IEEE AP-S DL Workshop & Meeting Series,
October 17-19, 2024, Belgrade, Serbia

All lectures, talks, presentations, and panels will have plenty of time for Q&As and discussion

IEEE AP-S Distinguished Lecturers Workshop, Thursday, October 17

8:30 AM – 8:50 AM Introduction

8:50 AM – 9:40 AM Branislav Notaroš, IEEE AP-S President

9:40 AM – 10:30 AM Maurizio Bozzi, IEEE MTT-S President

10:30 AM – 10:50 AM Break

10:50 AM – 11:40 AM Atif Shamim, IEEE AP-S Distinguished Lecturer

11:40 AM – 12:30 PM Meisong Tong, IEEE AP-S Distinguished Lecturer

12:30 PM – 2:00 PM Lunch

2:00 PM – 2:50 PM George Shaker, IEEE ComSoc Distinguished Lecturer

2:50 PM – 3:40 PM Qammer Abbasi, IEEE AP-S Distinguished Lecturer

3:40 PM – 4:00 PM Break

4:00 PM – 4:50 PM Debatosh Guha, IEEE AP-S Distinguished Lecturer

4:50 PM – 5:40 PM Levent Sevgi, IEEE AP-S DLPC Chair and former DL

5:40 PM – 7 PM Rest and/or Walk

7 PM – 10 PM Dinner

IEEE AP-S Professional Opportunities and University/Industry Collaboration, Friday, October 18

8:30 AM – 9:00 AM IEEE AP-S Overview, Branislav Notaroš, IEEE AP-S President

9:00 AM – 9:20 AM IEEE MTT-S Overview, Maurizio Bozzi, IEEE MTT-S President

9:20 AM – 10:20 AM IEEE AP-S SIGHT–COPE–DEIB Panel, Jawad Siddiqui, SIGHT Chair, Meisong Tong, COPE Vice Chair

10:20 AM – 10:40 AM Break

10:40 AM – 11:30 AM IEEE AP-S MGA–Membership & Benefits–YP Panel, Debatosh Guha, MGA Chair, George Shaker, M&B Vice Chair, Qammer Abbasi, YP Vice Chair

11:30 AM – 12:00 PM Milan Ilić, Chair, EM Dept., School of Electrical Engineering, Univ. of Belgrade

12:00 PM – 12:30 PM Dejan Gvozdić, Dean, School of Electrical Engineering, University of Belgrade

12:30 PM – 2:00 PM Lunch

2:00 PM – 2:25 PM Branko Kolundžija, President, WIPL-D, Belgrade

2:25 PM – 2:50 PM Felix Vega, Senior Director, Technology Innovation Institute, Abu Dhabi, UAE

2:50 PM – 3:05 PM George Shaker, Chief Scientist, Spark Technology Labs, Waterloo, ON, Canada

3:05 PM – 3:40 PM Final Discussion and Closing Remarks

3:40 PM – 5:40 PM Visit to Nikola Tesla Museum, Belgrade

5:40 PM – 7 PM Rest and/or Walk

7 PM – 10 PM Dinner

IEEE AP-S Networking Event: Technical and History Tour of Belgrade and Serbia, Saturday October 19

IEEE AP-S Distinguished Lecturers Workshop, October 17, 2024, Belgrade, Serbia

Electromagnetics and Antennas Computation and Design: New Methodologies and Interdisciplinary Applications

Branislav M. Notaroš
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ABSTRACT

RF, antennas, wireless, microwave, radar, microelectronics, and lightwave technologies are exploding! The importance of electromagnetic theory, computation, and design to these technologies can hardly be overstated. This talk presents several novel methodologies and computational technologies for electromagnetic analysis and design including uncertainty quantification, error control, and adaptive refinement, which are essential for modern effective and reliable simulation-based design in mission-critical applications. Our novel approaches constituted by accelerated, rigorous, adaptive, goal-oriented error estimation and control, sensitivity and uncertainty quantification, and model refinement for antennas and propagation and engineering in general show unparalleled accuracy, efficiency, robustness, and versatility of analyses and simulations. The talk also presents advanced engineering applications combining electromagnetics, antennas, and propagation concepts, techniques, and technologies with emerging interdisciplinary topics, to solve general real-world problems with impacts on wireless communication, medical imaging and diagnostics, and remote sensing/radar meteorology. The applications include cyber-physical systems in smart underground mining; design of RF coils/antennas for next-generation high-field, high-frequency magnetic resonance imaging scanners; direct electromagnetic coupling system for orthopaedic fracture-healing diagnostics, many times faster than using X rays; and optical and radar measurements, modeling, and characterization of snowflakes and snow.

BIO

Branislav M. Notaroš is a Professor of Electrical and Computer Engineering, Director of Electromagnetics Laboratory, and University Distinguished Teaching Scholar at Colorado State University. Previously, he held assistant/associate-professor positions at the University of Massachusetts Dartmouth and University of Belgrade. His research contributions are in computational and applied electromagnetics. His publications include about 330 journal and conference papers, and textbooks "Electromagnetics" (2010) and "MATLAB-Based Electromagnetics" (2013) with Pearson Prentice Hall and "Conceptual Electromagnetics" (2017) with CRC Press. Prof. Notaroš serves as President of the IEEE Antennas and Propagation Society (AP-S), Immediate Past President of the Applied Computational Electromagnetics Society (ACES), Immediate Past Chair of the USNC-URSI Commission B, and Track Editor of the IEEE Transactions on Antennas and Propagation. He served as General Chair of the IEEE APS/URSI 2022 Denver Conference, Chair of the IEEE AP-S Meetings Committee, Chair of the Joint Meetings Committee, and AP-S AdCom member. He was the recipient of the 1999 IEE Marconi Premium, 2005 IEEE MTT-S Microwave Prize, 2022 IEEE Antennas and Propagation Edward E. Altshuler Prize Paper Award, 2019 ACES Technical Achievement Award, 2014 Carnegie Foundation Colorado Professor of the Year Award, 2015 ASEE ECE Distinguished Educator Award, 2015 IEEE Undergraduate Teaching Award, and many other research and teaching awards. He is Fellow of IEEE and ACES.

Novel Topologies and Technologies for Microwave Sensors

Maurizio Bozzi
University of Pavia, Italy

ABSTRACT

A broad range of different physical quantities can be determined by adopting electromagnetic techniques at microwave frequency: among them, an important class of sensors aims at the determination of the electric and magnetic characteristics of materials, for instance with the scope to establish the content of a certain element in liquids. Another class of sensors are devoted to the accurate determination of the linear or the angular displacement of a target.

Depending on the intended application, the requested features of microwave sensors are typically the compact size, the low manufacturing cost, and the easy design and fabrication, as well as the good accuracy of the results.

This talk will provide an overview of some recent achievements in the area of microwave sensors, for applications ranging from the characterization of the electrical properties of materials to the determination of rotation and proximity. The use of planar structures and SIW technology, the fabrication by additive manufacturing, as well as the adoption of hybrid solutions will be presented and discussed.

BIO

Maurizio Bozzi received the Ph.D. degree in electronics and computer science from the University of Pavia, Pavia, Italy, in 2000. He held research positions with various universities worldwide, including the Technische Universitaet Darmstadt, Germany; the Universitat de Valencia, Spain; and the Ecole Polytechnique de Montreal, Canada. In 2002, he joined the Department of Electronics, University of Pavia, where he is currently a full professor of electromagnetic fields. He was also a Guest Professor at Tianjin University, China (2015-2017) and a Visiting Professor at Gdansk University of Technology, Poland (2017-2018). His main research interests concern the computational electromagnetics, the substrate integrated waveguide technology, and the use of novel materials and fabrication technologies for microwave circuits (including paper, textile, and 3D printing). He has authored or co-authored more than 180 journal papers and 360 conference papers. He co-edited the book Periodic Structures (Research Signpost, 2006) and co-authored the book Microstrip Lines and Slotlines (Artech House, 2013).

Prof. Bozzi is the 2024 President of the IEEE Microwave Theory and Technology Society (MTT-S). He was an elected Member of the Administrative Committee of MTT-S for years 2017–2022, the Budget Committee Chair in 2023, the MTT-S Treasurer in 2020–2022, the Chair of the Meetings and Symposia Committee for years 2018-2019, and the Secretary of MTT-S in 2016. He was also a member of the General Assembly of the European Microwave Association (EuMA) from 2014 to 2016. He was a Track Editor of the IEEE Transactions on Microwave Theory and Techniques, and an Associate Editor of the IEEE Microwave and Wireless Components Letters, the IET Microwaves, Antennas and Propagation, and the IET Electronics Letters. He was the General Chair of the IEEE MTT-S International Microwave Workshop Series-Advanced Materials and Processes (IMWS-AMP 2017), in Pavia, Italy, 2017, of the inaugural edition of the IEEE International Conference on Numerical Electromagnetic Modeling and Optimization (NEMO2014), in Pavia, Italy, 2014, and of the IEEE MTT-S International Microwave Workshop Series on Millimeter Wave Integration Technologies, in Sitges, Spain, 2011.

Maurizio Bozzi is a Fellow of the IEEE. He received several awards, including the 2015 Premium Award for Best Paper in IET Microwaves, Antennas & Propagation, the 2014 Premium Award for the Best Paper in Electronics Letters, the Best Student Paper Award at the 2016 IEEE Topical Conference on Wireless Sensors and Sensor Networks (WiSNet2016), the Best Paper Award at the 15th Mediterranean Microwave Symposium (MMS2015), the Best Student Award at the 4th European Conference on Antennas and Propagation (EuCAP 2010), the Best Young Scientist Paper Award of the XXVII General Assembly of URSI in 2002, and the MECSA Prize of the Italian Conference on Electromagnetics (XIII RiNEm) in 2000.

جامعة الملك عبدالله للعلوم والتقنية
King Abdullah University of Science and Technology

IMPACT Integrated Microwaves Packaging Antennas & Circuits Technology

On-Chip Antennas: The Last Barrier to True RF System-on-Chip

Antennas are integral part of wireless communication devices and traditionally have remained off the Integrated Circuits (ICs which are also commonly known as chips) resulting in large sized modules. In the last decade, the increased level of integration provided by silicon technologies and emerging applications at millimeter wave frequencies (such as 5G/6G) has helped to achieve true System-on-Chip solutions bringing the antennas on the chip. This is because antenna sizes at these frequencies become small enough for practical on-chip realization. Though, there are a number of benefits of putting antennas on-chip, such as monolithic integration resulting in compact systems, robustness due to absence of bond wires or other connection mechanisms between the antenna and the circuits, lower cost due to mass manufacturing in standard CMOS processes, etc. However, there are a number of challenges to overcome, for instance dealing with silicon substrate high conductivity and permittivity (resulting in poor radiation efficiency), metal stack-up and layout restrictions, and on-chip characterization through delicate probes, etc. Furthermore, the co-design of circuits and antenna, which sometime have contradicting requirements, need knowledge of both the domains. This talk aims to discuss the above challenges in detail as well as the proposed solutions. In particular, many design examples will be shown for the gain and radiation efficiency enhancement of on-chip antennas through artificial magnetic conductors. The talk will conclude with the upcoming trends in the field of on-chip antennas.

Biography of the Presenter

Atif Shamim – received his MS and PhD degrees in electrical engineering from Carleton University, Canada in 2004 and 2009 respectively. He was an NSERC Alexander Graham Bell Graduate scholar at Carleton University from 2007 till 2009 and an NSERC postdoctoral Fellow in 2009-2010 at Royal Military College Canada and KAUST. In August 2010, he joined the Electrical and Computer Engineering Program at KAUST, where he is currently a Full Professor and Principal Investigator of IMPACT Lab. He was an invited researcher at the VTT Micro-Modules Research Center (Oulu, Finland) in 2006. His research work has won best paper awards in IEEE ICMAC 2021, IEEE IMS 2016, IEEE MECAP 2016, IEEE EuWiT 2008, first prize in IEEE IMS 2019 3MT competition, IEEE AP-S Design Competition 2022 and IEEE MTT-S Design Competition 2024, finalist/honorable mention prizes in IEEE APS 2023, IEEE AP-S Design Competition 2020, IEEE IMS 2017 (3MT competition), IEEE IMS 2014, IEEE APS 2005 and R. W. P. King prize for journal papers in IEEE TAP 2017 and 2020. He has been selected as the Distinguished Lecturer for IEEE AP-S (2022-2024). He has won the Kings Prize for the best innovation of the year (2018) for his work on sensors for the oil industry. He was given the Ottawa Centre of Research Innovation (OCRI) Researcher of the Year Award in 2008 in Canada. His work on Wireless Dosimeter won the ITAC SMC Award at Canadian Microelectronics Corporation TEXPO in 2007. Prof. Shamim also won numerous business-related awards, including 1st prize in Canada's national business plan competition and was awarded OCRI Entrepreneur of the year award in 2010. He is an author/co-author of 1 book, 3 book chapters and more than 350 international publications, an inventor on 35 patents and has given over 100 invited talks at various international forums. His research interests are in innovative antenna designs and their integration strategies with circuits and sensors for flexible and wearable wireless sensing systems through a combination of CMOS and additive manufacturing technologies. He is a Fellow of IEEE, founded the first IEEE AP/MTT chapter in Saudi Arabia (2013) and served on the editorial board of IEEE Transactions on Antennas and Propagation (2013-2019), IEEE Journal of Electromagnetics, RF and Microwaves in Medicine and Biology (2020-2024), and as a Guest Editor for IEEE AWPL Special issue (2019). He is currently the Vice Chair of IEEE APS MGA Committee and previously served on IEEE Technical committees on Antenna Measurements (AP-S), Microwave Controls (MTT-S 13), and Additive Manufacturing (CRFID).

Find out more details at https://cemse.kaust.edu.sa/impacts

A Novel Meshless Method for Solving Electromagnetic Problems

Prof. Meisong Tong
Department of Electronic Science and Technology
Tongji University, Shanghai, China

Abstract — Volume integral equations (VIEs) are indispensable for solving inhomogeneous or anisotropic electromagnetic (EM) problems by integral equation approach. The solution of VIEs strongly relies on the appropriate discretization of volume integral domains, and tetrahedral discretization is usually preferred for arbitrarily-shaped geometries. Unlike discretizing a surface domain, the discretization of a volume domain could be very difficult in practice and special commercial software is needed in general even for a simple and regular geometry. To reduce the cost of descretizing volume domains, especially remove the constraint of mesh conformity required by the traditional method of moments (MoM), we propose a novel meshless method for solving the VIEs recently. The method is based on the transformation of volume integrals into boundary or surface integrals through the Green–Gauss theorem when integral kernels are regularized by excluding a small cylinder or cube enclosing an observation node. The original integral domain represented by the object is also expanded to a cylindrical or cubic domain circumscribing the object to facilitate the evaluation of boundary integrals. The singular integrals over the small cylinder or cube are specially handled with singularity subtraction techniques. Several numerical examples for solving typical EM problems are presented to illustrate the method and good results can be observed.

Biography: Meisong Tong received the B.S. and M.S. Degrees from Huazhong University of Science and Technology, Wuhan, China, respectively, and Ph.D. degree from Arizona State University, Tempe, Arizona, USA, all in electrical engineering. He is currently the Distinguished/Permanent Professor and Head of Department of Electronic Science and Technology, and Vice Dean of College of Microelectronics, Tongji University, Shanghai, China. He has also held an adjunct professorship at the University of Illinois at Urbana-Champaign, Urbana, Illinois, USA, and an honorary professorship at the University of Hong Kong, China. He has published more than 700 papers in refereed journals and conference proceedings and co-authored eight books or book chapters. His research interests include electromagnetic field theory, antenna theory and technique, modeling and simulation of RF/microwave circuits and devices, interconnect and packaging analysis, inverse electromagnetic scattering for imaging, and computational electromagnetics.

Prof. Tong is a Fellow of the Electromagnetics Academy, Fellow of the Japan Society for the Promotion of Science (JSPS), and Senior Member (Commission B) of the USNC/URSI. He has been the chair of Shanghai Chapter since 2014 and the chair of SIGHT committee in 2018, respectively, in IEEE Antennas and Propagation Society. He has served as an associate editor or guest editor for several well-known international

journals, including IEEE Antennas and Propagation Magazine, IEEE Transactions on Antennas and Propagation, IEEE Transactions on Components, Packaging and Manufacturing Technology, International Journal of Numerical Modeling: Electronic Networks, Devices and Fields, Progress in Electromagnetics Research, and Journal of Electromagnetic Waves and Applications, etc. He also frequently served as a session organizer/chair, technical program committee member/chair, and general chair for some prestigious international conferences. He was the recipient of a Visiting Professorship Award from Kyoto University, Japan, in 2012, and from University of Hong Kong, China, 2013. He advised and coauthored 15 papers that received the Best Student Paper Award from different international conferences. He was the recipient of the Travel Fellowship Award of USNC/URSI for the 31th General Assembly and Scientific Symposium (GASS) in 2014, Advance Award of Science and Technology of Shanghai Municipal Government in 2015, Fellowship Award of JSPS in 2016, Innovation Award of Universities' Achievements of Ministry of Education of China in 2017, Innovation Achievement Award of Industry-Academia-Research Collaboration of China in 2019, "Jinqiao" Award of Technology Market Association of China in 2020, Baosteel Education Award of China in 2021, Carl Friedrich von Siemens Research Award of the Alexander von Humboldt Foundation of Germany in 2023, and Technical Achievement Award of Applied Computational Electromagnetic Society (ACES) of USA in 2024. In 2018, he was selected as the Distinguished Lecturer (DL) of IEEE Antennas and Propagation Society for 2019-2022.

Radars, Digital Twins, and the Future: The Unseen Heroes of Tomorrow's Technology

George Shaker
University of Waterloo, Waterloo, ON, Canada

ABSTRACT

In this lecture, we delve into the cutting-edge integration of radar sensors and digital twins, a convergence driving transformative advancements across various industries. Radar technology, with its unparalleled capabilities in real-time monitoring and decision-making, is rapidly becoming a cornerstone of the wireless IoT ecosystem. We will explore how these technologies are revolutionizing consumer electronics and autonomous systems, enhancing UAV classification, and leading to groundbreaking healthcare applications—from non-invasive glucose sensing to the seamless integration of radar sensors into everyday environments.

Through detailed discussions on radar systems (including recent developments in antenna design & integration), the fusion of radar with AI, and the creation of digital twins, this talk will offer a comprehensive view of the current trends and future potential of these technologies. This lecture aims to inspire innovation by showcasing how radar and digital twins are not just enhancing existing systems but are also opening new frontiers in technology, with the potential to significantly improve safety, efficiency, and quality of life.

BIO

George Shaker (Senior Member, IEEE) is the Lab Director of the Wireless Sensors and Devices Laboratory at the Schlegel-UW Research Institute for Aging, where he founded and directs “THE MIRADA - Technology for Health Empowerment: Monitoring, Intervention, and Response for Aging Demonstration Apartment,” a groundbreaking not-for-profit initiative aimed at improving healthcare for aging populations through advanced sensing technology. He is also the Chief Scientist at Spark Technology Labs, where he has been leading innovation in wireless sensor technologies since its founding in 2011. Concurrently, Dr. Shaker is an adjunct associate professor in the Department of Electrical and Computer Engineering and the Department of Mechanical and Mechatronics Engineering at the University of Waterloo, Waterloo, ON, Canada.

Previously, Dr. Shaker was an NSERC scholar at the Georgia Institute of Technology, Atlanta, GA, USA. He also held multiple roles with Research In Motion (RIM, now BlackBerry), where he significantly contributed to the development of wireless communication technologies.

With close to 20 years of industrial experience in technology and approximately ten years in academia, Dr. Shaker has led numerous projects related to the application of wireless sensor systems in healthcare, automotive, and unmanned aerial vehicles (UAVs). His work has had a direct impact on the design of numerous commercial products available from many startups and multinationals, and has been featured in many news outlets including CNN and China Post. A sample list of companies he has closely engaged with includes Able Technologies, Agilent, Amazon, Apple, Aquasensing, BlackBerry, COMDEV, Ecobee, Electrans, Eleven-X, General Dynamics, General Motors, GoldSentintel, Google, Honeywell, LoopX, Loose Wheel, Lyngsoe, Maple Lodge Farms, Medella Health, Microsoft, NERV Technologies, North, Northpoint Lifesciences, Novela, ON Semiconductor, Purolator, Rogers, and Thalmic Labs.

Dr. Shaker has co-authored over 200 peer-reviewed publications and holds more than 35 patents, including several assigned to industry leaders such as Google in the fields of Augmented Reality and Sensing. His research has been recognized with numerous prestigious awards, including the IEEE Antennas and Propagation Society (AP-S) Best Paper Award, IEEE AP-S Honorable Mention Best Paper Awards (three times), the IEEE Antennas and Propagation Graduate Research Award, the IEEE Microwave Theory and Techniques Society (MTT-S) Graduate Fellowship, the IEEE Electronic

Components and Technology Best of Session Paper Award, the arXiv Top Downloaded Article (medical device category), the ACM MobileHCI Best Workshop Paper, and the Computer Vision Conference Imaging Best Paper. Three of his co-authored journal papers were on the list of top downloaded articles on IEEE Xplore for several consecutive months, and another was the 2022 top-accessed article in Wiley Engineering Reports.

In addition to his industry and research accomplishments, Dr. Shaker has been a dedicated mentor, and his students have earned multiple accolades, including the IEEE AP-S Design Contest Award in 2016, the NSERC Top Science Research Award in 2019, the IEEE AP-S Honorable Mention Paper Awards (twice), the Biotec Top Demo Award in 2019, the Velocity Fund in 2020, the NASA Tech Briefs Honorable Mention Award (medical device category) in 2020, the Concept Winner in 2021, the U.K. Dragons' Canadian Competition Winner in 2021, the CMC Nano Winner in 2021, the COIL CoLab Award in 2022, the 2023 Canadian Space Agency Satellite Design Contest Award (involving over 90 UW student members), the 2023 URSI Young Scientist Award, the 2023 Ontario Long Term Care Innovation of Year Award, the Engineer the Future Award in 2024, the IEEE MTT-S NEMO Best Student Paper Award, the Norman Esch Entrepreneurship Award in 2024, and the iCAN 2024 Gold Medal.

How to Bring 6G to Reality? Its Enabling Technologies

Qammer H. Abbasi
Professor, Applied EM and Sensing
Co-Director, Communication Sensing & Imaging Hub
James Watt School of Engineering
University of Glasgow

ABSTRACT

Future wireless networks are expected be more than allowing people, mobile devices, and objects to communicate with each other. The sixth generation (6G) of mobile networks are envisioned to include high data rate applications and ultra-massive, connected things. This also includes bio and nano-internet of things (IoT) tele-operated driving, unmanned mobility, haptic communications, unmanned aerial vehicles, and many more. Given the size of nano-sensors, THz frequency is proposed to do various sensing activities at this scale. However, it will be ideal to use the same radio frequency for communications as well. Furthermore, THz is also proposed as an enabler of extremely high data rate applications in 6G communications. The talk will be focused on Terahertz antenna design, Reconfigurable Intelligent Surfaces (RISs) and its role for joint communication and sensing feature of 6G.

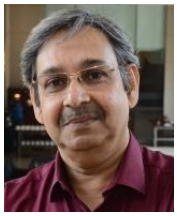
BIO

Qammer H. Abbasi (SMIEEE, FRET, FRSA, FEAI, FIET), Professor of Applied Electromagnetics & Sensing with the James Watt School (JWS) of Engineering, Theme lead for Connecting People priority at JWS, co-director for Communication Sensing and Imaging (CSI) Hub and deputy theme lead for Quantum technologies in the University's flagship Advance Research Centre at University of Glasgow, UK. He has grant portfolio of £10M+ and contributed to more than 500+ leading international technical journal (including nature portfolio) and peer reviewed conference papers, 11 books and received several recognitions for his research including UK exceptional talent endorsement by Royal Academy of Engineering, Sensor 2021 Young Scientist Award, University level Teaching excellence award in addition to coverage by various media houses including Analog IC tips, Microwaves & RF newsletters, Vertical news, Pakistan Dawn news, BBC news, Scotland TV, Fiercewireless and many other media houses. Prof. Abbasi is an IEEE senior member and is chair of IEEE AP/MTT UK, Ireland and Scotland joint chapter. He is an Associate editor for IEEE Journal of Electromagnetics, RF, and Microwaves in Medicine and Biology, IEEE Sensors, IEEE Internet of Things, IEEE open access Antenna and Propagation, IEEE JBHI and scientific reports. He was/is a committee member for IEEE APS Young professional, Sub-committee chair for IEEE YP Ambassador program, IEEE 1906.1.1 standard on nano communication, IEEE APS/SC WG P145, IET Antenna & Propagation and healthcare network. He is/was Fellow of Royal Society of Arts, industrial Fellow of Royal Academy of Engineering, Fellow of IET and Fellow of European Alliance of innovation.

New Techniques and Insights into Uniformly Low Cross-Polar Antenna Design

Debatosh Guha
Institute of Radio Physics and Electronics
University of Calcutta

This talk will address a novel and versatile technique which has been explored over the last two decades ensuring enormous possibility of advancement in planar antenna and array technology. It, indeed, is Defected Ground Structure (DGS) which originated from the electromagnetic band gap concept and was confined to the printed circuits at its early phase. In 2005, DGS was first explored for antennas, with a special application to addressing the cross-polarization issues. It grew rapidly as a new and versatile technique. This presentation will address its fundamental principles, the physical insights, and chronological advancement leading to the state-of-the-art achievement in terms of uniform suppression of cross-polar fields.



Debatosh Guha is a Professor in Radio Physics and Electronics, University of Calcutta and Dean for the Faculty of Engineering and Technology in the same University. He is a Fellow of IEEE and also a fellow of all four National Academies for Sciences and Engineering in India. He is Abdul Kalam Technology Innovation National Fellow, Department of Science and Technology, Govt. of India. He has served *IEEE Transactions on Antennas and Propagation* and *IEEE Antennas and Wireless Propagation Letters* as an Associate Editor, and *IEEE Antennas and Propagation Magazine* as a Section Editor. He has been serving IEEE AP Society and URSI Commission-B in various capacities. At present, he is the Chair of IEEE AP-S MGA Committee and also a Distinguished Lecturer of IEEE AP Society. His research interests include low-profile antenna techniques. A couple of books on antenna engineering published by IEEE Press and Wiley are to his credit.

Prof. Dr. Levent Sevgi
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From ENGINEERING ELECTROMAGNETICS to ELECTROMAGNETIC ENGINEERING:

Teaching/Training Next Generations

Abstract

The role of Electromagnetic (EM) fields in our lives has been increasing. Communication, remote sensing, integrated command/ control/surveillance systems, intelligent transportation systems, medicine, environment, education, marketing, defense are only a few areas where EM fields have critical importance. We have witnessed the transformation from ***Engineering Electromagnetics*** to ***Electromagnetic Engineering*** for the last few decades after being surrounded by EM waves everywhere. Among many others, EM engineering deals with broad range of problems from antenna design to EM scattering, indoor–outdoor radiowave propagation to wireless communication, radar systems to integrated surveillance, subsurface imaging to novel materials, EM compatibility to nano-systems, electroacoustic devices to electro-optical systems, etc. The range of the devices we use in our daily life has extended from DC up to Terahertz frequencies. We have had both large-scale (kilometers-wide) and small-scale (nanometers) EM systems. A large portion of these systems are broadband and digital and have to operate in close proximity that results in severe EM interference problems. Engineers must take EM issues into account from the earliest possible design stages. This necessitates establishing an intelligent balance between strong mathematical background (theory), engineering experience (practice), and modeling and numerical computations (simulation).

This keynote lecture aims at a broad-brush look at certain teaching / training challenges that confront wave-oriented EM engineering in the 21st century, in a complex computer and technology-driven world with rapidly shifting societal and technical priorities.

The lecture also discusses modeling and simulation strategies pertaining to complex EM problems and supplies several user-friendly virtual tools, most of which have been presented in the IEEE AP Magazine and which are very effective in teaching and training in lectures such as EM Wave Theory, Antennas and Radiowave Propagation, EM Scattering and Diffraction, Guided Wave Theory, Microstrip Circuit Design, Radar Cross Section Prediction, Transmission Lines, Metamaterials, etc.

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Prof. Dr. Levent Sevgi
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Prof. Dr. Levent Sevgi is a Fellow of the IEEE (since 2009) and the recipient of IEEE APS Chen-To Tai Distinguished Educator Award (2021). He received his B. Eng., M. Eng., and PhD degrees in Electronic Engineering from Istanbul Technical University (ITU) in 1982, 1984 and 1990, respectively. In 1987, while working on his PhD, he was awarded a fellowship that allowed him to work with Prof. L. B. Felsen at Weber Research Institute / New York Polytechnic University York for two years. His work at the Polytechnic concerned the propagation phenomena in non-homogeneous open and closed waveguides.

He was with Istanbul Technical University (1991–1998), TUBITAK-MRC, Information Technologies Research Institute (1999–2000), Weber Research Institute / NY Polytechnic University (1988–1990), Scientific Research Group of Raytheon Systems Canada (1998 – 1999), Center for Defense Studies, ITUV-SAM (1993 –1998 and 2000–2002) and with University of Massachusetts, Lowell (UML) MA/USA as a full-time faculty (2012 – 2013), with DOGUS University (2001-2014), with Istanbul OKAN University (2014 - 2021), and with Istanbul ATLAS University (2022-2024).

He served four years (2020-2023) as an IEEE AP-S Distinguished Lecturer. Since Jan 2024 he has been the chair of the IEEE AP-S DL Committee. He served one-term in the IEEE AP-S AdCom (2013-2015) and one-term and as a member of IEEE AP-S Field Award Committee (2018-2019). He had been the writer/editor of the "Testing ourselves" Column in the IEEE AP Magazine (2007-2021), a member of the IEEE AP-S Education Committee (2006-2021), He also served in several editorial boards (EB) of other prestigious journals / magazines, such as the IEEE AP Magazine (2007-2021), Wiley's International Journal of RFMiCAE (2002-2018), and the IEEE Access (2017-2019 and 2020 - 2022). He is the founding chair of the EMC TURKIYE International Conferences (www.emcturkiye.org).

He has been involved with complex electromagnetic problems and complex communication and radar systems for nearly three decades. His research study has focused on propagation in complex environments; electromagnetic scattering and diffraction; RCS prediction and reduction; EMC/EMI modelling, simulation, tests and measurements; multi-sensor integrated wide area surveillance systems; surface wave HF radars; analytical and numerical methods in electromagnetics; FDTD, TLM, FEM, SSPE, and MoM techniques and their applications; bio-electromagnetics. He is also interested in novel approaches in engineering education, teaching electromagnetics via virtual tools. He also teaches popular science lectures such as Science, Technology and Society.

He has given dozens of seminars, invited/keynote talks, organized/presented several tutorials, training sessions and short courses from half-day to three-days in universities/institutes all around the World. He has published more than a dozen special issues / sections in many journals as a guest editor and/or a co-guest editor.

He has published many books / book chapters in English and Turkish, over 180 journal/magazine papers / tutorials and attended more than 100 international conferences / symposiums. His three books *Complex Electromagnetic Problems and Numerical Simulation Approaches*, *Electromagnetic Modeling and Simulation* and *Radiowave Propagation and Parabolic Equation Modeling* were published by the IEEE Press - WILEY in 2003, 2014, and 2017, respectively. His fourth and fifth books, *A Practical Guide to EMC Engineering* (Sep 2017) and *Diffraction Modeling and Simulation with MATLAB* (Feb 2021) were published by ARTECH HOUSE.

His ***h-index*** is **37**, with a record of 5000+ citations (source: *Google Scholar*, May 2024).