

The public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington VA, 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to any penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number.
PLEASE DO NOT RETURN YOUR FORM TO THE ABOVE ADDRESS.

1. REPORT DATE (DD-MM-YYYY) 01-08-2022	2. REPORT TYPE Final Report	3. DATES COVERED (From - To) 20-Mar-2015 - 19-Mar-2016
-------------------------------------------	--------------------------------	-----------------------------------------------------------

4. TITLE AND SUBTITLE Final Report: Request for Graduate Student Support for the Thirty First	5a. CONTRACT NUMBER W911NF-15-1-0101
	5b. GRANT NUMBER
	5c. PROGRAM ELEMENT NUMBER 611102

6. AUTHORS	5d. PROJECT NUMBER
	5e. TASK NUMBER
	5f. WORK UNIT NUMBER

7. PERFORMING ORGANIZATION NAMES AND ADDRESSES Colorado School of Mines 1500 Illinois Street, Guggenheim Hall, Room 130 Golden, CO 80401 -1887	8. PERFORMING ORGANIZATION REPORT NUMBER
-------------------------------------------------------------------------------------------------------------------------------------------------------------	------------------------------------------

9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS (ES) U.S. Army Research Office P.O. Box 12211 Research Triangle Park, NC 27709-2211	10. SPONSOR/MONITOR'S ACRONYM(S) ARO
	11. SPONSOR/MONITOR'S REPORT NUMBER(S) 67031-EL-CF.1

12. DISTRIBUTION AVAILABILITY STATEMENT Approved for public release; distribution is unlimited.

13. SUPPLEMENTARY NOTES The views, opinions and/or findings contained in this report are those of the author(s) and should not be construed as an official Department of the Army position, policy or decision, unless so designated by other documentation.

14. ABSTRACT

15. SUBJECT TERMS

16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT UU	15. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON Atef Elsherbeni
a. REPORT UU	b. ABSTRACT UU	c. THIS PAGE UU			19b. TELEPHONE NUMBER 303-273-3667

RPPR Final Report
as of 02-Aug-2022

Agency Code: 21XD

Proposal Number: 67031ELCF

Agreement Number: W911NF-15-1-0101

INVESTIGATOR(S):

Name: Atef Z.. Elsherbeni
Email: aelsherb@mines.edu
Phone Number: 3032733667
Principal: Y

Organization: **Colorado School of Mines**

Address: 1500 Illinois Street, Guggenheim Hall, Room 130, Golden, CO 804011887

Country: USA

DUNS Number: 010628170

EIN: 846000551

Report Date: 19-Jun-2016

Date Received: 01-Aug-2022

Final Report for Period Beginning 20-Mar-2015 and Ending 19-Mar-2016

Title: Request for Graduate Student Support for the Thirty First

Begin Performance Period: 20-Mar-2015

End Performance Period: 19-Mar-2016

Report Term: 0-Other

Submitted By: Atef Elsherbeni

Email: aelsherb@mines.edu

Phone: (303) 273-3667

Distribution Statement: 1-Approved for public release; distribution is unlimited.

STEM Degrees: 0

STEM Participants:

Major Goals: Provide an international perspective and advance the state-of-the-art in the field of computational electromagnetics, specifically in finite elements for microwave engineering, and to support graduate student activities in this technical area.

Accomplishments: Conference was successful.

Training Opportunities: Nothing to Report

Results Dissemination: Nothing to Report

Honors and Awards: Nothing to Report

Protocol Activity Status:

Technology Transfer: Nothing to Report

RPPR Final Report
as of 02-Aug-2022

Partners

,

I certify that the information in the report is complete and accurate:

Signature: Angela McLean

Signature Date: 8/1/22 3:43PM



The 31st International Review of Progress in Applied Computational Electromagnetics

March 22-26, 2015
Williamsburg, Virginia, USA



ACES 2015 Conference Program



applied computational
ACES
electromagnetics society

ISBN 978-0-9960078-1-8

The 31st International Review of Progress in Applied Computational Electromagnetics

ACES 2015

**March 22 - 26, 2015
Williamsburg, Virginia**

General Chairs: **C. J. Reddy and Khaled ElMahgoub**

Technical Program Chairs: **Veysel Demir and Kubilay Sertel**

Short Course Chair: **Randy Haupt**

Registration and Finance Chair: **Atef Elsherbeni**

Exhibits Chair: **C. J. Reddy**

Local Arrangements Chair: **Osama Mohammed**

Student Paper Contest Chair: **Jiming Song**

Web Masters: **Matthew Inman and Kyle Patel**

Administrative Assistant: **Shanell Lopez**

Welcome to the 31st Annual Review of Progress in Applied Computational Electromagnetics

Welcome Message

It is our pleasure to welcome you to the 31st ACES conference.



C. J. Reddy

This year the conference venue is in Williamsburg, Virginia. Williamsburg was the thriving British colonial capital of Virginia from 1699 to 1780. For decades it was the political, cultural, and educational center of what was then the largest, most populous, and most influential of the British colonies in America. Near the end of the American Revolutionary War that followed, and through the influence of Thomas Jefferson, the seat of government of Virginia was moved up the peninsula to the safer and more centrally located city of Richmond.

For nearly a century and a half afterward, Williamsburg was a simple, quiet college town, home to the College of William and Mary, the second oldest institute of higher education in the United States.



Khaled ElMahgoub

In the early 20th century, many of the historic buildings were in ruins. With the vision of Rev. W. A. R. Goodwin and the financial backing of John D. Rockefeller Jr., Colonial Williamsburg was preserved and restored. Today, tourists can relive 17th century colonial life in the Historic Area which stretches over 301 acres, and includes 88 original 18th-century structures. Hundreds of houses, shops and public outbuildings are reconstructed on their original foundations populated by re-enactors in period costume.

We are pleased to let you know that this year's ACES conference has an exciting technical program, including comprehensive sessions on computational techniques in electromagnetics ranging from low frequency to very high frequency ranges. Sessions include EM Applications such as: RFID Systems, Nanotechnology MEMS and MMIC Bio-Electromagnetics. New this year, vendor tutorials and other tutorials are open to all registered ACES 2015 attendees and are available at no additional cost (free).

On behalf of the organizing committee, we hope to see you at this year's ACES conference. You will learn many new developments and applications in computational electromagnetics. Network with your colleagues, leaders, and researchers in our field, all in this intellectually historical setting. Come have a relaxing and enjoyable time with us in early spring of 2015.

Welcome to Williamsburg!!

**C. J. Reddy and Khaled ElMahgoub
General Chairs – ACES 2015**

Conference Sponsors

Platinum Level



Silver Level



Additional Exhibitors



Technical Co-Sponsors



IEEE



EMC SOCIETY®

Sessions Organizers

Ahmed, Shahid
Baghai-Wadji, Alireza
Bossard, Jeremy
Demir, Veysel
Ekpo, Sunday Cookey
ElMahgoub, Khaled
Elsherbeni, Atef
Fathy, Aly
Hoole, S. Ratnajeevan
Jiang, Zhihao
Kilic, Ozlem
Kindt, Rick

Kinzel, Edward
Koziel, Slawomir
Obayya, Salah
Peng, Zhen
Reddy, C. J.
Simsek, Ergun
Song, Jiming
Sun, Sheng
Wells, Andrew
Werner, Douglas
Xiao, Shu
Zhao, Kezhong

Sessions Chairs

Ali, Mohammad
Baghai-Wadji, Alireza
Barmada, Sami
Bossard, Jeremy
ElMahgoub, Khaled
Elsherbeni, Atef
Fathy, Aly
Fenn, Alan
Hoole, S. Ratnajeevan
Hyde, Milo
Jiang, Zhihao
Kanai, Yasui
Kilic, Ozlem
Kindt, Rick
Kinzel, Edward
Koziel, Slawomir

Nayeri, Payam
Obayya, Salah
Peng, Zhen
Reddy, C. J.
Sarma, Nookala
Simsek, Ergun
Song, Jiming
Sun, Sheng
Uko, Engr Mfon
Wells, Andrew
Werner, Douglas
Xiao, Shu
Yan, Lincan
Zhao, Kezhong
Zhou, Chenming

The 31st International Review of Progress In Applied Computational Electromagnetics ACES 2015

Keynote Speaker

Uwe Schramm

Chief Technical Officer of Altair

Simulation and the Creative Process – A New Paradigm Trends Applying Simulation to Product Design



The ability of a company to thrive in today's economy depends on new and innovative products. Profitable enterprises require a constant stream of creative ideas moved into products to win new customers and satisfy existing customers' needs. What computer-aided engineering tools will be needed in the future to complement the creative process of design? How will they be employed? Do current design tools actually inhibit the creative process? If so, how might this be rectified? How can simulation inform the ideation phase of product development? In the ideation phase, when the freedom to create and modify a design is at its peak and risk is low, creative use of computer-aided engineering can enable quantification of design performance based on the concept. This supplants subjective decision making and may lead to better product outcomes. Computational

techniques become tools for requirements-based design creation rather than merely tools for performance assessment. Traditionally, computer-aided engineering tools are used to document a verified design after-the-fact rather than as a tool to drive the design. Putting computer-aided engineering tools up front in the design process requires a fundamental paradigm shift in how organizations approach design, the use of simulation, and the roles of designers and analysts. Eventually, this will lead to a more efficient design process which will produce more innovative products. The requirements and technology for such a vision will be reviewed.

Uwe Schramm is the Chief Technical Officer for Altair's solvers, optimization and smart multi-physics solutions and strategy. Beyond developing computational engines for speed and accuracy to solve today's most complex engineering problems, his organization is committed to developing and deeply embedding optimization technology throughout Altair's software portfolio to spur innovation and to drive the design process. Holding senior management positions at Altair over the past 18 years and globally recognized for his research contributions in structural and multi-disciplinary optimization, Dr. Schramm brings a unique blend of deep technical and business management expertise to his current role. Dr. Schramm joined Altair in 1996 as an Engineering Manager following a career in academia at the University of Virginia and University of Rostock. In 1999, Dr. Schramm was promoted to Director and relocated from Germany to California to oversee the development of Altair's optimization technologies and to build a western region consulting practice. Having achieved success in both endeavors, he was promoted to Vice President of Product Technology for Altair HyperWorks in 2004 and then to Chief Technology Officer of HyperWorks in 2008. Moving back to Germany in 2011, Dr. Schramm assumed responsibility for Altair's German operations as Managing Director. Dr. Schramm received his Dipl.-Ing. (Master's) and Dr.Sc.Techn. (Ph.D.) in Solid Mechanics in 1984 and 1988, respectively, and completed his Dr.-Ing. Habil. (post-doctoral degree) in Mechanical Engineering in 1991 from the University of Rostock.

The 31st International Review of Progress In Applied Computational Electromagnetics ACES 2015

Plenary Speaker

Alireza Baghai-Wadji

**Professor of Electronic and Computational Engineering
Convener of the Electrical and Computer Engineering Programme
Electrical Engineering Department, The University of Cape Town (UCT)
Cape Town, South Africa**

Taming Infinities and Unveiling Grant Challenges in Computational Electromagnetics



Infinities are ubiquitous in pure, applied, and computational sciences and engineering alike. They are fearsome and their occurrence signals that something fundamental has not been grasped adequately in its inherent structural makeup, or has not been dealt with duly and rigorously. Cantor's Aleph and Cardinality introduced to understand the "strange nature of infinity," Einstein's "biggest blunder," the cosmological constant, and the more "mundane" problems such as the divergent behaviour of series and integrals, are examples where infinity manifests itself in one or another form. In early decades of 20th century quantum electrodynamics (QED) was devised to describe the mutual interaction of relativistic electrons and the quantized electromagnetic field. QED has been plagued with singularities and infinities. Alongside problems came solutions: various renormalisation

techniques in QED and summability and integrability methods in the theory of divergent series and integrals were devised. The basic tenet of QED is that all particles of nature should be viewed as quanta of certain fields. QED is applied to treat electrons and positrons as quanta of excitation of a "field" described by the Dirac equation. To this end sophisticated perturbation schemes have been developed. In those instances when higher order correction terms remain finite the term "renormalization" is used. On the other hand, Tikhonov's regularization technique and Cesaro's, Riesz', Abel's, Weierstrass' summability and integrability techniques replace singular matrices and divergent series or integrals, with a transformation that has a finite limit when a certain limit-procedure is carried out. More general schemes suggest extending the definition of convergence and operating with new notions of convergence in spaces of generalized functions. The concept of Hadamard's finite part, and the functional, Moore and Penrose definition of generalized inverse are further powerful examples for making sense of infinities. Despite remarkable progresses made, the computational electromagnetics community has not fully embraced this treasure trove of rich, multifaceted, and powerful tools. With the "return" of photons, phonons, plasmons, polaritons and other quantized fields it is expected that an unprecedented crosspollination among the aforementioned areas may emerge in applied computational electromagnetic community. The generalization of the ideas underlying number states, coherent states, squeezed states, dressed states, and allied concepts are examples which - when adapted to computational electromagnetics applications - could lead to the development of qualitatively unprecedented powerful tools.

In his recent writings the speaker has theorized about unifying relations underlying partial differential equations in mathematical physics. His work has led to diagonalized and supplementary partial differential equations equivalent with governing equations. The culmination of his efforts has been a novel

physics-based technique for the regularization of dyadic Green's functions. On this journey he has been drawing inspiration from handling infinities in physics, proves for improvability and incompleteness, uncertainties and limitations of what is knowable. This story will be shared with the audience along with unveiling a set of grand unsolved challenging problems in computational electromagnetics.

Alireza Baghai-Wadji is currently Professor of Electronic and Computational Engineering and the Convener of the Electrical and Computer Engineering Programme in the Electrical Engineering Department at the University of Cape Town (UCT), Cape Town, South Africa. He is also Assistant Dean (internationalisation) in the Faculty of Engineering and Built Environment at his university, and Distinguished Professor of Electromagnetic Simulation at the Centre of Electromagnetic Simulation, Beijing Institute of Technology, Beijing, China. He received his M.Sc. (Communication Engineering), Ph.D. (Computational Electronics), and Doctor of Science (Physical Electronics) in 1984, 1987 and 1994, respectively, from Vienna University of Technology (VUT), Vienna, Austria. In 2003 he was awarded Doctor of Science in Quantum Electronics and Materials Science from Helsinki University of Technology (HUT), Helsinki, Finland. Prior to joining UCT, he was 2005-2012 a Professor at RMIT University, School of Electrical and Computer Engineering, Melbourne, Australia, and an international representative of his university in the Far- and South East Asia, and the Middle East. He was 1979-2005 with the Department of Electrical and Information Technology at VUT: Associate Professor (1997-2005), Docent (1994-1997), Assistant Professor (1988-1994), Research Fellow (1984-1988), and Research Associate (1979-1983). He has worked on five continents accumulating vast experience in both academia and high-tech industry: Visiting Professor at BIT (Jan. 2014, Dec. 2013, Nov. 2012, Nov. 2011, Nov. 2010), Visiting Professor at HUT (Jan. 2009); Visiting Scientist at the Max Planck Institute (Quantum Optics), Garching, Germany, (July 2009, Nov 2009-Jan 2010); Consultant to EPCOS, Munich, Germany (2004-2012); Visiting Professor at HUT for one-and-a-half years (1999, 2000, and 2004); Nokia Fellow (2000); Visiting Professor at the Institute for High Performance Computing (IHPC) in Singapore and a Senior Member of the Institute for Mathematical Sciences (IMS) in Singapore for four months (Jan., Feb., Oct., Nov. 2003). He was three times the recipient of the prestigious Austrian Kurt Goedel Research Fellowship, enabling him to spend a total of ten months at the University of California, Irvine, USA (1990, 1991, and 1992); he was Adjunct Professor in the Department of Statistics and Mathematics at the Arizona State University, Tempe, Arizona, USA (1995-2004); Principal Engineering Consultant with Motorola, Scottsdale, Arizona, USA (1994-1999); Principal Engineering Consultant with CTS Albuquerque, New Mexico, USA (1999-2000), Principal Engineer Consultant with Siemens Matsushita, Graz, Austria (1990-1994); Consultant with Siemens, Munich, Germany (1983-1990). He was Director of the Aerospace and Aviation Electronics Program at The Sir Lawrence Wackett Aerospace Centre (2007 and 2008), Melbourne, Australia. He is an honorary Member and Fellow of The Electromagnetics Academy, USA and has been listed in Who's Who in Electromagnetics, USA. He is also listed in Marquis Who's Who in the World (Editions since 2009). Since 1997, he has been an Associated Editor for IEEE-UFFC Transactions. He was twice a Guest Editor for the IEEE-UFFC Transactions, editing special issues devoted to the Design, Modelling, Simulation and Optimization Techniques in Micro-acoustic Devices. He has more than 180 publications in peer reviewed journals and conference proceedings, and has delivered more than 110 invited speeches internationally. He is the owner of one patent in USA. He has a successful track record for instructing 24 very well received half-day or full-day short courses sponsored by IEEE or ACES since 1994. Since 1979, he has been fascinated by and contributed to the ab-initio and first-principle computational engineering for the high-tech industry, with applications in as varied areas as electromagnetics, micro-acoustics, microelectronics, photonics, quantum electrodynamics, and quantum optics. Since 2000, he has become deeply interested in the philosophy and history of science and has been lecturing widely on atomistic and holistic thinking, innovative and creative problem solving methodologies, quantum indeterminacy, spontaneity, and formation of consciousness. His lectures on meta-creativity, modern research methodologies, epistemology, and scientific strategic thinking are particularly-well received in China, South Africa and elsewhere in the Far- and South East Asia.

The 31st International Review of Progress In Applied Computational Electromagnetics ACES 2015

Plenary Speaker

Dejan S. Filipovic

**Professor, Antenna Research Group
University of Colorado Boulder**

Frequency Independent Antennas: Over a Half Century Journey of Bandwidth Unlimited Dreams



Frequency Independent (FI) antennas, first introduced over 60 years ago, continue to be considered many applications across commercial and defense sectors. Their performance remains consistent over wide instantaneous bandwidth, the limits of which are determined by the fidelity of the feed and overall antenna size. For flush-mounting, the aperture of a planar FI antenna is backed by an absorber-filled cavity. Unidirectional and efficient operation can be achieved by imprinting the FI shape onto a dielectric cone. In this talk, we start with the overview of fundamental principles behind the FI antennas followed with a rich history thereof by examining the most important developments within the spiral and log-periodic antenna families. Then, we demonstrate there is much more to these antennas than what is conventionally recognized. Traditionally accepted beliefs about miniaturization, backing, power handling, dispersion, arraying, modal excitation, beamforming, and direct RF feeding will be discussed and even debunked by examining the fundamental FI principles through theory and measurements. In summary, though the FI antennas have been known for a long time, there are still many open topics to research and questions to answer. Often, the conventionally accepted ‘truths’ are just perceptions.

Dejan S. Filipovic received the Diploma Engineering degree in Electrical Engineering from the University of Nis, Serbia in 1994, and the Ph.D. degree from the University of Michigan, Ann Arbor in 2002. He became an Assistant Professor in Electrical and Computer Engineering at the University of Colorado in 2002 and was promoted to an Associate Professor in 2009. His broader research interests are in the areas of computational and applied electromagnetics, specifically in: antenna theory and design with emphasis on frequency independent antennas; development of passive millimeter-wave components, systems, and electronic warfare front-ends; and multi-physics, multi-scale modeling. His research projects have been funded by the Department of Defense including DARPA, ONR, and NRL, National Science Foundation, and industry including Lockheed Martin, First RF, Applied EM, etc. Prof. Filipovic received the Nikola Tesla award for outstanding diploma thesis, best paper award at the 2002 IEEE Antennas and Propagation Symposium, DARPA MTO Recognition for his contributions on 3-D MERFS program, Holland Teaching Award, and he was a two-time recipient of the University of Colorado Provost’s Faculty Achievement Award (2008 and 2011). His students have been constantly placed in the finals of the various student paper competitions and have won several times as recently as 2014 IEEE APS/URSI Student Paper Contest. Prof. Filipovic has co-authored 3 book chapters on spiral and frequency independent antennas, and over 150 peer reviewed journal and conference papers.

The 31st International Review of Progress In Applied Computational Electromagnetics ACES 2015

Plenary Speaker

Randy Haupt

**Professor and Department Head, Department of Electrical Engineering and
Computer Science
Colorado School of Mines**

Optimization for Electromagnetics: The Best Solution



Not many years ago, engineers and scientists were satisfied with finding a solution. Computers and other technology advances encouraged us to build more complex systems and models for those systems. The large number of design variables associated with system design confounded traditional approaches to optimizing a system or finding the best design. Derivative based optimization approaches work best for small, linear systems. Large, nonlinear systems motivated the more recent development of guided random guessing algorithms that are modeled after natural processes. This talk starts with the foundations of analytical optimization and moves on to the elegant derivative based algorithms of the early computer age before ending with the guided random search strategies of today. The talk ends with a status of optimization approaches for electromagnetics and where

the future lies.

Randy L. Haupt received the BSEE from the USAF Academy (1978), the MS in Engineering Management from Western New England College (1982), the MSEE from Northeastern University (1983), and the PhD in EE from The University of Michigan (1987). He is Professor and Department Head of Electrical Engineering and Computer Science at the Colorado School of Mines and was an RF Staff Consultant at Ball Aerospace & Technologies, Corp., a Senior Scientist and Department Head at the Applied Research Laboratory of Penn State, Professor and Department Head of ECE at Utah State, Professor and Chair of EE at the University of Nevada Reno, and Professor of EE at the USAF Academy. He was a Project Engineer for the OTH-B radar and a Research Antenna Engineer for Rome Air Development Center early in his career. He is co-author of the books Practical Genetic Algorithms, 2 ed., John Wiley & Sons, 2004, Genetic Algorithms in Electromagnetics, John Wiley & Sons, 2007, and Introduction to Adaptive Antennas, SciTech, 2010, as well as author of Antenna Arrays a Computation Approach, John Wiley & Sons, 2010. Dr. Haupt is a Fellow of the IEEE and Applied Computational Electromagnetics Society (ACES). He is a Member of the IEEE Antenna Standards Committee and serves as an Associate Editor for the “Ethically Speaking” column in the IEEE AP-S Magazine.

The 31st International Review of Progress In Applied Computational Electromagnetics ACES 2015

Plenary Speaker

Mahbub Hoque

**Division Chief - Radio Frequency Communication Division
Space & Terrestrial Communications Directorate (S&TCD)
Communications-Electronics Research, Development & Engineering Center
(CERDEC) – US Army**

Performing Radio Frequency Modeling & Simulation Analysis for Army Mission



The development of state-of-the-art technologies and its application to the battlefield environment has driven the Department of Defense (DoD) researchers to increased reliance on modeling and simulation (M&S) techniques. Such M&S not only reduces the cost of expensive testing, it can also emulate a realistic battlefield environment. This helps to identify the problem more realistically, validate the solution as an integrated system and deliver the solution faster. For last decade, one of the research arms of the US Army; the Radio Frequency Communication (RFC) Division, formerly known as the Antennas & Spectrum Analysis (ASA) Division, in Communications-Electronics Research, Development and Engineering Center (CERDEC), US Army Research, Development and Engineering Command (RDECOM) has been leading the development of novel antenna technology and its application to the Army tactical vehicles. Many of the research efforts have been focused in developing broadband, low signature conformal antennas. In addition to the design of the novel antennas, performance of such devices should be analyzed holistically which will consider the effect of the vehicles and impacts from other collocated systems. This problem has been compounded by the interference effect from the collocated electronic warfare systems. For this purpose, it is essential to model the complete system and determine the performance. The division has developed several M&S models to address such issues using numerical electromagnetic techniques like Finite Difference Time Domain (FDTD), Finite Element Method (FEM), etc. The briefing will outline the development of such tool and highlight results for its application. The talk will also include the opportunities for academia and industries to collaborate with labs.

Mahbub Hoque is presently serving as the Division Chief of the Radio Frequency Communications Division of the Space & Terrestrial Communications Directorate (S&TCD) in the U.S. Army's Communications Electronics Research Development and Engineering Center (CERDEC), Aberdeen Proving Ground, Maryland. During the period of June 2007 to June 2013, Dr. Hoque simultaneously served as the Chief Scientist of S&TCD. From June 2012 to January 2013, Dr. Hoque also served as the acting Director of S&TCD. During his tenure as the Directorate's Chief Scientist, Dr. Hoque led S&TCD's basic research program, encompassing technology areas including network science, nanotechnologies, software-defined radios, network operations, modeling and simulation, tactical and strategic satellite communications, information assurance, antennas, electromagnetic interference/electromagnetic compatibility, spectrum management, and evolutionary commercial wireless

technologies. As Division Chief, Dr. Hoque leads his 100+ strong workforce dedicated to providing engineering solutions in the areas of spectrum management and electromagnetics. The Division operates in several critical technology areas, including the research, development, and engineering of new antenna technologies; modeling and simulation to study and mitigate coupling issues between collocated antennas; metamaterial research and development; and various spectrum management initiatives, to include the development of spectrum architectures, cognitive networks, et al. Prior to joining S&TCD in 2000, Dr. Hoque was a Director at Telcordia Technologies where he received 1996 Bellcore Presidential Award for his work analyzing the impacts of radio interference on Digital Subscriber Line technology. He has authored more than 70 publications and has chaired many sessions in various national and international conferences and symposiums. Dr. Hoque received his Ph.D. in Electrical Engineering (1983) from University College London, U.K. in Electromagnetics and Antennas. Dr. Hoque is the recipient of various awards, including the Commanders Award for Civilian Service.

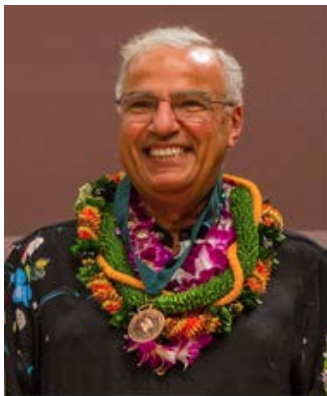
The 31st International Review of Progress In Applied Computational Electromagnetics ACES 2015

Plenary Speaker

Magdy F. Iskander

**Director of the Hawaii Center for Advanced Communications
College of Engineering, University of Hawaii at Manoa
Honolulu, Hawaii, USA**

Computational Electromagnetics: Vision for Seizing Opportunities in Growing Technologies



Computational techniques in electromagnetics have played long standing and remarkable role in advancing electromagnetic technologies and applications. Simulations methods and advanced visualization capabilities have played critical roles not only in facilitating effective understanding of electromagnetics and their often complex interactions, but also in enabling innovations and advancing electromagnetics based applications in wide variety and diverse areas. With the continued growth and broader applications of computational electromagnetics, however, there have been new challenges that need to be addressed to help improve the effectiveness of these methods and realize their much anticipated benefits. In this paper we describe the role of computers and advanced computational electromagnetics techniques in education and discuss their role in

developing wide variety of practical applications. This includes cognitive wireless communications networking, biomedical sensing and remote patient monitoring, propagation modeling and atmospheric sensing, and in the development of new broadband metamaterials for advanced radar applications. Specific examples from ongoing research projects at the University of Hawaii will be presented, computational challenges will be described and opportunities for advancing these technologies will be discussed.

Magdy F. Iskander is a Professor of Electrical Engineering and the Director of the Hawaii Center for Advanced Communications (HCAC), College of Engineering, University of Hawaii at Manoa, Honolulu, HI, USA. He is Co-Director of the NSF Industry/University Cooperative Research Center with four other universities. He is a Fellow of IEEE (1993) and was the 2002 President of the IEEE Antennas and Propagation Society, Distinguished Lecturer, and a Program Director in the Electrical, Communications, and Cyber Systems Division at the National Science Foundation. Dr. Iskander joined the University of Hawaii in 2002 and prior to that he was Professor of Electrical and Computer Engineering and the Engineering Clinic Endowed Chair Professor at the University of Utah. He received many awards for excellence in research and teaching including the University of Hawaii Board of Regents' Medal for Excellence in Research (2013), the Board of Regents Medal for Teaching Excellence (2010), and the Hi Chang Chai Outstanding Teaching Award (2011, 2014) which is based on votes by graduating seniors. He also received the IEEE MTT-S Distinguished Educator Award (2013), IEEE AP-S Chen-To Tai Distinguished Educator Award (2012), and Richard R. Stoddard Award from the IEEE EMC Society in 1992. He received the Northrop Grumman Excellence in Teaching Award in 2010, the American Society for Engineering Education (ASEE) Curtis W. McGraw National Research Award in 1985, and in 1991 the ASEE George Westinghouse National Award for Excellence in Education. Recently, his students won

1st place in the University of Hawaii Business Plan Competition for the “CP Stethoscope” project, and subsequently he founded the MiWa Technologies, LLC for medical devices and applications. He has published over 250 papers in technical journals, holds nine patents, and has made numerous presentations at national/international conferences. He authored/edited several books including the textbook *Electromagnetic Fields and Waves* (Prentice Hall, 1992, and Waveland Press, 2001; second edition 2012), and four books published by the Materials Research Society (MRS) on *Microwave Processing of Materials*. He is the founding editor of the *Computer Applications in Engineering Education (CAE)* journal published by John Wiley & Sons 1992 – present. His research in computational and biomedical electromagnetics and wireless communications is funded by the National Science Foundation, National Institute of Health, Army Research Office, U.S. Army CERDEC, Office of Naval Research, and several corporate sponsors.

The 31st International Review of Progress In Applied Computational Electromagnetics ACES 2015

Plenary Speaker

Manos M. Tentzeris

**Professor, The School of Electrical and Computer Engineering
Georgia Institute of Technology**

Inkjet-Printed Nanotechnology-enabled Wireless Communication, Sensing and Identification Nodes for Internet of Things, “Smart Skin” and “Zero-Power” Applications



Nanotechnology and Inkjet-printed flexible electronics and sensors fabricated on paper, plastic and other polymer substrates as well as silicon wafers are introduced as a sustainable ultra-low-cost solution for the first paradigms of Internet of Things, “Smart Skins” and “Zero-Power” applications. The talk will cover examples from UHF up to the millimeter-wave frequency ranges (mmID’s), while it will include the state of the art of fully-integrated wireless sensor modules on paper or flexible polymers and show the first ever 2D sensor integration with an RFID tag module on paper, as well as numerous on-chip inkjet printed passives, antenna arrays and microfluidic channels and 3D multilayer paper-based and LCP-based RF/microwave structures, that could potentially set the foundation for the truly convergent wireless sensor ad-hoc networks of the future with enhanced cognitive intelligence and “zero-power” operability through ambient energy harvesting and wireless power transfer. Examples from wearable (e.g. bio-monitoring) antennas and RF modules will be reported, as well as the first integration of inkjet-printed nanotechnology-based (graphene/CNT-based) sensors on paper, plastic, organic and bare silicon substrates. The talk will also present challenges for inkjet-printed high-complexity modules as well as future directions in the area of environmentally-friendly (“green”) RF electronics and “smart-house” conformal sensors.

Manos M. Tentzeris received the Diploma Degree in Electrical and Computer Engineering from the National Technical University of Athens (“Magna Cum Laude”) in Greece and the M.S. and Ph.D. degrees in Electrical Engineering and Computer Science from the University of Michigan, Ann Arbor, MI and he is currently a Professor with School of ECE, Georgia Tech, Atlanta, GA. He has published more than 420 papers in refereed Journals and Conference Proceedings, 5 books and 19 book chapters. Dr. Tentzeris has helped develop academic programs in Highly Integrated/Multilayer Packaging for RF and Wireless Applications using ceramic and organic flexible materials, paper-based RFID’s and sensors, biosensors, wearable electronics, inkjet-printed electronics, “Green” electronics and power scavenging, nanotechnology applications in RF, Microwave MEM’s, SOP-integrated (UWB, multiband, mmW, conformal) antennas and Adaptive Numerical Electromagnetics (FDTD, MultiResolution Algorithms) and heads the ATHENA research group (20 researchers). He is currently the Head of the GT-ECE Electromagnetics Technical Interest Group and he has served as the Georgia Electronic Design Center Associate Director for RFID/Sensors research from 2006-2010 and as the Georgia Tech NSF-Packaging Research Center Associate Director for RF Research and the RF Alliance Leader from 2003-2006. Prof. Tentzeris is one of the IEEE MTT-S Distinguished Microwave Lecturers from 2010-2012.

ACES 2015 Tutorials

Wednesday, March 25, 2015

Piedmont A and B

(01:20 - 02:20)



“Recent Developments and Trends in Metamaterials”
Douglas H. Werner

(02:20 - 03:20)



“Reflectarray Antennas: Theory, Designs, and Applications”
Payam Nayeri

ACES 2015 Tutorials

Wednesday, March 25, 2015

Virginia A

(01:20 - 02:20)



“Error Estimation in MoM and FEM for Extrapolation and Error Bars”

Andrew F. Peterson

(02:20 - 03:20)



“RFID and Internet of Things”

Khaled ElMahgoub

(03:40 - 04:40)



“Antenna Design using Characteristic Mode Analysis”

M. H. Vogel

ACES 2015 Tutorials

Wednesday, March 25, 2015

Virginia B

(01:20 - 02:20)



“Field and Potential-based Techniques in Complex Media Electromagnetics”

Michael Havrilla

(02:20 - 03:20)



“Quantum Operator Gymnastics in Computational Electromagnetics: I - An Introduction”

Alireza Baghai-Wadji

(03:40 - 04:40)



“Quantum Operator Gymnastics in Computational Electromagnetics: II - Advanced Topics”

Alireza Baghai-Wadji

ACES 2015 Tutorials

Wednesday, March 25, 2015

Virginia C

(01:20 - 02:20)



“From FETD to DGTD for Computational Electromagnetics”
Jian-Ming Jin

(02:20 - 03:20)



“Time-Domain Integral Equation Methods for the Solution of Maxwell’s Equations”
Daniel S. Weile

(03:40 - 04:40)



“UTD Ray and Beam Methods for Analysis of Large EM Wave Problems”
Prabhakar Pathak

ACES 2015 Vendor Tutorials

Title and Presenter

Room

Wednesday, March 25, 2015

Virginia D and E

(01:20 - 03:20)

“Advanced Electromagnetic Solution Techniques in FEKO”

Altair Engineering, Inc.

(03:40 - 05:40)

“Using Measurements as Field Sources in Computational Electromagnetics”

Microwave Vision Group

Piedmont A and B

(03:40-05:40)

“Hybrid Simulation Technology for Electrically Large Antenna System Design”

Ansys

ACES 2015 Invited Keynote and Plenary Talks

Title and Presenter

Virginia D and E

Monday, March 23, 2015

Simulation and the Creative Process – A New Paradigm

Trends Applying Simulation to Product Design

Uwe Schramm

Chief Technical Officer of Altair

Performing Radio Frequency Modeling & Simulation Analysis for Army Mission

Mahbub Hoque

Division Chief - Radio Frequency Communication Division

Space & Terrestrial Communications Directorate (S&TCD)

Communications-Electronics Research, Development & Engineering Center

(CERDEC) – US Army

Optimization for Electromagnetics: The Best Solution

Randy Haupt

Professor and Department Head, Department of Electrical Engineering and Computer Science

Colorado School of Mines

ACES 2015 Plenary Talks

Title and Presenter

Virginia D and E

Tuesday, March 24, 2015

Frequency Independent Antennas: Over a Half Century Journey of Bandwidth Unlimited Dreams

Dejan S. Filipovic

Professor of Electrical Engineering, Antenna Research Group
University of Colorado Boulder

Taming Infinities and Unveiling Grant Challenges in Computational Electromagnetics

Alireza Baghai-Wadji

Professor of Electronic and Computational Engineering
Convener of the Electrical and Computer Engineering Programme
Electrical Engineering department
University of Cape Town (UCT), Cape Town, South Africa

ACES 2015 Plenary Talks

Title and Presenter

Virginia D and E

Thursday, March 26, 2015

Inkjet-Printed Nanotechnology-enabled Wireless Communication, Sensing and Identification Nodes for Internet of Things, “Smart Skin” and “Zero-Power” Applications

Manos M. Tentzeris

Professor of Electrical Engineering, The School of Electrical and Computer Engineering
Georgia Institute of Technology

Computational Electromagnetics: Vision for Seizing Opportunities in Growing Technologies

Magdy F. Iskander

Professor and Director of the Hawaii Center for Advanced Communications
College of Engineering, University of Hawaii at Manoa
Honolulu, Hawaii, USA

ACES 2015 Sessions Overview

Session Title	Room
---------------	------

Monday, March 23, 2015 (Sessions 1-10)

1- Keynote Speaker	Virginia D and E
2- Plenary Talk – 1	Virginia D and E
3- Plenary Talk – 2	Virginia D and E
4- Antenna Applications - I	Virginia A
5- Modeling of Large Phased Arrays	Virginia C
6- Electromagnetics and Antenna Education	Piedmont A and B
7- Compressive Sensing	Virginia D and E
8- Nano-Electromagnetics	Virginia A
9- Student Paper Competition	Virginia C
10- Advanced FEM/MoM Modeling and Design	Piedmont A and B

Tuesday, March 24, 2015 (Sessions 11-19)

11- Plenary Talk – 3	Virginia D and E
12- Plenary Talk – 4	Virginia D and E
13- Advanced Electromagnetic Modeling Methods - I	Virginia A
14- Hardware and Software Acceleration Techniques	Virginia C
15- Numerical Modeling of Optical/IR Antennas and Metamaterials	Piedmont A and B
16- EM Modeling using FEKO	Virginia D and E
17- Advanced Electromagnetic Modeling Methods - II	Virginia A
18- Electromagnetic Metamaterials and Metasurfaces	Virginia C
19- Finite-Difference Time-Domain Method: Theory and Applications	Piedmont A and B

ACES 2015 Sessions Overview

Session Title	Room
Wednesday, March 25, 2015 (Sessions 20-35)	
20- Advanced Computational Techniques in Electromagnetics	Virginia D and E
21- EM-Simulation-Driven Design: Modeling and Optimization	Virginia A
22- Modelling Techniques for Photonic Devices	Virginia C
23- RF/Microwave Electromagnetics - Computational Modeling and Experiments	Piedmont A and B
24- Advanced Electromagnetic Solution Techniques in FEKO	Virginia D and E
25- Error Estimation in MoM and FEM for Extrapolation and Error Bars	Virginia A
26- From FETD to DGTD for Computational Electromagnetics	Virginia C
27- Recent Developments and Trends in Metamaterials	Piedmont A and B
28- Field and Potential-based Techniques in Complex Media Electromagnetics	Virginia B
29- RFID and Internet of Things	Virginia A
30- Time-Domain Integral Equation Methods for the Solution of Maxwell's Equations	Virginia C
31- Reflectarray Antennas: Theory, Designs, and Applications	Piedmont A and B
32- Quantum Operator Gymnastics in Computational Electromagnetics: I - An Introduction	Virginia B
32- Quantum Operator Gymnastics in Computational Electromagnetics: II - Advanced Topics	Virginia B
33- Using Measurements as Field Sources in Computational Electromagnetics	Virginia D and E
34- Antenna Design using Characteristic Mode Analysis	Virginia A
35- UTD Ray and Beam Methods for Analysis of Large EM Wave Problems	Virginia C
46- Hybrid Simulation Technology for Electrically Large Antenna System Design	Virginia B

ACES 2015 Sessions Overview

Session Title	Room
Thursday, March 26, 2015 (Sessions 36-46)	
36- Plenary Talk – 5	Virginia D and E
37- Plenary Talk – 6	Virginia D and E
38- Antenna Applications - II	Virginia D and E
39- Inverse Finite Element Optimization in Electromagnetic Product Design and Non-Destructive Evaluation - I	Virginia A
40- EM Interactions with Biodielectrics	Virginia C
41- EM Modeling using Sonnet - I	Piedmont A and B
42- Antenna Applications - III	Virginia D and E
43- Inverse Finite Element Optimization in Electromagnetic Product Design and Non-Destructive Evaluation - II	Virginia A
44- Sensors and Imaging Applications	Virginia C
45- EM Modeling using Sonnet - II	Piedmont A and B

ACES 2015 Technical Program

Sunday, March 22

- 02:00-05:00 Conference Registration
- 01:30-05:00 ACES Board of Directors Meeting
- 07:00-09:30 Reception

Monday, March 23

- 07:00-08:00 Breakfast
- 07:45-04:30 Conference Registration
- 01:30-05:00 Exhibitors

Room: **Virginia D and E**
08:00-08:05 ACES Business Meeting
Atef Elsherbeni, ACES President

08:05-08:10 Welcome Message
C. J. Reddy and Khaled ElMahgoub, Conference General Chairs

08:10-08:40 **Keynote Speaker** **Session 1**
“Simulation and the Creative Process – A New Paradigm
Trends Applying Simulation to Product Design”
Uwe Schramm

08:50-09:20 **Plenary Talk – 1** **Session 2**
“Performing Radio Frequency Modeling & Simulation Analysis for Army Mission”
Mahbub Hoque

09:30-10:00 **Plenary Talk – 2** **Session 3**
“Optimization for Electromagnetics: The Best Solution”
Randy Haupt

10:00-10:20 Break

Room:

Virginia A

Session 4

10:20-12:00

Antenna Applications - I



Khaled ElMahgoub

Session Organizer: Khaled ElMahgoub

Session Chair: Sami Barmada

This session addresses recent developments in wireless power applications, the use of segmented monopole antennas and Radio Frequency Identification (RFID) for smart systems.

10:20-10:40 “A Schottky Rectifier Design using EM Simulation Tools for RF Energy Harvesting Applications”

Hakan P. Partal, Mehmet Ali Belen, Sibel Zorlu-Partal, and Ahmed Tahir Ince

10:40-11:00

“Full Simulation of a Wireless Power Transfer System with Power Line Communication Integration”

Sami Barmada, Paolo Mezzanotte, Luca Roselli, and Mauro Tucci

11:00-11:20

“Printed-Circuit Realization of a Segmented Monopole for 2.4 GHz”

Payam Nayeri, Roger Hasse, Veysel Demir, Atef Z. Elsherbeni, and Darko Kajfez

11:20-11:40

“Shadowing Effect on the Area Spectral Efficiency of a Macro-Femto Heterogeneous Network for Cell-Edge Users”

Mfon C. Uko, Sunday C. Ekpo, Ubong Ukommi, and Rupak Kharel

11:40-12:00

“A Preference Based Smart Parking System: KFUPM Case Study”

M. Mohandes, N. Tasadduq, S. Aliyu, and M. Deriche

Room:

Virginia C

Session 5

10:20-12:00

Modeling of Large Phased Arrays



Rick Kindt

Session Organizer: Rick Kindt

Session Chairs: Rick Kindt and Nookala Sarma

In this session we look at full-wave modeling of large phased-array antennas. Large phased arrays are typically built from simplistic infinite design, yet their performance can be dominated by finite array effects. This session explores the state-of-the-art in full-wave tools that can accurately capture the complex electromagnetic phenomena seen in large phased arrays.

10:20-10:40

“Finite and Co-Site Array Simulation and Validation using the Domain Decomposition Method”

Stephen Essman, Joshua Mahaffey, Thomas Fontana, Victor Sanchez, and Steven Eason

10:40-11:00

“Robust Domain Decomposition Methods for Modeling of Large Phased Arrays”

Mingfeng Xue and Jian-Ming Jin

11:00-11:20

“High Performance Domain Decomposition Methods for Simulation-Aided Design of Complex Antenna Systems”

Zhen Peng

11:20-11:40

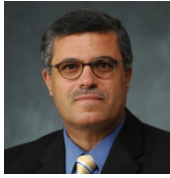
“Polarization Properties of Finite Ultra-Wideband Arrays”

Michael Y. Lee, Rick W. Kindt, and Marinos N. Vouvakis

Room:
10:20-12:00

Piedmont A and B
Electromagnetics and Antenna Education

Session 6



Atef Elsherbeni

Session Organizer: Atef Elsherbeni

Session Chair: Atef Elsherbeni

This session some recent development of educational software with emphasis on antenna design and general electromagnetic concepts.

10:20-10:40 “Space-Fed Antenna Array Design and Analysis Package”
Kyle Patel, Payam Nayeri, and Atef Elsherbeni

10:40-11:00 “Effects of Solder in the Feed Junction on Spiral Antenna Performance”
Sandeep Palreddy, Theodore K. Anthony, and Amir I. Zaghloul

11:00-11:20 “Matlab Demonstrations for Concepts in Electromagnetics”
Veysel Demir and Steffen Kist

Room:
01:20-05:00

Virginia D and E
Compressive Sensing

Session 7



Ozlem Kilic

Session Organizers: Ozlem Kilic and Aly Fathy

Session Chairs: Ozlem Kilic and Aly Fathy

Compressive sensing applications have been gaining momentum in the area of electromagnetics applications. Papers published on this topic span inverse scattering problems, microwave imaging, and synthesis and fault detection of large arrays to name a few. Both hardware and software implementations of the technique for electromagnetics applications are being investigated. The special session will address recent developments of compressive sensing for both hardware and software platforms in the context of electromagnetics applications.



Aly Fathy

01:20-01:40 “Compressive Sensing Based Contrast-Enhanced Thermoacoustic Imaging for Breast Cancer Detection”
Xiong Wang, Tao Qin, Russell S. Witte, and Hao Xin

01:40-02:00 “MIMO Radar Imaging of Targets Behind Multilayered Walls using Compressive Sensing”
Ahmad Hoorfar and Wenji Zhang

02:00-02:20 “Detection of Stationary Targets using Discrete Prolate Spheroidal Sequences”
Zhihui Zhu and Michael B. Wakin

02:20-02:40 “Distributed Greedy Sparse Recovery for Through-the-Wall Radar Imaging”
M. Stiefel, M. Leigsnering, A. M. Zoubir, F. Ahmad, and M. G. Amin

02:40-03:00 “A Compressive Sensing Based Approach for Through-Wall Tracking of Moving Targets”
Vinh Dang and Ozlem Kilic

03:00-03:20 “Implementation of Compressive Sensing on UWB Precise Indoor Localization”
Depeng Yang, Husheng Li, Gregory Peterson, and Aly E. Fathy

03:20-03:40 Break

03:40-04:00 “Colocated MIMO Radars using the Sparse Fourier Transform”
Xiaqing (Valerie) Yang, Bo Li, and Athina P. Petropulu

Room:

Virginia A

Session 8

01:20-05:00

Nano-Electromagnetics



Jeremy Bossard

Session Organizers: Jeremy Bossard, Douglas Werner, and Ergun Simsek

Session Chairs: Jeremy Bossard, Douglas Werner, and Ergun Simsek

The objective of this special session is to highlight emerging research on the electromagnetics of nanostructures. The special session consists of invited papers on both EM analysis and applications of nanostructures.



Douglas Werner

01:20-01:40 “Demonstration of Broadband and Wide-Angle Optical Metasurface-based Waveplates”
Zhi Hao Jiang, Lan Lin, Ding Ma, Douglas H. Werner, Zhiwen Liu, and Theresa S. Mayer

01:40-02:00 “On the Relevance of the Temperature in Electromagnetic Devices Based on 2D-Crystals”
Mario F. Pantoja, Safae El-Amrani, Daniel Romero-Mateos, A. R. Bretones, and Salvador G. Garcia



Ergun Simsek

02:00-02:20 “Normal Mode Splitting with Lossy Coupled Resonances”
Michael F. Finch and Brian A. Lail

02:20-02:40 “Synthesizing Visible Mirrors and Multispectral Filters using Fractal Random Cantor Superlattices”
Jeremy A. Bossard, Lan Lin, and Douglas H. Werner

02:40-03:00 “Enhancing Scattering and Absorption in Two-Dimensional Layered Material Systems with Surface Plasmons and Periodicity”
Bablu Mukherjee and Ergun Simsek

03:00-03:20 “Analysis of Electromagnetic Wave Interactions on Graphene Sheets using Time Domain Integral Equations”
Yifei Shi, Ismail E. Uysal, Ping Li, H. Arda Ulku, and Hakan Bagci

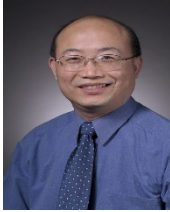
03:20-03:40 Break

03:40-04:00 “Tunable Absorption Based on Plasmonic Nanostructures Loaded with Graphene”
Christos Argyropoulos

Room:
01:20-05:00

Virginia C
Student Paper Competition

Session 9



Jiming Song

Session Organizer: Jiming Song
Session Chair: Jiming Song

ACES Student Paper Competition Committee selects the top ten (10) student papers submitted for presentation at a Special Student Papers Session. The top five (5) student papers presented at this special session will be announced at the Symposium Banquet.

- 01:20-01:40 “Transient Electrical-Thermal Co-Simulation in the Design of On-Chip and 3-D Interconnects”
Tianjian Lu and Jian-Ming Jin
- 01:40-02:00 “The Optical Loss Suppression in Thin Gold Film within Mid-IR Range”
Yassine Ait-El-Aoud, Adil-Gary Kussow, and Alkim Akyurtlu
- 02:00-02:20 “Transient Electromagnetic Scattering from Multiple Cavities Embedded in the 2-D Infinite Ground Plane”
Richard P. Uber and Aihua W. Wood
- 02:20-02:40 “High Order Locally Corrected Nyström Method with Continuity Constraints”
N. Hendijani, J. Cheng, R. J. Adams, and J. C. Young
- 02:40-03:00 “Direct Finite Element Solver of Linear Complexity for Analyzing Electrically Large Problems”
Bangda Zhou and Dan Jiao
- 03:00-03:20 “Finite Element Implementation of the Generalized-Lorenz Gauged A-Phi Formulation for Low-Frequency Circuit Modeling”
Yan Lin Li, Sheng Sun, and Weng Cho Chew
- 03:20-03:40 Break
- 03:40-04:00 “A Compressive Sensing Based Approach for Through-Wall Tracking of Moving Targets”
Vinh Dang and Ozlem Kilic
- 04:00-04:20 “MRI Induced Heating for Fully Implanted, Partially Implanted and Minimum Implanted Medical Electrode Leads”
Qi Zeng, Jianfeng Zheng, and Ji Chen
- 04:20-04:40 “Analysis of a Novel V-Shape Feed Line for Log-Periodic Dipole Array Antenna”
Samaneh Esfandiarpour and Ali Frotanpour
- 04:40-05:00 “Space-Fed Antenna Array Design and Analysis Package”
Kyle Patel, Payam Nayeri, and Atef Elsherbeni

Room:

Piedmont A and B

Session 10

01:20-05:00

Advanced FEM/MoM Modeling and Design



Sheng Sun

Session Organizers: Sheng Sun and Kezhong Zhao

Session Chairs: Sheng Sun and Kezhong Zhao

Method of moments and finite element methods have been widely used in the analysis of electromagnetic scattering and circuit problems in electrical engineering. This special session will cover the recent advances such as new FEM/MoM formulations and their analysis/applications, discretization schemes, fast solvers, and low-frequency computational electromagnetics.



Kezhong Zhao

01:20-01:40 “Low-Cost Multi-Objective Antenna Optimization with Design Space Reduction and Co-Kriging Surrogates”

Slawomir Koziel and Adrian Bekasiewicz

01:40-02:00 “Method of Moments for Partially Structured Mesh”

Caicheng Lu, Xiande Cao, and Ali Frotanpour

02:00-02:20

“A Direct Path from Geometrical Data to Electromagnetic Field Estimation using Isogeometric Analysis”

T. Khajah and G. Hou

02:20-02:40

“Automated Selection of Structure Discretization Level for EM-based Modeling and Optimization”

Alistair P. Duffy, Gang Zhang, Slawomir Koziel, and Lixin Wang

02:40-03:00

“Stable Formulation of Scattering from Perfect Electrical Conductors with Matrix Binormalization”

Jin Cheng, R. J. Adams, J. C. Young, and M. A. Khayat

03:00-03:20

“Findings on H- and H^2 -based Methods for Integral-Equation-based Electrically Large Analysis”

Wenwen Chai and Dan Jiao

03:20-03:40

Break

03:40-04:00

“Four Million Unknown MOM LU Factorization on a PC”

John Shaeffer

04:00-04:20

“A Vector Potential Integral Equation Method for Electromagnetic Scattering”

Qin S. Liu, Sheng Sun, and Weng Cho Chew

04:20-04:40

“A Low Frequency Stable Surface Integral Equation Solver for Dielectrics and Conductors”

Tian Xia, Hui Gan, Michael Wei, Weng Cho Chew, Henning Braunsch, Zhiguo Qian, Kemal Aygun, and Alaeddin Aydiner

ACES 2015 Technical Program

Tuesday, March 24

07:00-08:00 Breakfast

07:45-04:30 Conference Registration

08:00-05:00 Exhibitors

Room: Virginia D and E

08:50-09:20 Plenary Talk – 3

Session 11

“Frequency Independent Antennas: Over a Half Century Journey of Bandwidth Unlimited Dreams”

Dejan S. Filipovic

09:30-10:00 Plenary Talk – 4

Session 12

“Taming Infinities and Unveiling Grant Challenges in Computational Electromagnetics”

Alireza Baghai-Wadji

10:00-10:20 Break

Room: Virginia A

Session 13

10:20-12:00 Advanced Electromagnetic Modeling Methods - I

Session Organizers: Zhen Peng

Session Chairs: Zhen Peng and Lincan Yan

Computational electromagnetics (CEM) approaches applications from physical modelings to large scale computing methods. Physics and numerical methods are tightly coupled to deliver optimal solutions. In this special session, various electromagnetic methods are invited to deliver up-to-date modeling ideas. Both modeling capabilities and capacities are addressed to discuss the depth and broadness of CEM modelings.

10:20-10:40 “Multiphysics Characterization of Large-Scale Through-Silicon-Via Structures”

Tianjian Lu, Jian-Ming Jin, and Er-Ping Li

10:40-11:00 “An Efficient Solution for Scattering of Lossy Dielectric Objects and Power Absorption”

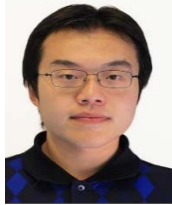
Lin E. Sun

11:00-11:20 “Efficient Modeling of a Small Circular Loop Antenna Coupling to a Twin-Lead Transmission Line”

Yifeng Qin, Donovan E. Brocker, Chenming Zhou, Jingcheng Li, Joseph Waynert, Pingjuan L. Werner, and Douglas H. Werner

11:20-11:40 “Electric Field of Grounded Horizontal Line Transmitter for Through-the-Earth Communication”

Lincan Yan and Carl Sunderman



Zhen Peng

11:40-12:00 “Method for Determining Statistical Mean and Variance of Electromagnetic Energy in Coupled Rooms”
Louis Kovalevsky and Robin S. Langley

Room: **Virginia C**

Session 14

10:20-12:00 Hardware and Software Acceleration Techniques

Session Organizer: Atef Elsherbeni

Session Chair: Atef Elsherbeni



Atef Elsherbeni

10:20-10:40 “Near-Field Interactions for Micro-Doppler Signature of Human Motion in Forest using FMM on Hybrid Platforms”
Nghia Tran, Vinh Dang, and Ozlem Kilic

10:40-11:00 “A Simple GPU Implementation of FDTD/PBC Algorithm”
Veysel Demir

11:00-11:20 “GPU-Accelerated FDTD Simulation of Human Tissue using C++ AMP”
Lingze Zhang, Yongxing Du, and Daocheng Wu

11:20-11:40 “Ultrafast Ray Tracing for Electromagnetics via kD-Tree and BVH on GPU”
Alfonso Breglia, Amedeo Capozzoli, Claudio Curcio, and Angelo Liseno

Room: **Piedmont A and B**

Session 15

10:20-12:00 Numerical Modeling of Optical/IR Antennas and Metamaterials

Session Organizer: Edward Kinzel

Session Chairs: Edward Kinzel and Mohammad Ali



Edward Kinzel

10:20-10:40 “Twist Modified Asymmetric Split Ring Resonators for Microwave Components Applications”
Yongjun Huang, Guangjun Wen, and Jian Li

10:40-11:00 “Impedance Analysis of Infrared Folded Dipole Antennas”
Yuancheng Xu and Brian A. Lail

11:00-11:20 “Broadband Directional Antenna on an EBG Structure for Body-Centric Wireless Communication”
Nowrin H. Chamok and Mohammad Ali

Room:
01:20-05:20

Virginia D and E
EM Modeling using FEKO

Session 16



C. J. Reddy

Session Organizer: C. J. Reddy

Session Chairs: C. J. Reddy and Alan Fenn

Recent developments in computational electromagnetics in general and in commercial software tool, FEKO in particular made electromagnetic simulation of complex problems practical. During this session, various papers will be presented illustrating the use of FEKO for wide range of applications.

- 01:20-01:40 “Electromagnetic Environmental Effects on Aircraft with Composite Materials”
Martin Vogel
- 01:40-02:00 “FEKO Simulation of Multi-Resonant Low-Profile PIFA”
Christian W. Hearn and William A. Davis
- 02:00-02:20 “3D-Printed Conformal Microstrip Patch Array Antenna: Simulations and Measurements”
A. J. Fenn, D. J. Pippin, D. Hogan, C. M. Lamb, F. G. Willwerth, H. M Aumann, and J. P. Doane
- 02:20-02:40 “Comparison of Various CEM Methods for Antenna Array Applications”
Gopinath Gampala and C. J. Reddy
- 02:40-03:00 “Design and Analysis of FSS Radomes”
Gopinath Gampala and C. J. Reddy
- 03:00-03:20 “Overview of the Latest Electromagnetic Solver Features in FEKO Suite 7.0”
Marianne Bingle, Andrés Garcia-Aguilar, Frank Illenseer, Ulrich Jakobus, Evan Lezar, Mary Longtin, and Johann van Tonder
- 03:20-03:40 Break
- 03:40-04:00 “Non-Complementary Modulated Arm Width Spiral Design and Application”
William N. Kefauver and Dejan S. Filipovic
- 04:00-04:20 “Near-Field Scanning Characteristics of Focused Reflectarray Antennas”
Payam Nayeri, Atef Z. Elsherbeni, Randy L. Haupt, and Fan Yang
- 04:20-04:40 “An Ultra-Wideband Absorber Backed Planar Slot Antenna”
William O’Keefe Coburn
- 04:40-05:00 “Using Antenna Measurements in Numerical Simulations”
Lars J. Foged, Lucia Scialacqua, Francesco Saccardi, Francesca Mioc, Javier L. A. Quijano, and Giuseppe Vecchi
- 05:00-05:20 “Bandwidth Enhancement of Dipole Antennas using Parasitic Elements”
Garrett R. Hoch, Payam Nayeri, and Atef Elsherbeni

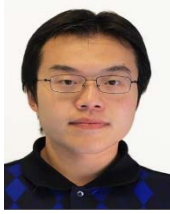
Room:

Virginia A

Session 17

01:20-05:20

Advanced Electromagnetic Modeling Methods - II



Zhen Peng

Session Organizers: Zhen Peng

Session Chairs: Zhen Peng

Computational electromagnetics (CEM) approaches applications from physical modelings to large scale computing methods. Physics and numerical methods are tightly coupled to deliver optimal solutions. In this special session, various electromagnetic methods are invited to deliver up-to-date modeling ideas. Both modeling capabilities and capacities are addressed to discuss the depth and broadness of CEM modelings.

01:20-01:40

“Inverse Spectral Theory and Kramers-Kronig Relations”

Giovanni Franco Crosta

01:40-02:00

“Domain Decomposition Method using Integral Equations and a Boundary Condition Impedance for Solving Wave Scattering from Large Platforms Covered by a Thin Dielectric Coat”

Julien Maurin, André Barka, Vincent Gobin, and Xavier Juvigny

02:00-02:20

“Magnetic Flux Observer Design with Fast Convergence and Less Transient Oscillation”

Chang-Woo Park

02:20-02:40

“Efficient Initial Guesses for Solving Guided and Leaky Modes in Dielectric Rod”

Siming Yang and Jiming Song

02:40-03:00

“Integral Equation Discontinuous Galerkin Methods for Time Harmonic Electromagnetic Wave Problems”

Zhen Peng and Brian Mackie-Mason

03:00-03:20

“Error Estimation for the EFIE with RWG Bases”

Sang Kyu Kim and A. F. Peterson

03:20-03:40

Break

03:40-04:00

“Mutual Coupling Effects in Through-the-Wall Imaging of Targets Behind Wall Structures”

Quang Nguyen and Ozlem Kilic

04:00-04:20

“Cylindrical Convex PML: Properties and Limitations”

Kamalesh Sainath and Fernando L. Teixeira

04:20-04:40

“CAD2Mesh - A Meshing Toolkit for Full Wave EM Solvers”

C. M. Rowell and K. Y. Szema

04:40-05:00

“Simulation of Subsurface Wireless Telemetry using a Semianalytical Finite Element Method”

Jiefu Chen

05:00-05:20

“A Physics-based Reduced Order Basis Method (RBM) for Rapid and Accurate Computations of Large-Scale EM Simulations”

Vijaya Shankar, Dale Ota, Touraj Sahely, and William Hall

Room:

Virginia C

Session 18

01:20-05:20

Electromagnetic Metamaterials and Metasurfaces



Douglas Werner

Session Organizers: Douglas Werner and Zhihao Jiang

Session Chairs: Douglas Werner and Zhihao Jiang

Metamaterials/metasurfaces are engineered three/two-dimensional artificial subwavelength-featured structures with exotic electromagnetic properties. They provide scientists and engineers unprecedented degrees of freedom in designing microwave and optical devices with novel or improved functionality. The papers in this special session discuss diverse topics involving the theory, modeling, and experiment of metamaterials/metasurfaces, providing insights into the physics and suggesting valuable practical design considerations.



Zhihao Jiang

01:20-01:40 “Ferrite Based Tunable Metamaterials for the Applications of Electromagnetic Wave Controlling and Absorbing”

Yongjun Huang, Guangjun Wen, and Jian Li

01:40-02:00

“Relationship Between Phased Arrays and Negative Refraction”

Gregory A. Talalai, Timothy J. Garner, Steven J. Weiss, and Amir I. Zaghoul

02:00-02:20

“Negative Refraction in Arrays of Identical Dielectric Resonators”

F. Chen and E. Semouchkina

02:20-02:40

“Scattering Control using Metasurfaces for Objects Beyond the Quasi-Static Limit”

Zhi Hao Jiang and Douglas H. Werner

02:40-03:00

“Design of a 1D Infrared Leaky-Wave Antenna”

Navaneeth Premkumar, Franklin Manene, and Brian A. Lail

03:00-03:20

“Size-Reduced Bandpass Filter using HMSIW and Modified U-Shaped DGS Slot-Pairs”

Yong Mao Huang, Tao Huang, and Zhenhai Shao

03:20-03:40

Break

03:40-04:00

“Simple Analysis of an Electromagnetic Band Gap Structure”

Seth A. McCormick and William O. Coburn

04:00-04:20

“Effect of Metamaterial Substrates on Bandwidth”

Morteza Karami and Michael A. Fiddy

04:20-04:40

“Comparison of Two AMC’s on a High-Permittivity Substrate”

Anne I. Mackenzie

04:40-05:00

“RIS based Poly Fractal Boundary Microstrip Antenna”

Venkateshwar V. Reddy and NVSN Sarma

05:00-05:20

“Design a Multiband Perfect Metamaterial Absorber Based on Hexagonal Shapes”

Mehdi Bahdorzadeh Ghandehari, Nooshin Feiz, and H. Bolandpour

Room:

Piedmont A and B

Session 19

01:20-04:20

Finite-Difference Time-Domain Method: Theory and Applications

Session Organizer: Veysel Demir

Session Chair: Chenming Zhou



Veysel Demir

This session addresses recent developments in the Finite Difference Time Domain method. Some topics in consideration are biological and photonics applications as well as advancements in new formulations.

- 01:20-01:40 “Absorbing Boundary for Terminating FDTD Simulations Based on Surface Impedance Concept”
Yunlong Mao, Atef Z. Elsherbeni, Tao Jiang, and Si Li
- 01:40-02:00 “Interlayer-based FDTD/NS-FDTD Connection Algorithm for the Extension of the NS-FDTD Method”
Tadao Ohtani, Yasushi Kanai, and Nikolaos V. Kantartzis
- 02:00-02:20 “Radio Propagation Analysis in Mines and Tunnels Based on FDTD”
Chenming Zhou and Ronald Jacksha
- 02:20-02:40 “Simulating and Exploring Large-Scale Wave Fields from MPI-Parallel Finite-Difference Time-Domain Simulations of Electromagnetic Wave Propagation using the Maui Framework and Interactive In-Situ Visualization”
Christoph Statz, Marco Mütze, Sebastian Hegler, Mareike Kühn, Toni Haugwitz, and Dirk Plettemeier
- 02:40-03:00 “A Hybrid FDTD-Transfer Matrix Method Applicable to Adiabatic Photonic Simulation”
Christos D. Samolis and Luca Daniel
- 03:00-03:20 “FDTD Simulation of Magnetic Heat Induction on Human Body Subject”
Lingze Zhang, Yongxing Du, and Daocheng Wu
- 03:20-03:40 Break
- 03:40-04:00 “Multiband Multipolarized Planar Antenna for WLAN/WiMAX Applications”
Rama Sanjeeva Reddy, D. Vakula, and NVSN Sarma
- 04:00-04:20 “WLP-FDTD Implementation of CFS-PML for Plasma Media”
Jiangfan Liu, Yun Fang, Zhongbo Zhu, and Xiaoli Xi

ACES 2015 Technical Program

Wednesday, March 25

07:00-08:00 Breakfast

07:45-04:30 Conference Registration

08:00-05:00 Exhibitors

01:20-05:40 Tutorials

07:00-10:00 Banquet: Place will be announced at the conference

Room: Virginia D and E

Session 20

08:00-12:00 Advanced Computational Techniques in Electromagnetics



Alireza Baghai-Wadji

Session Organizer: Alireza Baghai-Wadji

Session Chair: Alireza Baghai-Wadji

Finite Element Method, Finite Difference Time Domain, and the Method of Moments, along with their various modifications, continue to build the backbone of today's traditional computational electromagnetics. These methods, complemented with less-widely used techniques and practical examples of optimization tools, are covered in this session.

- 08:00-08:20 "Optimum Positioning of Inductive Components on PCB Designs for EMI Reduction using a 3D Finite Elements and Genetic Algorithms"
A. Berzoy, A. A. S. Mohamed, and O. A. Mohammed
- 08:20-08:40 "Ray Reversal in SBR RCS Calculations"
John M. Baden and Victor K. Tripp
- 08:40-09:00 "Robust Cubature Methodology for Spectral Integrals"
Kamalesh Sainath and Fernando L. Teixeira
- 09:00-09:20 "Edge Currents in Analysis of Reflector Antennas"
Numan Unaldi, Mustafa Akbas, and M. Serhan Yildiz
- 09:20-09:40 "Assessment of MoM Isolation Matrix Manipulations"
Andrew F. Peterson
- 09:40-10:00 "Three Dimensional Finite Element Analysis for the Study of Voltage Drop Behavior in Zinc Air Batteries Under Load Conditions"
Christopher R. Lashway and Osama A. Mohammed
- 10:00-10:20 Break
- 10:20-10:40 "Parabolic Equation Method for Loran-C ASF Prediction over Irregular Terrain"
Dandan Wang, Xiaoli Xi, Yurong Pu, and Jiangfan Liu

- 10:40-11:00 “Elimination the Resonance of a Rectangular Enclosure with Aperture”
M. Bahadorzadeh1, H. Bolandpour, Reza AliAkbarzadeh
- 11:00-11:20 “Subgrid Representations of Objects for NS-FDTD Calculations Based on Mie Theory for Layered Structures”
Jame B. Cole and Saswatee Banerjee

Room: **Virginia A**

Session 21

08:00-10:00 EM-Simulation-Driven Design: Modeling and Optimization



Slawomir Koziel

Session Organizer: Slawomir Koziel

Session Chairs: Slawomir Koziel and Milo Hyde

The session focuses on recent advances in EM-simulation-driven design, including both modeling and optimization methods and their applications for the design of high-frequency structures. The presented papers cover, among others, simulation-assisted design and performance evaluation of antennas and antenna arrays, waveguide probe for nondestructive characterization of materials, EM modeling of high-speed generators in microgrids, as well as geometry optimization of electrothermal thruster resonant cavity using metaheuristics.

- 08:00-08:20 “Rapid Design Optimization of Miniaturized Rat-Race Coupler using Multi-Fidelity Electromagnetic Models”
Slawomir Koziel, Adrian Bekasiewicz, and Piotr Kurgan
- 08:20-08:40 “Fast Microwave Filter Optimization using Adjoint Sensitivities and Variable-Fidelity Electromagnetic Simulations”
Adrian Bekasiewicz and Slawomir Koziel
- 08:40-09:00 “Single Mode Field Derivation and Simulation of a Dual Ridged Waveguide Dual Probe”
Jason G. Crosby, Milo W. Hyde, and Michael J. Havrilla
- 09:00-09:20 “EM-SS Model of High-Speed Generators in Microgrids”
A. A. Arkadan and M. Hariri
- 09:20-09:40 “Bandwidth Optimization of a Wideband Co-Co Antenna Array on a Thin Flexible Dielectric using HFSS”
Joseph D. Majkowski and Malcolm J. Packer
- 09:40-10:00 “Simulation of Crumpling in Integrated EBG Textile CPW Fed Monopole Antenna”
A. Alemaryeen and S. Noghianian

Room:

Virginia C

Session 22

08:00-10:00

Modelling Techniques for Photonic Devices



Salah Obayya

Session Organizer: Salah Obayya

Session Chair: Salah Obayya and Slawomir Koziel

With the increasing miniaturization and sophistication of photonics devices, modeling techniques are currently facing new challenges in order to continue to correctly and accurately model such devices. Improvements in different solution domains are currently under investigations. Modal analysis techniques presented include full-vectorial cardinal-type approximation method as well as advances in finite element method. On the propagation side, a novel discontinuity analysis between dielectric and plasmonic waveguides is presented. Efficient sensitivity analysis of photonic devices is also discussed. Finally, the design of tunable power splitter based on multi-core liquid crystal photonic crystal fiber is suggested.

08:00-08:20

“Rapid Simulation-Driven Design Optimization of Photonic Directional Couplers using Variable-Fidelity EM Simulations”

Adrian Bekasiewicz and Slawomir Koziel

08:20-08:40

“Highly Accurate Sensitivity Analysis for Photonic Devices Based on Vector Finite Element Method”

Shaimaa Azzam and S. S. A. Obayya

08:40-09:00

“Efficient Design of High Tunable Power Splitter Based on Multi-Core Liquid Crystal Photonic Crystal Fiber”

Mohamed Farhat O. Hameed and S. S. A. Obayya

09:00-09:20

“Analysis of Plasmonic Coupler using Finite Element Frequency Domain”

Khaled S. R. Atia, A. M. Heikal, and S. S. Obayya

09:20-09:40

“Full-Vectorial Cardinal-Type Approximation Method for Optical Waveguide Analysis”

Amgad A. El-Mohsen, A. M. Heikal, and Salah S. A. Obayya

09:40-10:00

“Discontinuity Between Dielectric and Plasmonic Waveguides”

Afaf M. A. Said, A. M. Heikal, and S. S. A. Obayya

Room: **Piedmont A and B** **Session 23**
08:00-12:00 **RF/Microwave Electromagnetics - Computational Modeling and Experiments**



Shahid Ahmed

Session Organizer: Shahid Ahmed
Session Chair: Khaled ELMahgoub

- 08:00-08:20 “Integrated Computational Study of an Optoelectronic Pulsed Power Radio Frequency Source”
Timothy Wolfe, John Cetnar, Eric Moore, Roger Burchett, Seth Nickolas, Ashley Francis, Derrick Langley, James Petrosky, Andrew Terzuoli, and Timothy Zens
- 08:20-08:40 “Flexible 5.8 GHz-Patch Antenna with Ink-Jet Printed Thin Silver Metallization”
Y. Rabobason, M. A. C. Niamien, N. Benjelloun, B. Mirkhaydarov, M. Shkunov, and B. Ravelo
- 08:40-09:00 “Beam Position Monitoring Model of Microstrip Patch Antenna for Particle Accelerators”
Sabir Hussain, Alistair Duffy, and Hugh Sasse
- 09:00-09:20 “CST Models of Spherical Antenna Structures”
Steven Weiss and Gregory Mitchell
- 09:20-09:40 “WLAN Based Indoor Positioning in Building Halls by using Trilateral Method”
Atalay Kocakusak and Selcuk Helhel
- 09:40-10:00 “Attenuation of Vegetation and Snow on RF Wireless Communication”
S. Selim Seker, S. Gokce Ceran, Osman Cerezci, and A. Yasin Citkaya
- 10:00-10:20 Break
- 10:20-10:40 “Multipactor in Dual-Mode Elliptical Waveguide”
Ali Frotanpour, Benito Gimeno Martinez, and Samaneh Esfandiarpour
- 10:40-11:00 “Electrostatic and Full Wave Simulations of Buried-Plates Interdigitated BST Varactors”
Mahdi Haghzadeh, Craig Armiento, and Alkim Akyurtlu
- 11:00-11:20 “Progress on the Multiphysics Capabilities of the Parallel Electromagnetic ACE3P Simulation Suite”
Oleksiy Kononenko, Lixin Ge, Kwok Ko, Zenghai Li, Cho-Kuen Ng, and Liling Xiao
- 11:20-11:40 “A New Fractal Antenna Array for Wireless Communications”
E. L. Barreto, A. G. d’Assunção, and L. M. Mendonça
- 11:40-12:00 “Optimizing Propagation Models for LTE and LTE-A using Genetic Algorithms at 850 MHz”
B. Cavalcanti, P. Alves, and L. Mendonça

01:20-04:40 Tutorials

- Room: Virginia A** **Session 25**
01:20-02:20 “Error Estimation in MoM and FEM for Extrapolation and Error Bars”
Andrew F. Peterson
- Room: Virginia C** **Session 26**
01:20-02:20 “From FETD to DGTD for Computational Electromagnetics”
Jian-Ming Jin
- Room: Piedmont A and B** **Session 27**
01:20-02:20 “Recent Developments and Trends in Metamaterials”
Douglas H. Werner
- Room: Virginia B** **Session 28**
01:20-02:20 “Field and Potential-based Techniques in Complex Media Electromagnetics”
Michael Havrilla
- Room: Virginia A** **Session 29**
02:20-03:20 “RFID and Internet of Things”
Khaled ElMahgoub
- Room: Virginia C** **Session 30**
02:20-03:20 “Time-Domain Integral Equation Methods for the Solution of Maxwell’s Equations”
Daniel S. Weile
- Room: Piedmont A and B** **Session 31**
02:20-03:20 “Reflectarray Antennas: Theory, Designs, and Applications”
Payam Nayeri
- Room: Virginia B** **Session 32**
02:20-03:20 “Quantum Operator Gymnastics in Computational Electromagnetics:
I - An Introduction”
Alireza Baghai-Wadji
- 03:20-03:40 Break
- Room: Virginia B** **Session 32**
03:40-04:40 “Quantum Operator Gymnastics in Computational Electromagnetics:
II - Advanced Topics”
Alireza Baghai-Wadji
- Room: Virginia A** **Session 34**
03:40-04:40 “Antenna Design using Characteristic Mode Analysis”
M. H. Vogel
- Room: Virginia C** **Session 35**
03:40-04:40 “UTD Ray and Beam Methods for Analysis of Large EM Wave Problems”
Prabhakar Pathak

01:20-05:40 Vendor Tutorials

Room: **Virginia D and E**

Session 24

01:20-03:20 “Advanced Electromagnetic Solution Techniques in FEKO”
Altair Engineering, Inc.

03:20-03:40 Break

Room: **Virginia D and E**

Session 33

03:40-05:40 “Using Measurements as Field Sources in Computational Electromagnetics”
Microwave Vision Group

Room: **Piedmont A and B**

Session 46

03:40-05:40 “Hybrid Simulation Technology for Electrically Large Antenna System Design”
Ansys

ACES 2015 Technical Program

Thursday, March 26

07:00-08:00 Breakfast

07:45-02:00 Conference Registration

08:00-12:00 Exhibitors

01:20-03:20 Tutorials

Room: Virginia D and E

08:50-09:20 Plenary Talk – 5

Session 36

“Inkjet-Printed Nanotechnology-enabled Wireless Communication, Sensing and Identification Nodes for Internet of Things, “Smart Skin” and “Zero-Power” Applications”

Manos M. Tentzeris

09:30-10:00 Plenary Talk – 6

Session 37

“Computational Electromagnetics: Vision for Seizing Opportunities in Growing Technologies”

Magdy F. Iskander

10:00-10:20 Break

Room: Virginia D and E

Session 38

10:20-12:00 Antenna Applications - II

Session Organizer: Atef Elsherbeni

Session Chair: Khaled ElMahgoub

This session addresses recent developments in wireless power applications, the use of segmented monopole antennas and Radio Frequency Identification (RFID) for smart systems



Atef Elsherbeni

10:20-10:40 “A Compact and Low-Profile Wideband Circularly-Polarized Slot Antenna Fed by Coplanar Waveguide and Microstrip Line”

Wenxing Li, Yujing Liu, Zhuqun Zhai, Si Li, and Yunlong Mao

10:40-11:00 “Pattern of Antenna within Radome: Simulation vs. Measurements”

N. Teneh, G. Lukovsky and M. R. Rosenkrantz

11:00-11:20 “Design and Analysis of a Ultra-Wideband Antenna with Triple Frequency Filtering Characteristics”

Wen Zhang, Yingsong Li, Wenhua Yu, and Yingdeng Dai

11:20-11:40 “Microstrip Line Fed E-Patch Antenna for WLAN Applications”

Khaled ElMahgoub

11:40-12:00 “A Compact Dual-Band WLAN Antenna by using a Meander Line and a Lateral L-Shaped Patch”

Xinbo Liu, Yingsong Li, and Wenhua Yu

Room:

Virginia A

Session 39

10:20-12:00

Inverse Finite Element Optimization in Electromagnetic Product Design and Non-Destructive Evaluation - I



S. Ratnajeevan
Hoole

Session Organizer: S. Ratnajeevan Hoole

Session Chairs: S. Ratnajeevan Hoole and Yasui Kanai

This session focuses on the common principles of inverse problem solution that underlie device design optimization and non-destructive evaluation.

10:20-10:40

“Reduced-Order Modeling VFETD/FDTD Schemes for the Optimized Design of 3-D Nanocomposite Structures”

Nikolaos V. Kantartzis, Tadao Ohtani, Yasushi Kanai, and Theodoros D. Tsiboukis

10:40-11:00

“Magnetic Shielding Design of Wireless Power Transfer Systems”

Tommaso Campi, Silvano Cruciani, Francesca Maradei, and Mauro Feliziani

11:00-11:20

“Data Redundancy in Diffraction Tomography”

P. Roy Paladhi, A. K. Sinha, A. Tayebi, L. Udpa, and A. Tamburrino

11:20-11:40

“A Parameterized 3D Mesh Generator for Optimization in NDE and Shape Design on a GPU”

S. Sivasuthan, P. Jayakumar, R. Thyagarajan, and S. R. H. Hoole

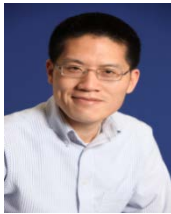
Room:

Virginia C

Session 40

10:20-12:00

EM Interactions with Biodielectrics



Shu Xiao

Session Organizer: Shu Xiao

Session Chairs: Shu Xiao and Sami Barmada

This session includes a talk on how electric fields permeabilize cell membrane on the atomic level, a talk on the delivery of electric fields to tissues using a conical antenna and a talk on the assessment of MRI induced heating due to the implanted medical electrode leads.

10:20-10:40

“Simulation of a Conical Antenna for Stimulating Neurological Tissue”

R. A. Petrella and S. Xiao

10:40-11:00

“MRI Induced Heating for Fully Implanted, Partially Implanted and Minimum Implanted Medical Electrode Leads”

Qi Zeng, Jianfeng Zheng, and Ji Chen

11:00-11:20

“Phospholipid Bilayers in Permeabilizing Electric Fields - Biophysical Electrostatics at the Atomic Scale”

P. Thomas Vernier

Room:
10:20-12:00

Piedmont A and B
EM Modeling using Sonnet - I
Session Organizer: Veysel Demir
Session Chair: Payam Nayeri

Session 41



Veysel Demir

- 10:20-10:40 “Multi-Fidelity Design Optimization of Planar Inductors with Sonnet”
Piotr Kurgan and Slawomir Koziel
- 10:40-11:00 “Dual Resonance Trapezoidal Patch Antenna”
E. Emre Guner, Tahsin Durak, and Taha İmeci
- 11:00-11:20 “Design and Simulation of Patch Antenna Array”
Hikmet Mangal, Tahsin Durak, and Taha İmeci
- 11:20-11:40 “Simulation Study on a 3-dB Quadrature Coupled Structure”
Sohin R. Patel and Claudio M. Montiel
- 11:40-12:00 “Miniaturization with Dumbbell Shaped Defected Ground Structure for Power Divider Designs using Sonnet”
Peyman Mahouti, Mehmet Ali Belen, Hakan Paşa Partal, Salih Demirel, and Filiz Güneş

Room:
01:20-03:20

Virginia D and E
Antenna Applications - III
Session Organizer: Atef Elsherbeni
Session Chair: Atef Elsherbeni

Session 42



Atef Elsherbeni

- 01:20-01:40 “Modal Q as a Bounding Metric for MIMO Antenna Optimization”
Binbin Yang and Jacob J. Adams
- 01:40-02:00 “An Enhanced Frequency and Radiation Pattern Reconfigurable Antenna for Portable Device Applications”
Wenxing Li, Lei Bao, Zhuqun Zhai, Yingsong Li, and Si Li
- 02:00-02:20 “Simulation and Realization of a Miniaturized Tunable Microstrip Patch Antenna”
Volkan Akan, Süleyman Köse, and Lokman Kuzu
- 02:20-02:40 “An Antenna Array for Ku Band Satellite Reception”
Ahmet F. Yagli, Mesut Gokten, Lokman Kuzu, Hasan H. Ertok, and Senol Gulgonul

Room:

Virginia A

Session 43

01:20-03:20

Inverse Finite Element Optimization in Electromagnetic Product Design and Non-Destructive Evaluation - II



S. Ratnajeevan
Hoole

Session Organizer: S. Ratnajeevan Hoole

Session Chairs: S. Ratnajeevan Hoole and Yasui Kanai

This session focuses on the common principles of inverse problem solution that underlie device design optimization and non-destructive evaluation.

01:20-01:40 “Coil Positioning for Defect Reconstruction in a Steel Plate”

Victor U. Karthik, Thavappiragsam Mathialakan, Paramsothy Jayakumar, Ravi S. Thyagarajan, and S. R. H. Hoole

01:40-02:00

“Time Domain Monotonicity Based Inversion Method for Eddy Current Tomography”

Zhiyi Su, Antonello Tamburrino, Salvatore Ventre, Lalita Udpa, and Satish Udpa

02:00-02:20

“Wire Fault Diagnosis using Time-Domain Reflectometry and Backtracking Search Optimization Algorithm”

Hamza Boudjefdjouf, Houssein R. E. H. Bouchekara, Rabia Mehasni, Mostafa K. Smail, Antonio Orlandi and Francesco de Paulis

02:20-02:40

“Optimum Positioning of Inductive Components on PCB Designs for EMI Reduction using a 3D Finite Elements and Genetic Algorithms”

A. Berzoy, A. A. S. Mohamed, and O. Mohammed

Room:

Virginia C

Session 44

01:20-03:20

Sensors and Imaging Applications



Sunday Cookey
Ekpo

Session Organizers: Sunday Cookey Ekpo and Andrew Wells

Session Chairs: Engr Mfon Uko and Andrew Wells

The session will provide an interactive forum for sensor practitioners, researchers, managers, developers, analysts, educators and users to exchange innovative ideas, concepts, applications and lessons learned in addressing domain-specific problems, applications-oriented topics, methodologies, standards, multidisciplinary research opportunities and findings relating to EM-based sensor systems/applications.

01:20-01:40 “Sidelobe Behavior of Hexagonal and Circular Arrays”

K. Buchanan and G. Huff

01:40-02:00 “Reconstruction of 3D Targets from Microwave Measurements using a Model-based Inversion Scheme”

Maokun Li, Aria Abubakar, and Tarek M. Habashy

02:00-02:20

“Characterization of a Dual-Polarization Microstrip Phased Array Antenna for Weather Sensing Applications”

T. Grabow, S. Karimkashi, and G. Zhang

02:20-02:40

“Application of EM Broadband Backlobe Absorber for Antennas”

N. Korkut Uluaydin, S. Selim Seker, and A. Yasin Citkaya



Andrew Wells

02:40-03:00 “Imaging of Cracks in Composite Materials”
Can Suer and Ibrahim Akduman

03:00-03:20 “The LF Band Ground Conductivity Inversion Based on Integral Equation Method”
Pu Yurong, Zhou Lili, Liu Jiangfan, and Xi Xiaoli

Room: **Piedmont A and B**

Session 45

01:20-03:20 EM Modeling using Sonnet - II
Session Organizer: Veysel Demir
Session Chair: Payam Nayeri



Veysel Demir

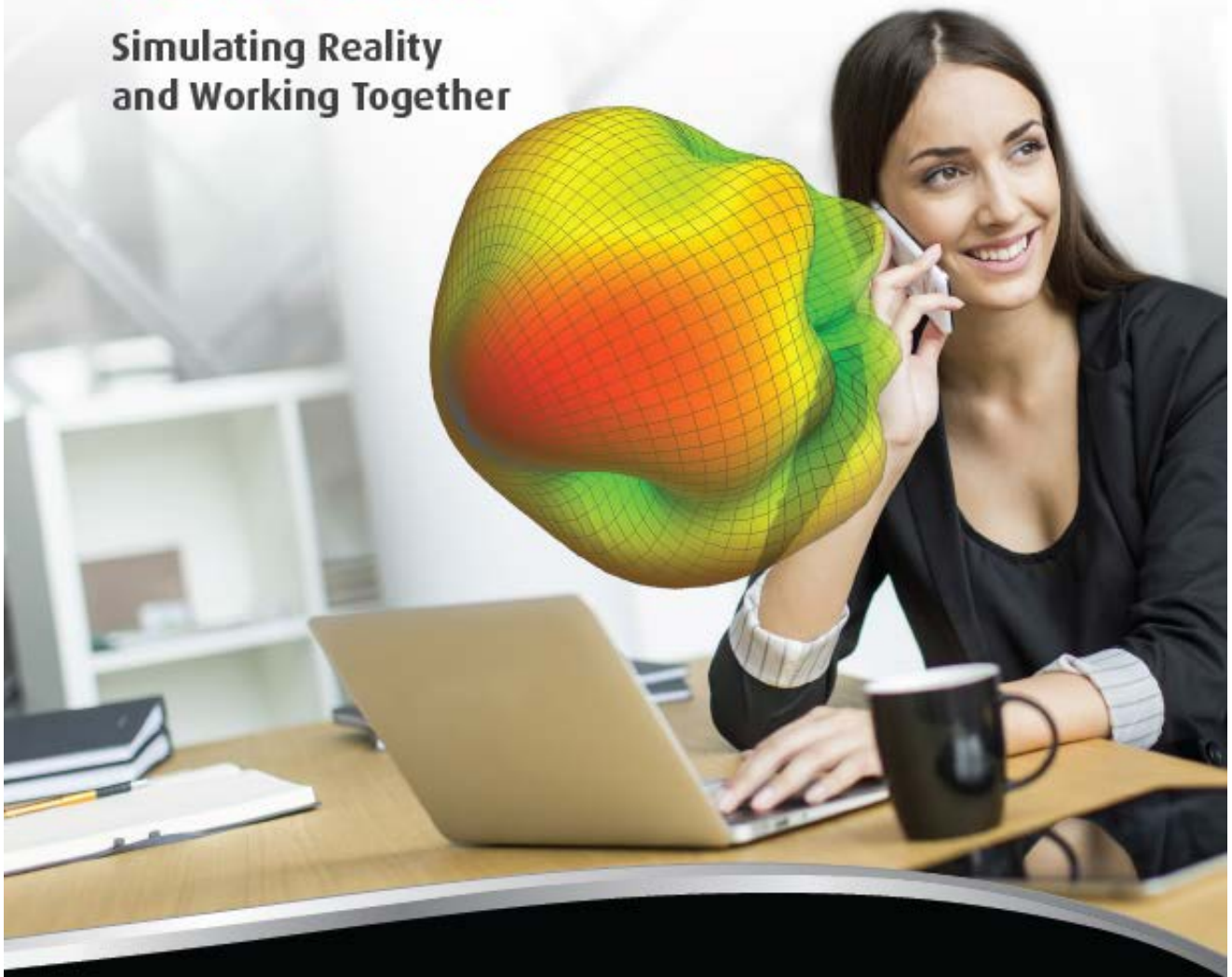
01:20-01:40 “Optimization of Ultra-Wideband LNA using a Single CRLH TL Cell Matching Circuit with Hybrid Genetic-Nelder Mead Algorithm”
T. Karataev, F. Güneş, S. Demirel, and M. Ali Belen

01:40-02:00 “A Stripline Low Pass Filter”
Osman Selçuk and Ş. Taha İmeci



It's about...

Simulating Reality
and Working Together



The integration of FEKO into the Altair HyperWorks suite gives our customers access to the richest variety of multiphysics solutions – ranging from electromagnetic to structural, CFD and system-level simulation – through a unique value-based licensing scheme. Driving an exciting technology roadmap for the future of your products with Altair HyperWorks.

Learn more - altairhyperworks.com/FEKO





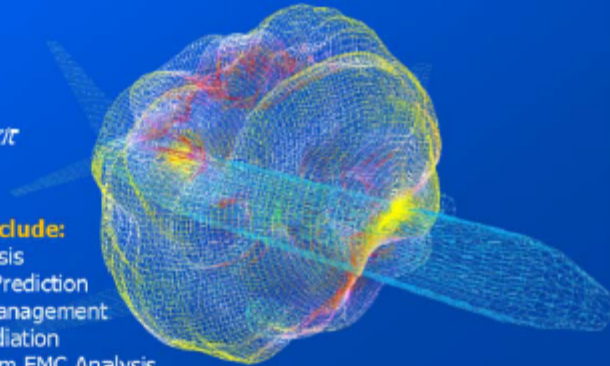
CEM Software Toolkit

Interfaces for:

- GEMACS
- SARA's Dream
- Navy PIE code
- HPM-Expert PEEC Solver
- uCAST UTD Solver*
- WIPL-D†
- FEKO†

Applications Include:

- Cosite Analysis
- EM Hazard Prediction
- Spectrum Management
- Antenna Radiation
- Inter-Platform EMC Analysis



*In Development †Future Capability

www.androcs.com

At ANDRO, we are proud to be at the forefront of CEM software development with our E³Expert Toolkit. We are committed to using our Expert System solutions to solve the latest Electromagnetic Environment Effects (E³) problems for large complex systems.



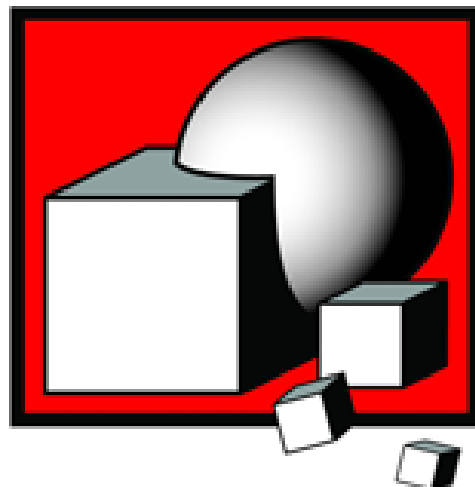
Beeches Professional Campus
One Beeches Place
7980 Turin Rd., Bldg. 1
Rome, NY 13440-1934 USA

Call: (315) 334 1163

Fax: (315) 334 1397

Email: androcs@androcs.com

CST



The 31st Annual Review of Progress in Applied Computational Electromagnetics
 March 22-26, 2015
 Williamsburg, Virginia, USA

Conference Rooms and Exhibitor Layout

