study of EMI Filter Performance Without LISN Based on Noise Impedances**

Kangrong Li and Kye Yak See (Nanyang Technological University, Singapore)

PS1-03 **"Customization" in EMC Measuring System**

Lei Zhou (Jiangsu Institute of Metrology, China)

PS1-04 **A Parasitic Extraction Method of Diode Based on Time - Frequency Characteristics of Ringing Current**

Hui Xu, Donglin Su, Kaixiang Zhu and Xiaofan Shang (Beihang University, China)

PS1-05 **Effect of ESD Generator Ground Strap Configuration on ESD Waveform**

Jawad Yousaf, Jaeyoung Shin, Rao Leqian and Wansoo Nah (Sungkyunkwan University, Korea); Jin-Sung Youn, Daehee Lee and Chanseok Hwang (Samsung Electronics, Korea)

PS1-06 **More Insight Into Conducted Immunity Tests and Investigation of Support Influences**

Osman Sen, Soydan Cakir, Savas Acak (TUBITAK UME, Turkey)

- PS1-07 **Comparison of Log-Periodic and Horn Antenna on the Field Uniformity and Power Efficiency from 80 MHz to 1 GHz**
Dwi Mandaris and Niek Moonen (University of Twente, The Netherlands); Jaap Schuurmans (Thales, The Netherlands); Frank Leferink (University of Twente, The Netherlands)
- PS1-08 **A New Concept of a Standard Antenna for Measuring a Commercial Antenna Gain**
Jong-Hyuk Lim (National Radio Research Agency, Korea)
- PS1-09 **Comparison of Measurement Results on the Transfer Impedance of a Coaxial Cable**
Hyung-Uk Kim (Korea Testing Laboratory, Korea)
- PS1-10 **Unintentional Radiation of Electromagnetic Waves Caused by Deterioration of Metal Halide Lamps**
Young-Choul Lim and Hongsik Keum (Korea Radio Promotion Association, Korea); Junkyu Yang (National Radio Research Agency, Korea); Yeong-min Lee (Korea Radio Promotion Association, Korea)
- PS1-11 **Radiated Emission Tests due to the Direction of an Highly Directional EUT in a SAC And a RC**
Sang il Kwak, Jong Hwa Kwon and Dong-Uk Sim (Electronics and Telecommunications Research Institute, Korea); Young Joong Yoon (Yonsei University, Korea)
- PS1-12 **Conceptual Design and Characteristics of Wireless Power Charging System for HTS Magnet using Copper Resonance Coupling Coils**
Yoon Do Chung and Jiseong Kim (Suwon Science College, Korea)
- PS1-13 **Electromagnetic Shielding Structure for Reduction of the Leakage Magnetic Field in Wireless Power Transfer System**
Jong Chan Kim, Domin Choi and Nam Kim (Chungbuk National University, Korea); Seung-Yeop Rhee (Chonnam National University, Korea)
- PS1-14 **A Study on Characteristics of Ferrite Sheets in Wireless Power Transfer at 6.78 MHz**
Tae-Hyung Kim and Se-Hwa Yoon (Yonsei University, Korea); Gi-Ho Yun (Sungkyul University, Korea); Woong Yong Lee (Amotech, Korea); Jong-Gwan Yook (Yonsei University, Korea)
- PS1-15 **Improvement of Power Transmission Efficiency by Negative Impedance Converter for WPT**
Se-Hwa Yoon, Jong-Gwan Yook and Tae-Hyung Kim (Yonsei University, Korea); Woong Yong Lee (Amotech, Korea); Gi-Ho Yun (Sungkyul University, Korea)
- PS1-16 **A Method to Improve Transfer Efficiency in Contactless Power Transfer Systems With Magnetically-Coupled Coils**
Taejun Lim and Yongshik Lee (Yonsei University, Korea)
- PS1-17 **Design and Optimization of Inductive Snubber for DC-DC Converter**
Hyo Sub Shin and Soyoung Kim (Sungkyunkwan University, Korea)
- PS1-18 **Investigation on Characteristic Impedance of Transmission Line in Meshed-ground Flexible Printed Circuit**
Yantao Zhu and Fengchao Xiao (The University of Electro-Communications, Japan); Xiangyang Sun (University of Electric Science and Technology of China, China); Yoshiki Kayano and Yoshio Kami (The University of Electro-Communications, Japan)
- PS1-19 **Introduction of Outdoor Radar Cross Section (RCS) Measurement System**
Hyunsung Tae, Mingyeong Seo, Eungjoo Lee, JoonHyuck Kwon and Eungjo Kim (Agency for Defense Development, Korea)

- PS1-20 **A Consideration of Mechanism of Audio Signal Deterioration Caused by Propagation Noise**
Takahiro Fujino and Takahiro Yoshida (Tokyo University of Science, Japan)
- PS1-21 **The Analysis and Design of Milk Pasteurization System by Using Radio Frequency Electric Fields**
Chanon Srisuma (Suranaree University of Technology, Thailand)
- PS1-22 **Experiment and Design a Suitable Induction Heating for Air Heat Exchanger Application**
Keeratidech Thepsatitsilp and Phanupong Saeung (Suranaree University of Technology, Thailand)
- PS1-23 **Research on Weight in AHP - Fuzzy Comprehensive EMC Evaluation based on Entropy Method**
Geng Yifang, Xu Ping, Xiaochao Jiang and Hengxu Wang (Harbin Engineering University, China); Sanjun Dong (Northwestern Polytechnical University, China); Tao Jiang (Harbin Engineering University, China)
- PS1-24 **Analysis and Verification for Errors of Normalized Site Attenuation Method Below 30 MHz**
Hongsik Keum (Korea Radio Promotion Association, Korea); Jun-Gyu Yang (National Radio Research Agency, Korea); Nam Kim (Chungbuk National University, Korea); Seungwoo Lee (KEPCO, Korea)
- PS1-25 **Bounded-Wave (BW) Outdoor HEMP Simulator**
Kihwan Song, Joon Hyuck Kwon, Saedong Yeo and Eungjo Kim (Agency for Defense Development, Korea)
- PS1-26 **Measurement of Magnetic Field Levels Generated by EV/HEV Vehicles With Respect to Human Exposure**
Yunhyeong Jo and Jaehyun Park (I-SPEC, Korea); Seongkyu Lee (Hanyang University, Korea); Jaekon Shin (Korea Automobile Testing & Research Institute, Korea)
- PS1-27 **3-D Modeling of Common Mode Choke for Thermal Analysis**
Yong Liu and Kye Yak See (Nanyang Technological University, Singapore)
- PS1-28 **Non-invasive Detection of Object by UWB Radar**
Wei Ping Hung (National Chiao Tung University, Taiwan); Tsern-Huei Lee and Chia-Hung Chang (Chinese Culture University, Taiwan)

Thursday, 22 June

09:00 – 10:20

TH-AM-1: System-level EMC

Time 09:00 – 10:20, Thursday, 22 June

Room IBK Hall

Chairs **TBD**

09:00 **Study of Currents Induced in Wire Lines Placed inside the Metal Shield of Electronics in the Beginning of the Resonance Mode**

Pavel Kundyshev (All-Russia Research Institute of Automatics, Russia); Valentin Butin (FSUE VNIIA & NRNU MEPHI, Russia)

09:20 **Shielding Effectiveness Performance of Conductive Concrete Structures**

Lim Nguyen (University of Nebraska-Lincoln, USA)

09:40 **Recovery Method of S/W Failure Induced by ESD using Far-end Crosstalk between PCB Traces**

Jongjin Baek (Samsung Electronics, Korea); Soyoung Kim (Sungkyunkwan University, Korea)

10:00 **Conducted EMI from Motor Drive System of Electric Vehicle Under Load Operation**

Li Zhai and Chao Song (Beijing Institute of Technology, China)

TH-AM-2: Modeling and Simulation Techniques for EMC, SI and PI (I)

Time 09:00 – 10:20, Thursday, 22 June

Room JH Kwak Hall

Chairs Ikpyo Hong (Kongju National University, Korea)

Si-Ping Gao (Institute of High Performance Computing; A*STAR, Singapore)

09:00 **Study of Monopole Antenna's Received Power in Reverberation and Anechoic Chambers**

Huapeng Zhao (University of Electronic Science and Technology of China, China)

09:20 **Evaluating Airborne Slotted Waveguide Antenna Arrays Using an Equivalent Model Based on Near-Field Samplings Over Slots**

Si-Ping Gao (Institute of High Performance Computing; A*STAR, Singapore); Hui Min Lee (A*STAR Institute of High Performance Computing, Singapore); Wei-Jiang Zhao and En-Xiao Liu (Institute of High Performance Computing, Singapore); Ching Eng Png (A*STAR Institute of High Performance Computing, Singapore)

09:40 **Evaluation of Electromagnetic Field According to Current Change of Wireless Power Transmission**

SangWook Park, BeomJin Choi and EunHa Kim (Korea Automotive Technology Institute, Korea); SeungDo Kim (Green Power, Korea)

10:00 **EM Coupling Analysis Between Windscreen Antennas and Power Cables in Electric Vehicles**

Jaehoon Kim (Altair Engineering, Korea)

TH-AM-3: Near Field Scanning Technology for EMC (I)

Time 09:00 – 10:20, Thursday, 22 June

Room Helinox Hall

- Chairs Xing-Chang Wei (Zhejiang University, China)
Erping Li (Zhejiang University, China)
- 09:00 **Estimation of Initial Guess of Steepest Descent Method for Near Field Phase Retrieval**
Huapeng Zhao (University of Electronic Science and Technology of China, China)
- 09:20 **Near-Field-Based Array Failure Diagnosis Using Sparse Source Reconstruction**
Huapeng Zhao (University of Electronic Science and Technology of China, China)
- 09:40 **Study on the Phase Error of Plane Wave Spectrum Expansion**
Sihong Tao, Huapeng Zhao, Ying Zhang, Jun Hu and Zhizhang Chen (University of Electronic Science and Technology of China, China)
- 10:00 **An Effective Equivalent Radiation Source Based on Near-field Scanning for Electromagnetic Interference Estimation**
Jun Li, Xing-Chang Wei, Liang Gao and Yufei Shu (Zhejiang University, China)

TH-AM-4: EMC Issues Related to Common-mode Noise (I)

Time 09:00 – 10:20, Thursday, 22 June

Room Muak Rotary Hall

Chairs Yoshitaka Toyota (Okayama University, Japan)
Wansoo Nah (Sungkyunkwan University, Korea)

- 09:00 **Dependency of Transmission Loss of Shielded-FPC on Thickness of Conductive Shield**
Yoshiki Kayano (The University of Electro-Communications, Japan); Hiroshi Inoue (The Open University of Japan, Japan)
- 09:20 **An Efficient Partition Analysis for Electromagnetic Interference Estimation of High-Speed Input/Output Differential Interfaces**
Chi-Kai Shen and Tzong-Lin Wu (National Taiwan University, Taiwan); Tze-Min Shen (MStar Semiconductor, Taiwan); Chih-Ying Hsiao (National Taiwan University, Taiwan); Ting-Kuang Wang and Kuan-Yu Chen (MStar Semiconductor, Taiwan)
- 09:40 **Technique of Immunity Estimation for In-Vehicle 1Gbps Ethernet -Defining Test Criterion**
Miyuki Mizoguchi, Youhei Sekiya, Hiroyuki Mori and Noboru Maeda (Nippon Soken, Inc., Japan); Kaoru Yoshida Hiroki Keino, Takashi Yasuda and Hideki Goto (Toyota Motor Corporation, Japan)
- 10:00 **Study of Magnetic Field Exposure Emitted From a Motor Drive System of an Electric and Hybrid Vehicle**
Kyoseung Keum and Seongkyu Lee (Hanyang University, Korea); Jongkyoung Lee (E&R Tech, Korea); Jaekon Shin (Korea Automobile Testing & Research Institute, Korea); Jaehoon Choi (Hanyang University, Korea)

10:40 – 12:20

TH-AM-5: Signal Integrity and Power Integrity

Time 10:40 – 12:20, Thursday, 22 June

Room IBK Hall

Chairs TBD

- 10:40 **Transmission Line Model for Designing Common-Mode Suppression Filter on Multi Differential Signal Pairs**

Ding-Bing Lin (National Taiwan University of Science and Technology, Taiwan); Yong-Xun Chen, Yi-Hsien Lee and Lin-Zong Zheng (National Taipei University of Technology, Taiwan)

11:00 **Improvement of Eye Diagram of USB 3.0 Signal in Laptop PC Using Passive Equalizer Embedded on Flexible PCB**

Jun-Young Jang, Ho-Seong Lee and Jong-Gwan Yook (Yonsei University, Korea)

11:20 **Fabrication and Evaluation of the Quasi-distributed Constant Line Filter with Multiple Magnetic Cores**

Yusuke Ohdaira, Koki Harada and Shigeyoshi Yoshida (NEC TOKIN Corporation, Japan); Toshiro Sato (Shinshu University, Japan)

11:40 **SI/PI Co-Optimization for LPDDR3 Mobile Interface**

Nitin Srivastava, Antonio C Scogna, YongHyock Lee, Hyunho A Baek, Hwan-woo Shim and Dong Sub Kim (Samsung Electronics, Korea)

12:00 **Signal Integrity Analysis of High Speed Connector for Multi-Media System**

Huijin Song, Jonghoon J. Kim, Junyong Park and Jounggho Kim (KAIST, Korea)

TH-AM-6: Electromagnetic Environment and High Power EMC

Time 10:40 – 12:00, Thursday, 22 June

Room JH Kwak Hall

Chairs [TBD](#)

10:40 **Exposure to Electromagnetic Near-Fields Radiated by an RFID Reader Antenna**

Kassem Jomaa (Grenoble University, France); Fabien Ndagijimana (University Joseph Fourier; IMEP-LAHC lab, France); Hussam Ayad, Majida Fadlallah and Jalal Jomaah (Lebanese University, Lebanon)

11:00 **An Automatic Method of Detecting and Analyzing Electromagnetic Emission**

Donglin Su, Jia Yi Wu, Xiaofan Shang, Kaixiang Zhu and Zhenzhen Peng (Beihang University, China)

11:20 **Spacecraft Design Considerations for Spacecraft Charging Environments**

Nicole Pothier (Electro Magnetic Applications, USA)

11:40 **Analysis and Reduction on Electromagnetic Interference for Photovoltaic Converter**

Lei Zhou (Jiangsu Institute of Metrology, China); Wei Yan (Nanjing Normal University, China)

TH-AM-7: Radio-Frequency Interference

Time 10:40 – 12:20, Thursday, 22 June

Room Helinox Hall

Chairs Chulsoon Hwang (Missouri University of Science and Technology, USA)

10:40 **LCD Baseband Noise Modulation Estimation for Radio Frequency Interference in Mobile Phones**

Chulsoon Hwang (Missouri University of Science and Technology, USA); Sunkyu Kong (Korea Advanced Institute of Science and Technology, Korea); Takashi Enomoto, Kenji Araki and Junji Maeshima (Sony Global Manufacturing and Operations Corporation, Japan); David Pommerenke and Jun Fan (Missouri University of Science and Technology, USA)

11:00 **Analysis of Throughput Performance of Smart TV by Noise Effect Using Simulation Methodology**

Soonyong Lee and Yeonsik Yu, Hoyong Kim, Yonghee Cho and Sungsoo Choi (Samsung Electronics, Korea)

11:20 **SMPS Noise Modeling and Analysis in Mobiles at 3-level Buck Converter-based Fast Charging Mode**

Kiyeong Kim, Hwan-woo Shim, Antonio Ciccomancini Scogna, and Dong-Sub Kim (Samsung Electronics, Korea)

11:40 **Extraction of Equivalent Array Dipole-Moments Model From Only Magnitude Data of Near-Field Scan**

Kyungjin Kwak (Ulsan National Institute of Science and Technology, Korea); Taeil Bae, Kichul Hong and Hyungsoo Kim (SK Hynix, Korea); Jinguok Kim (Ulsan National Institute of Science and Technology, Korea)

12:00 **Modeling of Printed Spiral Coils Based on Conformal Mapping Method With Fringing Capacitance Effects**

Kyungmin Kim and Eakhwan Song (Kwangwoon University, Korea)

TH-AM-8: Biological Effects of EMC

Time 10:40 – 12:20, Thursday, 22 June

Room Muak Rotary Hall

Chairs Nam Kim (Chungbuk National University, Korea)

10:40 **The Effects of RF-EMF in Alzheimer Disease Models**

Yun-Sil Lee (Ewha Womans University, Korea)

11:00 **Time Reversal based Microwave Focusing for Medical Applications**

Jang-Yeol Kim, Soon-Ik Jeon and Seong-Ho Son (Electronics and Telecommunications Research Institute, Korea)

11:20 **Transmission Array of a Focused Microwave Thermotherapy System for Leg Diseases**

Soon-Ik Jeon, Jang-Yeol Kim and Seong-Ho Son (Electronics and Telecommunications Research Institute, Korea)

11:40 **Influence of RF-EMF exposure on neurotransmitters in rat: glutamate and dopamine**

Hye Sun Kim (Ajou University, Korea); Hyung Do Choi (Electronics and Telecommunications Research Institute, Korea); Jeong Pack (Chungnam National University, Korea); Nam Kim (Chungbuk National University, Korea); Young Hwan Ahn (Ajou University, Korea)

12:00 **Effects of Wrist Model During the Specific Absorption Rate Evaluations on Smart-watch**

Seon-Eui Hong, Jong Hwa Kwon and Hyung Do Choi (Electronics and Telecommunication Research Institute, Korea); Jeong Pack (Chungnam National University, Korea)

13:30 – 14:30

TH-PM-1: Electronic Packaging EMC

Time 13:30 – 14:30, Thursday, 22 June

Room IBK Hall

Chairs [TBD](#)

13:30 **Mitigation of Unintentional Radiation from the Package Lid Using PMC Packaging**

Xiaoli Yang, Er-Ping Li, Dong-Ke Zhu, Yong-Sheng Li and Ping Cheng (Zhejiang University, China); Hui-Chun Yu and Bin Li (Huawei Technologies Co. Ltd, China)

- 13:50 **Miniaturization of Planar EBG Structure using Dual Power Planes**
Xingxiaoyu Lin, Kengo Iokibe and Yoshitaka Toyota (Okayama University, Japan); Toshiyuki Kaneko (KYOCERA Corporation, Japan)
- 14:10 **Synthesized Network Compensator for Crosstalk Cancellation**
Sang Seop Song and Ki Jin Han (Ulsan National Institute of Science and Technology, Korea)

TH-PM-2: Modeling and Simulation Techniques for EMC, SI and PI (II)

Time 13:30 – 14:30, Thursday, 22 June

Room JH Kwak Hall

Chairs Ikpyo Hong (Kongju National University, Korea)
Si-Ping Gao (Institute of High Performance Computing; A*STAR, Singapore)

- 13:30 **Estimating Frequency Spectrum of IC Power Supply Current Through Time-Domain Voltage Measurement on Power Distribution Network**
Jun Wu Zhang, Eng Kee Chua and Kye Yak See (Nanyang Technological University, Singapore); Wee Jin Koh and Weng Yew Chang (DSO National Laboratories, Singapore)
- 13:50 **Modeling of Current Sources Near a Wall of Reverberation Chambers in Discrete Singular Convolution Method**
Huapeng Zhao (University of Electronic Science and Technology of China, China)
- 14:10 **Application of Space Object Conjunction Method in the System Level EMC Evaluation**
Tao Jiang, Asad Husnain Baqar and Xu Ping (Harbin Engineering University, China); Yachen Zhang (Heilongjiang University, China)

TH-PM-3: Near Field Scanning Technology for EMC (II)

Time 13:30 – 14:30, Thursday, 22 June

Room Helinox Hall

Chairs Jinguok Kim (Ulsan National Institute of Science and Technology, Korea)
Seungyoung Ahn (KAIST, Korea)

- 13:30 **Investigation of the Probe-Factor Deconvolution Methods for Dynamic ESD Fields Measurements**
Myungjoon Park (Ulsan National Institute of Science and Technology, Korea); Joungcheul Choi (SK Hynix Inc., Korea); Jinwoo Kim and Seonghoon Jeong (SK Hynix, Korea); Manho Seung and Seokkiu Lee (SK Hynix Inc., Korea); Jinguok Kim (Ulsan National Institute of Science and Technology, Korea)
- 13:50 **Constant Velocity Motion of a Micro-Robot Using a Uniform Magnetic Field**
Dongwook Kim and Seungyoung Ahn (KAIST, Korea)
- 14:10 **A Flexible Broadband Loop Antenna for Electronic Capsule Endoscopy**
Cai Lulu, MengJun Wang and Ze Yang (Hebei University of Technology, China)

TH-PM-4: EMC Issues Related to Common-mode Noise (II)

Time 13:30 – 14:30, Thursday, 22 June

Room Muak Rotary Hall

Chairs Wansoo Nah (Sungkyunkwan University, Korea)
Yoshiki Kayano (The University of Electro-Communications, Japan)

- 13:30 **Generation of Common Mode in Non-Uniform Differential Interconnections**
Xinglong Wu, Flavia Grassi, Xiaokang Liu, Jingkai Sun and Sergio A Pignari (Politecnico di Milano, Italy); Paolo Manfredi (Ghent University-imec, Belgium); Dries Vande Ginste (Ghent University, Belgium)
- 13:50 **A Novel Differential Serpentine Delay Line to Reduce Differential to Common Mode Conversion and Impedance Discontinuity**
Jianquan Lou and Xiaoxia Zhou (CISCO, China); Shun Li (Ericsson, China); Yingchun Shu (CISCO, China); Alpesh Bhoje (CISCO, USA); Jinghan Yu (CISCO, China)
- 14:10 **Common Mode Reduction in Bi-directional DCDC Converter by Changing Position of Parasitic Capacitor**
Tohlu Matsushima, Takao Kuroyanagi and Takashi Hisakado (Kyoto University, Japan); Osami Wada (Kyoto University, Japan)

14:50 – 16:50

TH-PM-5: Antenna and Wave propagation

Time 14:50 – 16:50, Thursday, 22 June

Room IBK Hall

Chairs [TBD](#)

- 14:50 **On Signal-Strength-of-Arrival Based Localization with Unknown Transmit Power**
Di Wang, Er-Ping Li and Jiao He (Zhejiang University, China)
- 15:10 **A Multi-Horn Antenna Produced by a 3D Printer**
Haim Matzner (HIT-Holon Institute of Technology, Israel); Ely Levine (AFEKA, Academic College of Engineering, Israel); Yaron Levy and Moshe Raminfar (Azrieli College of Engineering, Israel)
- 15:30 **Phased Array Antenna Modules with Dual Ports for Independent Transmitting and Receiving Beam-Forming Networks**
Hsi-Tseng Chou and Yen Ting Chen (National Taiwan University, Taiwan)
- 15:50 **Spectrum Analysis of Finite Conductor Slit at terahertz frequencies**
Jun Hur, Jong-Eon Park and Hosung Choo (Hongik University, Korea)
- 16:10 **Sidelobe Suppression of Reflector Antennas by Embedding Non-Resonant Periodic Metal Cells along the Reflector Edge Boundary**
Shih-Chung Tuan (OIT, Taiwan); Hsi-Tseng Chou (National Taiwan University, Taiwan); Hsien-Kwei Ho (Yuan Ze University, Taiwan)
- 16:30 **An Analysis on the Compact Quasi-Isotropic Antenna Using Folded Split Ring Resonator**
Joon-Hong Kim and Sangwook Nam (Seoul National University, Korea)

TH-PM-6: Computational Electromagnetics and Multiphysics methods for Simulating Complex Electromagnetic Environment Effects

Time 14:50 – 16:50, Thursday, 22 June

Room JH Kwak Hall

Chairs Wen-Yan Yin (Zhejiang University, China)

- 14:50 **A Discontinuous Galerkin Time-Domain Method for Modeling of Power-Ground Planes With Narrow Slots and Signal Vias**

Hui Min Lee (A*STAR Institute of High Performance Computing, Singapore); Si-Ping Gao (Institute of High Performance Computing; A*STAR, Singapore); En-Xiao Liu (Institute of High Performance Computing, Singapore)

15:10 **JEMS-FD: Engineering Application Oriented High-Performance Program for Electromagnetic Compatibility Analysis**

Weijie Wang (Institute of Applied Physics and Computational Mathematics; Software Center for High Performance Numerical Simulation, China); Haijing Zhou (Institute of Applied Physics and Computational Mathematics, China)

15:30 **Shielding Effectiveness Prediction of Metallic Structures with Thin Slots Using FDTD**

Mingjiang Fang, Liping Yan, Zhangshuai Cao and Xiang Zhao (Sichuan University, China); Qiang Liu and Haijing Zhou (Institute of Applied Physics and Computation Mathematics, China)

15:50 **Multi-GPU based Fast Electromagnetic Simulation Method for Analyzing PCB**

Yuta Inoue and Hideki Asai (Shizuoka University, Japan)

16:10 **Application of Group Theory in 2D Electromagnetic Scattering in Resonant Frequency**

Changwei Xu (Luoyang Electronic Equipment Test Center, China)

16:30 **Hybrid Scheme Combining Iterative Physical Optics and Edge Current Method to Compute Scattering by Conducting Tail-Wing Structure**

Jae-Won Rim, Hyunsoo Lee and Il-Suek Koh (Inha University, Korea)

TH-PM-7: EMC & Antenna Design for Wireless Communication Systems

Time 14:50 – 16:50, Thursday, 22 June

Room Helinox Hall

Chairs Hark-Byeong Park (Samsung Electronics, Korea)

Bumhee Bae (Samsung Electronics, Korea)

Soonyong Lee (Samsung Electronics, Korea)

14:50 **A Novel Robust Design Method for a Mobile Antenna With a Metal Frame**

Keum Cheol Hwang and Sungwoo Lee (Sungkyunkwan University, Korea); Sanguk Park and Soonyong Lee (Samsung Electronics, Korea)

15:10 **Design of the PCB Embedded Active IC Structure for Ultra-thin Wearable Application With Low-RFI**

Bumhee Bae, JongWan Shim, Younho Kim and Hyung-geun Kim (Samsung Electronics, Korea); Jonghoon Kim (KAIST, Korea); Harkbyeong Park (Samsung Electronics, Korea)

15:30 **Advanced Impedance Matching Technology to Optimize RF Circuit Design of Practical Wireless Systems**

Sinhung Jeon (Samsung Electronics, Korea)

15:50 **IC Placement Optimization for RF Interference based on Dipole Moment Sources and Reciprocity**

Chulsoon Hwang and Qiaolei Huang (Missouri University of Science and Technology, USA)

16:10 **Design Optimization of Board-level Signal Integrity Depending on PCB Stack-up Configuration in a Mobile Device**

Inmu Kim, Kipyong Kim and Youngmin Cho (LG Electronics, Korea); Eakhwan Song (Kwangwoon University, Korea)

16:30 **Design and Analysis of On-chip Active Power Distribution Network for Efficient Simultaneous Switching Noise Suppression in Mobile AP**

Subin Kim, Youngwoo Kim and Joungcho Kim (KAIST, Korea)

TH-PM-8: Power Electronics Related EMC

Time 14:50 – 16:50, Thursday, 22 June

Room Muak Rotary Hall

Chairs Wansoo Nah (Sungkyunkwan University, Korea)
Tsuyoshi Funaki (Osaka University, Japan)

14:50 **Design of Effective Surge Protection Circuits for an Active EMI filter**

Sangyeong Jeong and Dongil Shin (Ulsan National Institute of Science and Technology, Korea); Jongpil Kim and Seokjoon Kim (Hyundai Motor Group, Korea); Jinguok Kim (Ulsan National Institute of Science and Technology, Korea)

15:10 **Sensitivity Analysis of Behavioral MOSFET Models in Transient EMC Simulation**

Philipp Hillenbrand (University of Stuttgart, Germany); Michael Beltle and Stefan Tenbohlen (Universität Stuttgart, Germany); Stefan Moench (Institute of Robust Power Semiconductor Systems, University of Stuttgart, Germany)

15:30 **A Study on Wiring Pattern Design for Intelligent SiC Power Module With PEEC Method**

Eisuke Masuda, Takaaki Ibuchi and Tsuyoshi Funaki (Osaka University, Japan); Hiroataka Otake, Yasuo Kanetake, Tatsuya Miyazaki and Takashi Nakamura (ROHM Co., Ltd., Japan)

15:50 **Extraction of Network Parameters for the Winding-to-Shaft Coupling Effect of an AC Motor**

Ki Jin Han and Younggon Ryu (Ulsan National Institute of Science and Technology, Korea)

16:10 **Parameter Identification of Noise-source Linear Equivalent Circuit of DC-DC Converter and Its Evaluation**

Yuhei Osaki, Yusuke Yano, Kengo Iokibe and Yoshitaka Toyota (Okayama University, Japan)

16:30 **System-level Modeling of Conducted Emission in Motor Driving Circuit for Brake System**

Junesang Lee, Jungrae Ha, Minho Kim, Chanho Lee, Sangwon Yun and Yeongsik Kim (Mando, Korea); Wansoo Nah (Sungkyunkwan University, Korea)

17:00 – 18:00

TH-PM-9: Poster Session (II)

Time 17:00 – 18:00, Thursday, 22 June

Room Lobby

Chairs **TBD**

PS2-01 **Element-Based Electromagnetic Interference Suppression for Modular Systems**

Aixin Chen, Yue Zhao, Xiaojun Ying and Wenbin Wu (Beihang University, China)

PS2-02 **Noise Reduction Between High Speed Differential Pairs and Ground Shape**

Chung-Han Tsai, Hank Lin, Shih-Keng Chuang and Bin-Chyi Tseng (ASUSTek Computer Inc., Taiwan)

PS2-03 **A Study On EMI Generation From A Capacitive Touch Screen Panel**

Hoon Bae Kim (Yonsei University; LG-Display Company, Korea)

PS2-04 **Experimental Study on Probability Threshold of Electromagnetic Effect of Electronic Equipment**

Ping Wu, Cui Meng and Yinong Liu (Tsinghua University, China)

- PS2-05 **Evaluation of Fibre Weaving of Substrate on Differential Microstrip Using an Analytical Approach**
Eng Kee Chua, Jun Wu Zhang and Kye Yak See (Nanyang Technological University, Singapore);
Wee Jin Koh and Weng Yew Chang (DSO National Laboratories, Singapore)
- PS2-06 **Crosstalk Reduction by Introducing Periodic Structure into Dense Differential Pairs**
Hiroaki Takeda, Kengo Iokibe and Yoshitaka Toyota (Okayama University, Japan)
- PS2-07 **Crosstalk Suppression by Applying Multilevel Signal Transmission**
Yafei Wang (Bistu, China); Xuehua Li (BITI, China)
- PS2-08 **Discontinuous Galerkin Time-Domain Analysis of Power/Ground Plate Pairs With Wave Port Excitation**
Ping Li (The University of Hong Kong, Hong Kong); Lijun Jiang (University of Hong Kong, Hong Kong); Hakan Bagci (King Abdullah University of Science and Technology, Saudi Arabia)
- PS2-09 **Surface Charging Dynamics in a Space Plasma**
Bryon Neufeld (Electro Magnetic Applications, USA)
- PS2-10 **Effective Equation of EMP Shielding Effectiveness with Multi-layered Waveguide-Below-Cutoff Array**
Sangin Kim, Yuna Kim and Jong-Gwan Yook (Yonsei University, Korea)
- PS2-11 **Modal Analysis of Three-phase Cable Systems Based on a Modified High-frequency Model**
Xiaoxin Chen, Yong Qian, Yongpeng Xu, Gehao Sheng and Jiang Xiucheng (Shanghai Jiao Tong University, China)
- PS2-12 **Modified Pinwheel Meander-line Perforated Plane Structure for System-in-Package**
Youngbong Han, Au Hai Huynh and Soyoung Kim (Sungkyunkwan University, Korea)
- PS2-13 **Measured Near Field Communication Antenna for Fintech Innovation**
Wen Cheng Lai (National Taiwan University of Science and Technology, Taiwan)
- PS2-14 **Small Handheld UHF RFID Reader Antenna for Industrial Laundry Applications**
Guan-Lin Chen, Rong Cao and Chow-Yen-Desmond Sim (Feng Chia University, Taiwan)
- PS2-15 **A Ka-band Parallel-plate Parabolic Reflecting Structure to Implement the Beam Forming Networks for Phased Array of Antennas**
Hsi-Tseng Chou (National Taiwan University, Taiwan); Ying-Shan Chen (Yuan-Ze University, Taiwan); Chia-Hung Chang (Feng Chia University, Taiwan)
- PS2-16 **Design Integrated Antenna With Balun for Miracast**
Wen Cheng Lai (National Taiwan University of Science and Technology, Taiwan)
- PS2-17 **High-Performance DOA Estimation for Coprime Arrays With Unknown Number of Sources**
Anh-Tuan Nguyen, Takashi Matsubara and Takakazu Kurokawa (National Defense Academy, Japan)
- PS2-18 **Research on 8mm-band Elliptic Cylindrical Reflector Antenna and a New Feed Antenna**
Liqing Wang (Harbin Institute of Technology, China)
- PS2-19 **Size Reduction of a Sinuous Antenna Using Planar Meandering**

Hosang Lee (Sungkyunkwan University, Korea); Taehoon Yoo (Dongyang Mirae University, Korea); Wansoo Nah (Sungkyunkwan University, Korea)

- PS2-20 **Prediction of Satellite Signal Propagations Using an Eikonal Equation Ray Tracing Technique**
Hayeon Kim and Haengseon Lee (Sogang University, Korea); Dae-Sub Oh (Electronics and Telecommunications Research Institute, Korea)
- PS2-21 **Theoretical and Experimental Evaluation of Plasma Column Used to Plasma Antenna**
Mahdi Abbasi (Shahid Beheshti, Iran); Shahrooz Asadi (Shahid Beheshti University, Iran)
- PS2-22 **Modal Analysis of Radio Frequency Interference From Shield Can Holes in Mobile Devices**
Hyun Ho Park (The University of Suwon, Korea); Eakhwan Song (Kwangwoon University, Korea)
- PS2-23 **Modeling of Wave propagation in Thin Graphene Sheets With 3-D ADE-WLP-FDTD Method**
Liu Ru-Jun and Chen Wei-Jun (Lingnan Normal University, China)
- PS2-24 **Analysis of Impedance Matrix Fill-in Time in CBFM Optimization for Large Scale EMC Problem**
Chan-Sun Park (Yonsei University, Korea); Ic Pyo Hong (Kongju National University, Korea); Heoung-Jae Chun (Yonsei University, Korea); Yong Bae Park (Ajou University, Korea); Youn-Jae Kim (Agency for Defense and Development, Korea); Jong-Gwan Yook (Yonsei University, Korea)
- PS2-25 **EM Scattering From Corrugations in a Circular Cylinder**
Yong Bae Park and Sangsu Lee (Ajou University, Korea)
- PS2-26 **Impact of Magnetic Field Generated by Wireless Power Transfer System of Electric Vehicle on Retinal Pigment Epithelium Cell in Vitro**
Weinong Sun, Yaqing He, Yinliang Diao and Sai Wing Leung (City University of Hong Kong, Hong Kong); Yun Ming Siu (City University of Hong Kong, Japan); Richard Y C Kong (City University of Hong Kong, China)
- PS2-27 **Evaluating Human Exposure to Electromagnetic Field Radiated by the Commercial Wireless Power Charging Device**
Jun Seok Kang, Byung Nam Kang, Kang Hui Jeon and Nam Kim (Chungbuk National University, Korea)
- PS2-28 **Implementation of Chip-Level EMC Strategies in 0.18 μm CMOS Technology**
Yin-Cheng Chang (Chip Implementation Center, National Applied Research Laboratories, Taiwan); Ping-Yi Wang (National Tsing Hua University, Taiwan); Shuohung Hsu (National Tsinghua University, Taiwan); Mao-Hsu Yen (National Taiwan Ocean University, Taiwan); Yen-Tang Chang (Bureau of Standards, Metrology and Inspection, Taiwan); Chiu-kuo Chen (National Chiao Tung University, Taiwan); Ta-Yeh Lin and Da-Chiang Chang (Chip Implementation Center, National Applied Research Laboratories, Taiwan)