Three New Distinguished Lecturers for 2018-2019

Vignesh Rajamani, EMC Society Vice-President for Member Services

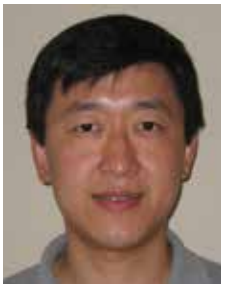
The EMC Society Board of Directors has approved three new Distinguished Lecturers (DLs) for the term 2018-2019. They are Zhong Chen, Ihsan Erdin and Richard Xian-Ke Gao. Our other four DLs, Andy Marvin, Zhiping Yang, Kris Hatashita and En-Xiao Liu continue their terms through December of 2018.

Before introducing the newest DLs, I want to acknowledge the contributions made by our retiring DLs Kate Remley, Farhad Rachidi and Chunfei Ye over the past two years. During their terms, they volunteered to spend many days away from home, family, familiar food, and familiar people. They traveled by airplane, by car, and bus in order to give presentations in the Unites States, Americas, Asia and Europe. Our Society's local Chapter meetings have benefited from the in-person contributions of these bright and learned volunteers. For those of you who have attended one of their presentations, I am sure you know what a very fun and educational experience these folks provide. Please join me in thanking our retiring DLs, and welcoming our new expert speakers.

If you have not seen a DL at your Chapter meeting, you are really missing one of the most popular benefits that our Society offers. I am certain that this year's new speakers will continue the DL tradition of offering excellent technical education, advice, and entertainment. Chapter Chairs can request any of the Distinguished Lecturers to come to their local Chapter meeting. Once the schedule details are agreed upon by both parties, the EMC Society pays for the travel costs, so the local Chapter gets expert speakers, on a wide range of topics, at no cost to the local Chapter!

Following are our new Distinguished Lecturers for 2018-2019. Please feel free to contact them directly by phone or email to discuss hosting them at your next Chapter meeting, university class, or other special event. You can find contact information under the Distinguished Lecturer section of the EMC Society web site (www.emcs.org).

Zhong Chen



Zhong Chen is the Director of RF Engineering at ETS-Lindgren. He received his MSEE degree from The Ohio State University in 1996. He has more than 20 years of experience in RF testing as well as EMC antenna and field probe design and measurements. He is an active member of the ANSI ASC C63® committee and Chair of Subcommittee 1, which is responsible for the antenna calibration and test site validation standards. He is Chair of the IEEE 1309 Standard committee developing calibration standards for field probes; Chair of the IEEE 1128 Standard committee providing a recommended practice for RF absorber evaluation; and a member of the United States Technical Advisory Groups (US TAG) to CISPR and IEC. He has published more than 30 journal and conference papers on EMC measurements, antenna and field probe calibrations and applications, as well as on other electromagnetic theory and applications. He has served as a technical committee member of, and chaired numerous conference workshops at, the IEEE EMC international symposiums, AMTA, and other international conferences. Following is a summary of his presentation options:

Talk 1: Challenges and Methods to Improve Accuracies in Antenna Calibrations and Site Qualification Measurements below 1 GHz

It is impractical to achieve a far-field and free-space environment for EMC antenna calibrations below 1 GHz due to the long wavelengths. Anechoic absorbers are also typically not large enough to achieve the requisite reflectivity performance to calibrate antennas. Standard site method (SSM) in an open area test site over a PEC ground plane is the industry standard for calibrating these low gain/low frequency antennas. Realizing most measurements are not performed in the far field in this frequency range, an accurate free-space antenna factor (AF) is actually not the most accurate representation of the underlying physics. Free-space AF (or gain) is shown as a compromised average, which yields low "enough" uncertainties. However, for anechoic chamber evaluations where much lower uncertainties are desired, a more rigorous model, including near-field effects, pattern variations, and phase center movement is needed. We discuss the assumptions and limitations of the SSM and the state-of-the-art research on improving the accuracy for antenna calibrations for both free-space antenna factors and site validation measurements.

Talk 2: Optimizing Results from Electric Field Probes during EMC Testing

In this presentation, we discuss the theory and applications of electric field probes as well as calibration methods. The presentation will discuss the influencing factors of the measurement uncertainties from the calibration process as well as during the end use, and practical considerations on how to reduce the effects.

Talk 3: Time Domain Site VSWR for Anechoic Chamber Evaluation

Typical anechoic chambers are evaluated using the site VSWR (for EMC chambers) or Free-space VSWR (antenna measurement chambers). In these methods, a receive antenna (probe antenna) is scanned over a distance. The standing wave in the chamber is measured, and the chamber reflectivity is derived from this mea-

surement. This measurement can be performed alternatively by transforming the vector response in time domain (through inverse Fourier transform). In time domain, the reflections can be separated from the antenna main responses due to their time delays. The time domain VSWR method is currently being incorporated into the new ANSI C63.25 standard. We will discuss the implementations, benefits and challenges of using this method.

Ihsan Erdin

Dr. Ihsan Erdin is the Engineering Design Manager and SI/PI subject matter expert at Celestica. His primary job function is Celestica's global SI/PI/EMC subject matter expert on product development and technical services. The responsibilities also include mentoring and providing technical support to the SI/PI design and analysis team. He has 20 years of experience in signal and power integrity design of multi-gigabit rate ATCA core and edge routers, including Metro Ethernet, ATM, MPLS and Carrier Ethernet line cards/backplanes. He is an expert in timing, jitter and power/signal integrity analysis of high-speed serial and parallel interfaces as well as power and still-air thermal analysis of printed circuit structures with an in-depth knowledge of electromagnetic theory, expert on transmission lines, microwave/EMI filters as well as grounding techniques for challenging mixed-analog/digital systems. He has published over 30 journal and conference papers on electromagnetic analysis of printed circuit structures with particular emphasis on signal and power integrity. Dr. Erdin has authored over 150 signal and power integrity reports for a variety of customers including IBM, Microsoft, CISCO, Ciena, DirecTV, NEC, Juniper and others. Following is a summary of his presentation options:

Talk 1: Physical Insights and Analytical Methods for Signal Integrity in High-Speed Designs

While the signal integrity challenges due to increasing switching frequencies and sharper edge rates of data are becoming major bottlenecks in high-speed designs, the analysis tools are continuously playing catch-up. Although 3D-EM simulators are available today for analysis of critical paths and design modules, they are very slow for practical purposes and can blur the designer's insight into the fundamentals of the problems they are trying to solve. This emphasizes the importance of analytical electromagnetic techniques in signal integrity. For serial data links, which can transmit data rates over 56 Gbps, the analysis of interconnect, discontinuities like crossing junctions, slots on reference planes and vias cannot be overstated. Conformal mapping methods combined with microwave analysis techniques will be discussed as a quick and accurate supplementary simulation tool to computationally intensive and opaque numerical methods. Physical insight into the underlying problems will be provided, enabling faster signal integrity analysis of disjoint modules as well as full systems.

Talk 2: Fundamentals and Advances in Power Integrity Modeling and Analysis Methods

For multicore processors with current loads exceeding 100 A, the power noise is not only a growing electromagnetic interference (EMI) concern, but also a potential logic problem in high-speed printed circuit designs. Depending on the type of application, on-board or on-package local decoupling capacitors are the most commonly used components to mitigate this problem. The board/package real-estate concerns, however, impede the haphazard placement of these components and makes imperative the use of optimization methods for their most effective placement and selection. The computation of power noise in high-speed designs lies at the core of all optimization techniques. For decades, the computation methods that rely on lumped circuit theory have been very popular as quick and dirty analysis tools. At today's circuit speeds, however, they are too simplistic for accurate results. Numerical electromagnetic analysis tools are arguably the reliable alternatives but they are computationally too intensive for repetitive analysis. Semi-analytic algorithms based on planar circuit theory will be discussed as a balance between these two extreme cases. Accuracy and performance comparison with state-of-the art tools will be provided. The practical implications of these methods will be discussed with application to real-life scenarios.

Richard Xian-Ke Gao

Dr. Richard Xian-Ke Gao is the manager of the radio frequency engineering group and senior scientist with the A*STAR Institute of High Performance Computing (IHPC) in Singapore. He also holds visiting professor appointments with universities. He received the B. Eng. degree and M. Eng. degree from Huazhong University of Science and Technology in China, and his Ph. D. degree from National University of Singapore in Singapore. Dr. Gao is currently the chair of IEEE EMC Singapore Chapter (2010 – 2011, 2016 – present) and a senior member of IEEE and its EMC, MTT, AP, PSES, and BTS Societies. He has been working in the Chapter executive committee for many years. He serves as a reviewer of prestigious international journals and symposiums, including the IEEE Transactions on EMC, IEEE Transactions on Magnetism, IEEE Transactions on Industrial Electronics, IEICE, InterMag, EMC Zurich Symposiums, APEMCs, IEEE EMC Symposiums, APMCs, CompuMag, etc. He is the co-TPC chair of the 2018 Joint IEEE EMC and APEMC Symposium. He was a subcommittee co-chair of PIERS 2017 and track chair of APEMC 2017. He was a member of the steering committee and the publication chair of APEMC 2008 and the 19th International Zurich Symposium on EMC. He has served extensively on the APEMC committees for APEMC 2010, 2012, 2015, and 2016. He served as the publication, publicity and session chair of EDAPS 2010. He was the chair of the 2011 IEEE Singapore EMC Workshop. He was the TPC member of GSMM 2012 and is an OC member of IMS 2020/2023. He has received many awards, including the Notable Service from the IEEE, Outstanding Service from the IEEE EMC Society, and Valued

Service from the IEEE Singapore Section. Under his leadership, the Singapore EMC Chapter received the "Chapter-of- the-Year" award from the IEEE EMC Society in 2010 and the "2011 Best Chapter in Singapore" from the IEEE Singapore Section. His main research interests include electromagnetic interference/compatibility, RF, microwave, antenna, wireless, metamaterial, smart grid, robust design and optimization, and CAD/CAE/CAM. Following is a summary of his presentation options:

Talk 1: EMC Fundamentals, Diagnosis and Challenges

Electronics have been widely applied in our work and life because of rapid technology advancement. In electronics, some are designed to generate and transmit signals, others are sensitive receivers. The signal quality, or data quality, is one of the inevitably basic but critical requirements in communications. According to the nature of electricity, the signal quality could be affected by all parameters/factors involved in data communications. The quality is mostly referred to as the tolerance level to the internal and external electromagnetic environment. This situation is directed to electromagnetic compatibility (EMC) which is thus a crucial element in any modern electronics design. EMC is the ability of electronic/electric devices and systems that operate in their intended operational environment without suffering unacceptable degradation or causing unintentional degradation because of electromagnetic radiation, coupling or interference. It involves the electromagnetic spectrum control and management; concepts and doctrines for maximizing operational effectiveness, and system design configuration and guidelines for interference-free operation. This talk will be given in two parts: the first part presents the fundamental phenomena of electromagnetic interference, and the second part addresses EMI diagnosis and EMC challenges.

Talk 2: Common-mode Electromagnetic Noise Mitigation for High-Speed Electronics

A wideband and compact microstrip filter for mitigating common-mode electromagnetic (EM) noise in high-speed electronic circuits is presented in this talk. By using specific slots etched in a ground metallic plane, which forms a defected ground structure (DGS), the common-mode noise can be suppressed. The effect of the DGS on the electromagnetic characteristics of the microstrip lines is examined. It is proved that the common-mode noise can be reduced at least by 15 dB at operational frequency with a broad bandwidth, whilst the differential signal is unaffected. An equivalent circuit model is also built based on the simulation result to understand the filtering behavior. The filter size is comparably small to the operational wavelength. A substrate-filled metallic cavity beneath a conventional DGS is proposed for the application in multilayer printed circuit boards. Behaving as electromagnetic shielding and absorption for the cavity, the back-radiation from the DGS is effectively reduced, while the filtering characteristic of the DGS is retained in the interested frequency band. The optimization technique is employed to realize the optimal filter with robust properties. The DGS based filtering technique can effectively tackle the EMI issue by increasing microstrip line insertion loss. It can be used extensively in microwave filter design.

Talk 3: Effective Modeling and Characterization of Lightning Effect on Aircraft Composite

The lightning strike on aircraft can induce a very large amount of electric current that redistributes on the aircraft skin. This could lead to a possible hazard. The extent of damage caused by a lightning strike increases due to the increased use of composite material in aerospace development. For instance, carbon fiber reinforced polymer (CFRP) is employed for aircraft fuselage and wing design. Since the lightning phenomenon and its direct redistribution effects are very complex, it is imperative to study the intrinsic characteristics of lightning direct and indirect effects on composite material through theoretical modeling and computational simulation. This is because experimental labs have tremendous difficultly duplicating the real lightning phenomenon. A theoretical modeling study examines the internal electromagnetic performance of different plies of composite materials and understands the conditions that may result in delamination or dielectric breakdown at the interface in the composite laminates and between composite and metallic objects. The current-carrying capability of composite is characterized for enhancing aircraft lightning protection.

The Distinguished Lecturer Program – How it Works

The EMC Society's Distinguished Lecturer Program provides speakers for Society Chapter meetings and similar functions. Each Distinguished Lecturer (DL) can offer one of several pre-prepared presentations on various EMC and SI/PI topics. DLs are appointed by the EMC Society Board of Directors for a two-year term. In 2018, the EMC Society will have seven Distinguished Lecturers serving on alternating terms.

Distinguished Lecturers may give up to six talks per year under the program, which reimburses the DL for their approved traveling expenses up to a recommended limit of $1,500 per US engagement, or $2,000 for international engagements. To provide as many opportunities to as many members as possible, the Society encourages hosting Chapters whenever possible to absorb some part of the speaker's costs, such as by providing or paying for local transportation, meals, and lodging.

For more information about the EMC Society's Distinguished Lecturer Program, visit our web site at http://www.emcs.org/dl-main.html. You can also contact Vignesh Rajamani via email at vignesh@ieee.org.

Please also note the Respected Speaker Bureau which is comprised of past DLs and other notable speakers. Information on the Respected Speaker Bureau can be found on the DL web site.

Also, remember to take a look at the Video DL program information. These DVDs can also be used at Chapter meetings. **EMC**