## 2012 IEEE International Symposium on Antennas and Propagation and USNC-URSI National Radio Science Meeting

### Technical Program

(As of May 28, 2012)

Note: Interactive Forum (IF) posters will be on display from 10:00 am until 5:00 pm on the scheduled day. Authors of IF poster papers are expected to be present at their posters from 10:00 am until 12:00 noon on the assigned day.

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Monday, July 9 10:20-12:00 Chicago VI
Session 101 AP-S

Applications of Numerical Methods

Session Chairs: Paul Bernhardt, Branislav Notaros

10:20 101.1 Electric Field Glow Discharge Inside Externally Excited Porous Spherical Cavity Resonators
P. A. Bernhardt, A. W. Filippet, Naval Research Laboratory, United States

10:40 101.2 Integral Equation Method for Analyzing Purcell Effect in Plasmonic System
Y. F. Chen, University of Electronic Science and Technology of China, China; W. C. Chew, University of Illinois at Urbana-Champaign, USA; W. E. I. Sha, W. C. H. Chew, L. Jiang, University of Hong Kong, China

11:00 101.3 Modal Analysis and Solution of Electromagnetic Wave Propagation in Cholesteric Liquid Crystal Cells
A. C. Polycarpou, M. A. Christou, N. C. Papanicolaou, University of Nicosia, Cyprus

11:20 101.4 Empirical Formulas for Self Resonance Frequency of Archimedean Spiral Coils and Helical Coils
H.-C. Yan, G. Lee, W. S. Park, Pohang University of Science and Technology, South Korea

11:40 101.5 The Far Field Transformation Using the Iterative Source Reconstruction Method Based on the Phaseless Data
P. Li, L. Jiang, University of Hong Kong, China

Monday, July 9 10:20-12:00 Chicago VII
Session 102 AP-S/URSI

Millimeter-Wave Antennas

Session Chairs: Wael Abdel Wahab, Dimitris Psychoudakis

10:20 102.1 Low-Cost Fabrication of Millimeter-Wave All-Silicon High Efficiency Antenna
M. A. Bashar, A. S. Abdellatif, S. Safavi-Naeini
University of Tabuk, Saudi Arabia; 2University of Waterloo, Canada

10:40 102.2 Design of a 60 GHz Dielectric Resonator Antenna Array Mounted on a Conformal Structure
H. C. Chorn, M. Nedil, J. Ben Mabrouk, T. A. Denidni, L. Talibi
1University of Quebec a UQAT, Canada; 2UQO, Canada; 3INRS-EMT, Canada

11:00 102.3 Artificial Dielectric Layer as Sub-MM Wave Antenna Super-Strates
G. Fiorentino, W. H. Syed, P. M. Sarro, A. Neto, TUDelft, Netherlands

11:20 102.4 Millimeter-Wave Antennas on a LTCC Cavities
H. D. Yang, S. Zhao, University of Illinois at Chicago, United States

11:40 102.5 CPW-Fed Yagi Array with Dielectric Resonator Antenna for W-Band and Imaging System Applications
Z. Hraiech, O. M. Haraz, Concordia University, Canada; A.-R. Sebak, M. R. Abdel-Rahman, King Saud University, Saudi Arabia

Monday, July 9 10:20-11:40 Chicago X
Session 103 AP-S

Globalization of Engineering Education: Perspectives and Panel Discussion

Session Chairs: Magdy Iskander, Parveen Wahid

10:20 103.1 Globalization: Setting a New Agenda for Engineering Education
M. E. Iskander, University of Hawaii at Manoa, United States; S. M. El Ghazaly, National Science Foundation, United States; P. Wahid, University of Central Florida, United States

10:40 103.2 Engineering Globalization: Overview of Trends & Implications
R. Hira, Rochester Institute of Technology, United States

11:00 103.3 IEEE and National Science Foundation Recent Activities in Globalization of Engineering Education
P. Sneath, IEEE Corporate Office, United States; S. El-Ghazaly, National Science Foundation, United States

11:20 103.4 An Industry View of Industry/Academic Research Collaboration
G. Peters, J. Wenstrand, R. Stancliff, T. Wu, J. Kikuchi, Agilent Technologies, United States

Monday, July 9 10:20-12:00 Huron
Session 104 AP-S

Magnetic Resonance Imaging

Session Chairs: Agostino Monorchio, Elia Attardo

10:20 104.1 Mitigating RF Heating near Medical Devices in Magnetic Resonance Imaging
J. E. Brown, C. S. Lee, Southern Methodist University, United States

10:40 104.2 Analytically-Based Approach for the Analysis of MRI Volume Coil Loaded with Multilayered Cylinder
G. Tiberi, M. Tosi, J. Tropp, A. Monorchio
1University of Pisa, Italy; 2Stella Maris Scientific Institute and Fondazione Imago7, Italy; 3General Electric Medical Systems, USA

11:00 104.3 3-D Optimization of Magnetic Field Shimming in MRI by Convex Programming Approach
E. A. Attardo, M. Perez Cerquera, F. P. Andruíl, G. Vecchi
1University of Milano, Italy; 2Politecnico di Torino, Italy; 3ENST de Bretagne (TELECOM Bretagne), France

11:20 104.4 A Numerical Assessment of the Effect of MRI Surface Coils on Implanted Pacemakers
N. Fontana, A. Monorchio, University of Pisa, Italy; M. O. Munoz Torrico, Y. Hao, Queen Mary College, University of London, United Kingdom

11:40 104.5 Design of Phased Array Coils for Increasing the Signal-to-Noise Ratio of Magnetic Resonance Imaging
D. Liang, H. T. Hu, T. S. Yeo, National University of Singapore, Singapore

Monday, July 9 10:20-12:00 Michigan A
Session 105 AP-S/URSI

Electronic Devices, Circuits, and Applications I

Session Chairs: Vitaliy Lomakin, Mahmoud El Sabbagh

10:20 105.1 RF-MEMS Reconfigurable Power Divider for Multi-Functional Antenna Transceivers
D. Psychoudakis, Laboratory for electromagnetic fields and microwave electronics (LFEH), Switzerland; Z. Yang, D. Peroulis, Birck nanotechnology center, USA

10:40 105.2 Compact Wideband Combine Filter Using Inter-Resonator Taps and Capacitive Loading
A. S. Martin, M. A. El Sabbagh, Syracuse University, United States; B. Mohajer-Iravani, EMWaveDev, United States

11:00 105.3 60 GHz Non-reciprocal Phase Shifters in 90 nm CMOS for Beam-steering Coupled Oscillator Arrays
C.-C. Liu, R. Rojas, The Ohio State University, United States

11:20 105.4 Investigations of 5.2GHz Dual-Mode Wide Band Bandpass Filter
C. H. Chen, R.O.C. Air Force Academy, Taiwan; H.-M. Chen, National Kaohsiung University of Applied Sciences, Taiwan; Y.-K. Wang, Advanced Connection Technology Inc, Taiwan

11:40 105.5 A CMOS Vector-Sum Phase Shifter for Wideband Polarization-Agile Applications
J.-F. Kang, Y.-T. Lo, National Taiwan University, Taiwan

Monday, July 9 10:20-12:00 Michigan B
Session 106 AP-S

Radar Systems, Target Phenomenology and Processing

Session Chairs: Kunal Sarabandi, Traian Dogaru

10:20 106.1 A High Resolution Radar with Programmable Waveform for Applications at VHF and UHF Bands
A. Y. Nashashibi, K. Sarabandi, The University of Michigan, United States
10:40 106.2 Simulations of the Millimeter-Wave Interferometric Signature of Walking Humans  
J. A. Namazi, Johns Hopkins University, United States

11:00 106.3 Clutter Rejection Processing for Airborne Radar in Rotated Space-Time Domain  
S. M. A. Motahari, H. Deng, Florida International University, United States

11:20 106.4 Doppler Features from Wind Turbine Scattering in the Presence of Ground  
A. R. Naidu, N. Whitelonis, H. Ling, The University of Texas at Austin, United States

11:40 106.5 Ground Clutter Rejection for Airborne Radar Using Doppler Compensation  
S. M. A. Motahari, H. Deng, Florida International University, United States

**Monday, July 9**  
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**Superior A**  
**Session 107**  
AP-S/URSI

**High Frequency Techniques**

Session Chairs: A. Neto, Carey Rappaport

10:20 107.1 Characterization of Automotive MIMO Antenna Configurations Through Simulations and Measurements  
C. Okonomopoulos-Zachos, T. O. Mohammed, M. Arnold, IMST GmbH, Germany

10:40 107.2 Ray Tracing for 3D Simulation and Inversion for Whole-Body Imaging  
K. Williams, Z. Chen, L. Tirado, B. Gonzalez-Valdes, J. A. Martinez-Lorenzo, C. Rappaport, Northeastern University, United States

11:00 107.3 GTD Analysis for Diffraction by a Thin Slit on Ininitely Long PEC Screen  
R. Sato, Niigata University, Japan; H. Shirai, Y. Abe, Chuo University, Japan

11:20 107.4 An Iterative Physical Optics Algorithm for the Analysis and Design of Dielectric Lens Antennas  
G. Carluccio, M. Albani, University of Siena, Italy; A. Neto, Technical University of Delft, The Netherlands

11:40 107.5 Computation of Surface Fields Excited on Arbitrary Smooth Convex Surfaces with an Impedance Boundary Condition  
V. B. Emruk, B. Alisun, Istanbul University, Turkey

**Monday, July 9**  
**10:20-11:20**  
**Superior B**  
**Session 108**  
AP-S/URSI

**Ionospheric Modeling and Propagation**

Session Chairs: Ana Alejos, Yang Li

10:20 108.1 Study of Peak Electron Density Obtained by COSMIC, Ionosondes and IRI Model over Europe During a Four Year Period  
H. Hazardsburg, S. Anazagori, Frederick University, Cyprus

10:40 108.2 A Less Opaque Ionosphere: Brillioun Precursors Evolution in Natural and Artificial Plasma  
A. V. Alejos, University of Vigo, Spain; M. Danwood, New Mexico State University, USA; F. Falcone, M. Benete, M. Sorolla, Universidad Publica de Navarra, Spain

11:00 108.3 REGION DETECTION AND STATISTICAL ANALYSIS OF HF E, F LAYER IONOSPHERIC CLUTTER RD SPECTRA  
Y. Li, Z. Ji, Y. Wei, N. Zhang, W. Tang, Harbin Institute of Technology, China

**Monday, July 9**  
**10:20-12:00**  
**Colorado**  
**Session 109**  
URSI

**Adaptive and Wideband Arrays**

Session Chairs: Kubilay Sertel, Reuven Shavit

10:20 109.1 Hybrid Adaptive Antenna Arrays for Mm-Wave Communications  
Y. J. Guo, X. Huang, V. Dydyuyk, CSIRO, Australia

10:40 109.2 A Self-Calibration Scheme for Adaptive Antenna Array Systems  
C.-J. Chang, H.-P. Lin, National Taiwan University of Technology, Taiwan; M.-C. Tseng, Industrial Technology Research Institute, Taiwan; S.-S. Jeng, National Dong Hwa University, Taiwan

11:00 109.3 Finite Size Effects on Performance of Ultrawideband Tightly Coupled Arrays with Resistive Substrate Loading  
W. Moulkei, K. Sertel, J. L. Volakis, Ohio State University, United States

11:20 109.4 Extending the Bandwidth of Planar Ultra-Wideband Modular Antenna (PUMA) Arrays  
J. T. Logan1, R. W. Kind1, N. M. Vouvakis1,  
1University of Massachusetts, Amherst, United States; 2US Naval Research Lab., United States

11:40 109.5 Wide Band and High Gain Planar Array with a Suspended Stripline  
R. Shavit, N. Davidovitz, U. Zohar, Ben-Gurion University of the Negev, Israel

**Monday, July 9**  
**10:20-12:00**  
**Missouri**  
**Session 110**  
AP-S/URSI

**Diagnostic and Therapeutic Applications of Hyperthermia**

Session Chairs: Gianluca Lazzi, Elise Fear

10:20 110.1 Hyperthermic Monitoring of Breast Cancer  
E. Colebeck, R. Bertucci, R. Green, E. Topsakal, Mississippi State University, United States

10:40 110.2 Use of Tumor-Specific Resonances in Microwave Hyperthermia of Breast Tumor  
S. K. Hung, W. A. Davis, Virginia Polytechnic Institute and State University, United States

11:00 110.3 Cellular Hyperthermia for Early Breast Cancer Detection  
R. B. Green, E. Colebeck, R. Bertucci, E. Topsakal, Mississippi State University, United States

11:20 110.4 Construction of a Conformal Applicator for Hyperthermia Treatment of Superficial Skin Cancer  
Y. S. Koo, A. E. Fathy, University of Tennessee, United States; R. Kazemi, K. N. Toosi Univ. of Tech, Iran; J. Phillips, Lincoln Memorial University, United States

11:40 110.5 Design of Compact Microstrip Antennas Embedded in Water Bolus for Hyperthermia Applications  
E. Korkmaz, M. A. Nassor, S. Kara, O. Isik, Fatih University, Turkey; B. Turetken, TUBITAK, Turkey

**Monday, July 9**  
**10:20-12:00**  
**Parlor C**  
**Session 111**  
AP-S

**Vehicular Antennas**

Session Chairs: Chi-Chih Chen, Daniel Aloi

10:20 111.1 Omnidirectional Circularly Polarized Antenna for DSRC Systems  
T. Varum1, J. N. Matos2,3, P. Pinho1,3,  
1Instituto de Telecomunicacoes, Portugal; 2Universidade de Aveiro, Portugal; 3Instituto Superior de Engenharia de Lisboa, Portugal

10:40 111.2 Modeling, Simulation, and Measurement of a Transparent Armor Embedded Meshed Microstrip Antenna  
E. N. Lee1, R. H. Hall1, G. Katulka1, K. Duncan1, C. Byars2, P. Pa2, M. Mirotznick1, P. Patel1, L. Holmes1,  
1US Army Research Lab, United States; 2S&TCD - CERDEC, United States; 3University of Delaware, United States

11:00 111.3 Single-Pin Dual-Band Patch Antenna for GPS and SDRS Applications  
D. N. Aloi, E. Ghulati, Oakland University, United States

11:20 111.4 A Compact Antenna Design for Satellite Reception with High Efficiency Based on Low-Cost Materials  
G. Sacht, S. Lademar, Universitat der Bundeswehr München, Germany

11:40 111.5 Compact Low-Profile Omnidirectional Surface Wave Antenna for UMTS Applications  
L. Lizzii, F. Ferrero, J.-M. Ribero, R. Staraj, LEAT - University of Nice-Sophia Antipolis, CNRS, France
Arrays for Cognitive Networking
Session Chairs: Michael Chrysomallis, Greg Huff
10:20 112.1 Development of a Smart Phone Enabled Cognitive Controlled Phased Array
J. S. Jensen, J.-F. Chamberland, G. H. Huff, Texas A&M University, United States
10:40 112.2 An Advance Array System for Cognitive Networking
Y. Huang, R. J. Weber, Montana State University, United States
11:00 112.3 Ring Array Antenna with Optimized Beamformer for Simultaneous Transmit and Receive
K. T. Kolodziej, P. T. Hurst, A. J. Fern, L. I. Parad, Massachusetts Institute of Technology – Lincoln Laboratory, United States
11:20 112.4 Performance of the Improved Transmit Scheme in V2V and V2I Communications
A. Ekten, TUBITAK-BILGEM, Turkey
11:40 112.5 A Novel Reconfigurable Antenna Based on Active Band Reflective Frequency Selective Surface
L. Zhang, G. Yang, Q. Wu, Harbin Institute of Technology (HIT), China
Photonic Crystal Slab: Simulation by Spectr
V. Eksim
Properties

Electromagnetic Effects of Materials
Session Chairs: Lanlin Zhang, Alkim Akyurtlu
10:00 113.1 Controlling Ferroelectricity in Sputtered Cr-Doped InO Thin Films
Y. Ait El Aoud, M. C. Hickey, A.-G. Kussow, A. Akyurtlu, University of Massachusetts – Lowell, United States
10:20 113.2 Transmission Through Electrochromic Windows (ECW) at Microwave and Millimeter-Wave Frequencies
J. M. Mower, Y. Kuga, M. Taya, University of Washington, United States
10:40 113.3 Graded Index Flat Lenses with Integrated Antireflective Properties
B. L. Good, Naval Surface Warfare Center Carderock, United States; M. S. Mirotznik, University of Delaware, United States
11:00 113.4 Implementation & Application of a Lossy Dielectric Shell Model
Y. Cabil, Caltech JPL, United States
11:20 113.5 Enhancement of Second Harmonic Generation in an Air-Bridge Photonic Crystal Slab: Simulation by Spectral Element Method
M. Luo, Q. H. Liu, Department of Electrical and Computer Engineering, Duke University, United States

Impedance Matching and Decoupling for MIMO Systems
Session Chairs: Koichi Ogawa, Sailing He
10:00 111.5 A MIMO Antenna with Improved Isolation Using RFC for LTE Mobile Application
D. Gu, Y. Lee, T. Song, J. Choi, Hanyang Univ., South Korea
10:10 111.6 Maximum Eigenvalues and Capacity of MIMO Systems Using Matching Networks
J. Zhang, New Star Research Institute of Applied Technology, China; J. Zheng, Y. Yao, Z. Feng, Dept. Electronic Engineering, Tsinghua Univ., China
10:20 111.7 Single-Plate, Two-in-one PIFA for 2.4 GHz Modules
S.-W. Liu, C.-T. Lee, Late-On Technology Corporation, Taiwan; F.-S. Chang, Cheng Shiu University, Taiwan
10:30 111.8 Design Consideration of Closely Spaced Polarization- and Pattern-Diversity Antenna Pair
C.-P. Liu, S.-Y. Chen, Graduate Institute of Communication Engineering National Taiwan University, Taiwan; H.-J. Li, Department of Electrical Engineering National Taiwan University, Taiwan
10:40 111.9 Novel Dual-Band Decoupling Network for Two-Element Closely Spaced L-Shape Antenna Array
K.-C. Lin, C.-H. Wu, T.-G. Mu, National Taiwan University of Science and Technology, Taiwan
10:50 111.10 Tri-Band Antenna with Compact Conventional Phone Antenna and Wideband MIMO Antenna
J.-F. Li, Q.-X. Chu, School of Electronic and Information Engineering, South China University of Technology, China
11:00 111.11 Impedance Matching Through a Single Passive Fractional Element
A. G. Radwan, Cairo University, Egypt; A. Shamim, K. N. Salama, King Abdullah University of Science and Technology (KAUST), Saudi Arabia
11:10 111.12 A Compact Directional Coupler for Use in Beam-Forming Networks
E. Gandini1,2, M. Ettore1, R. Sauleau1, A. Grbic2
1IETR - University of Rennes 1, France; 2University of Michigan, USA
11:20 111.13 Low-Mutual Coupling Antenna Array for Millimeter-Wave MIMO Applications
A. Hragas, T. A. Denidni, University of Quebec, Canada; N. Mourad, C. Yacoub, UQAT, Canada
11:30 111.14 A Novel Figure of Merit for Small Multiantenna Systems: the Duplex Isolation
M. Pelosi, O. N. Alrabadi, O. Franek, G. F. Pedersen, Aalborg University, Denmark
11:40 111.15 Low Mutual Coupling T-Shaped Two-Port Slot Antenna
S. Song, J. Li, R. D. Murch, The Hong Kong University of Science and Technology, China
11:50 111.16 INTERACTIVE MATCHING NETWORK and FILTER DESIGN WEB-BASED TOOL Using PYTHON
A. Frodl, B. Westrick, Purdue University Fort Wayne, United States
IF12.4 A Novel Chipless RFID Based on Multi-Resonant High-Impedance Surfaces
F. Costa1, S. Genovesi1,2, A. Monorchio1,2
1University of Pisa, Italy; 2CNIT, Italy

IF12.5 Near Field Enhancement Using Uniaxial Wire Medium with Impedance Loadings
C. S. R. Kaipa, A. B. Yakovlev, University of Mississippi, United States; M. G. Silveirinha, S. I. Maslovski, University of Coimbra, Instituto de Telecomunicacoes, Portugal

IF12.6 Scattering Problems Involving Three-Dimensional Non-Local Wire Metamaterials Based on a Transport Model
G. W. Hanso, E. Fonti, University of Wisconsin Milwaukee, United States

IF12.7 Retrieving Effective Material Parameters with Reasonable Dispersion for Metamaterial Slabs
H. Walls, Aalto University School of Electrical Engineering, Finland

IF12.8 Radar Invisibility of Canonical DB Objects
S. P. Kiminki, J. Markkanen, A. Sihvola, P. Yli-Oijala, Aalto University, Finland

IF12.9 Cloaking Properties of a Metamaterial-Coated Conductor with an Air Gap
A. G. Jamil, T. C. Rao, University of Massachusetts Lowell, United States

IF12.10 Measurements of the Reflection and Transmission Properties for a Metasurface with Scatterer Size Variation
K. L. Kumley, E. F. Kuester, University of Colorado at Boulder, United States; C. L. Holloway, S. Kim, National Institute of Standards and Technology, United States

IF12.11 Wideband Circular Waveguide Polorizer with Metamaterial Liner
M. G. Bray, E. Lier, R. Shaw, Lockheed Martin Space Systems, United States

IF12.12 Classification of Media Where Electromagnetic Fields Cannot Propagate
O. Zandi, Z. A. Aitafshab, Tarbiat Modares University (TMU), Iran; M. S. A. Shirvamian, K. N. Toosi University of Technology, Iran

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Monday, July 9
10:00-5:00
River Exhibition Hall B

Session IF13
AP-S/URSI Interactive Forum

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Fields and Waves in Metamaterials - Part II

Session Chairs: Christopher Holloway, Hakan Bagci

IF13.1 Investigating Imperfections in a Fluid Tunable Metasurface/Metafilm
C. L. Holloway, J. A. Gordon, National Institute of Standards and Technology (NIST), United States

IF13.2 Generalized Snell’s Law in Three Dimensions and Out-of-Plane Refraction with Anisotropic Optical Antenna Metasurfaces
F. Aieta, P. Genevet, N. Yu, M. Kats, Z. Gaburro, F. Capasso, Harvard University, United States

IF13.3 Multiple Sources and Scatterers in Epsilon-Near-Zero (ENZ) Structures
H. Caglayan, U. Chettiar, B. Edwards, N. Engheta, University of Pennsylvania, United States

IF13.4 Mode Matching Analysis and Circuit Physics in Zero Index Material
Q. J. Dai, W. C. Chen1, Y. H. Lo1, L. J. Jiang1
1The University of Hong Kong, China; 2University of Illinois at Urbana-Champaign, USA

IF13.5 Low-Loss Optical Metamaterials and Metasurfaces
A. Ala1, Y. Zhao1, P.-Y. Chen1, B. Memarzadeh1, G. Naik1, A. Kildishev2, H. Mousaeei2, A. B. Boltasseva3, V. Shalaev3, N. Engheta4
1The University of Texas at Austin, United States; 2Northeastern University, United States; 3Purdue University, United States; 4University of Pennsylvania, United States

IF13.6 Effects of Having Dense Metamaterial Arrays on the Retrieved Parameter Results for Permittivity and Permeability
G. Turhan-Sayan1, O. Turkmen2
1Middle East Technical University (METU), Turkey; 2Kocaeli University, Turkey
IF14.7 Eigen-Modal Propagation in 3-D Magnetodielectric Particle Arrays and Metamaterials at Oblique Incidence
A. N. Askarpour, University of Tehran, Iran; X.-X. Liu, A. Alu, The University of Texas at Austin, United States

IF14.8 Modeling the Optical Performance of an Array of Plasmonic Nanorods Illuminated by an Obliquely Incident Plane Wave by Using the Characteristic Basis Function Method
A. Rashidi, H. Mosallaei, Northeastern Univ., United States; R. Mittra, Penn State Univ., United States

IF14.9 Practical Realization of DB Surface Using Resonant MENZ Inclusions
D. Zaluski, D. Muh, S. Hrabur, L. Depic, I. Szalaj, University of Zagreb, Croatia

IF14.10 Design of Building Blocks with Positive Epsilon Mimicking Negative Epsilon
N. Jankovic1,2, A. Vaki1, A. Alves1, N. Engheta1
1University of Pennsylvania, United States; 2University of Novi Sad, Serbia

IF14.11 Performance Enhancement of RF Absorbers by Using Resistively-Loaded Periodic Screens
Y. Zhou, R. Mittra, The Pennsylvania State University, United States

IF14.12 Investigation of Image Formation Properties of 3-D Dielectric DNG and Wire Mesh ENZ Metamaterials at Microwave Frequencies
D. Pulito, J. Venkataraman, Z. Lu, Rochester Institute of Technology, United States

Monday, July 9 10:00-5:00 River Exhibition Hall B
Session IF15 AP/S/URSI Interactive Forum

Small Antennas: Wideband, Multiband, High-Frequency and On-Body Applications

Session Chairs: Richard Ziolkowski, Nader Behdad

IF15.1 Metamaterial-Inspired Wideband Circular Monopole Antenna
Y. He, G. V. Eleftheriades, University of Toronto, Canada

IF15.2 Novel Multiband Autonomous Impedance Restoration Antenna System by Using a Probe
M. Hugak, S. Obayashi, H. Shoki, Corporate Research & Development Center, TOSHIBA corp., Japan

IF15.3 Wideband, Electrically-Small, Planar, Coupled Subwavelength Resonator Antenna with an Embedded Matching Network
J. Bae1, S. Shi1, R. Nelson2, D. W. Prather3
1University of Delaware, United States; 2Air Force Research Laboratory, United States

IF15.4 AAMC-Loaded Cavity-Backed Slot Antennas
D. J. Gregory, J. S. Colburn, C. R. White, HRL Laboratories, United States

IF15.5 Designing a Quad-Band Antenna for Mobile Phone Applications Including Metal Ring and Hand Effects
Q. Guo, Communication University of China, China; R. Mittra, Pennsylvania State University, USA; J. Byun, Samsung Electronics Co., Ltd, South Korea

IF15.6 A Highly-Efficient Single-Feed Planar Fabry-Pérot Cavity Antenna for 60 GHz Technology
S. A. Hosseini, F. De Flaviani, F. Capolino, University of California, United States

IF15.7 60-GHz CMOS on-Chip Corrugated Linear Tapered Slot Antenna
Y.-H. Chang1, K.-H. Tsai1, H.-R. Chiang1
1National Cheng Kung University, Taiwan; 2HTC Corporation, Taiwan

IF15.8 Design of a V-Band Active Integrated Antenna (AIA) with Voltage Controlled Oscillator
Y.-C. Lin, H.-Y. Chang, National Central University, Taiwan

IF15.9 A 77 GHz on-Chip Strip Dipole Antenna Integrated with Balun Circuits for Automotive Radar
I. Tekin, Sabancı University, Turkey; M. Kaynak, IHP, Germany

IF15.10 Semiconductor-Substrate Integrated 3D-Micromached W-Band Helical Antennas

Monday, July 9 10:00-5:00 River Exhibition Hall B
Session IF16 URSI Interactive Forum

Remote Sensing, Imaging, and Inverse Scattering

Session Chairs: Mahta Moghaddam, Lotfollah Shafai

IF16.1 Scattering Simulation and Reconstruction of a 3D Complex Target above Background Surface Using SIMO Downward-Looking Radar
Y.-Q. Jin, W. Li, Fudan University, China

IF16.2 Feasibility Study of a Dual-Polarized Near-Field Imaging System Based on the Scattering Probe Technique
M. Ostadrabhir, J. LoVetri, L. Shafai, University of Manitoba, Canada

IF16.3 A Joint Inversion Scheme and Its Applications for Resistivity Logging Response
T. Wei, M. Ma, China Oilfield Services Limited, China; Z. Zhang, Zhejiang University, China

IF16.4 Correction of Frequency Uncertainty in the Interferometric Measurement of Moving Humans
L. A. Nanez, Johns Hopkins University, United States; A. H. Zai, University of Colorado at Boulder, United States

IF16.5 Comparison of Reconstruction Algorithms for Microwave Tomography, with Applications to Experimental Data
V. Picco1, T. Negishi1, S. Nishikata2, D. Errecoli3
1University of Illinois at Chicago, United States; 2Mitsubishi Heavy Industries, Ltd., Japan

IF16.6 Microwave Imaging Using the FDTD Time-Reversal Method
C. Bardak, M. Saed, Texas Tech University, United States

IF16.7 Directed Wave Propagators and Microwave Tomographic Imaging of Forward-Scattering Objects
G. Samuelsohn, Helon Institute of Technology, Israel

IF16.8 Characterization of Lossy Dielectric Targets Using Time Reversal Arrays
M. H. Hosseini, R. Safian, Isfahan University of Technology, Iran

N. Semnit, J. Oberhammer, KTH-Royal Institute of Technology, Sweden
Session 151
AP-S

Fast Solution, Model Reduction, and Domain Decomposition for Finite Element Analysis

Session Chairs: Marinos Vouvakis, Jian-Ming Jin

13:20 151.1 A Deterministic-Solution Based Fast Quadratic Eigenvalue Solver for 3-D Finite Element Analysis
F. Sheng, D. Jiao, Purdue University, United States

13:40 151.2 Simulation of 3D Tool Response Using the Dual-Primal Finite Element Tearing and Interconnecting Method Incorporated with Tree-Cotree Splitting
W. Yao, J.-M. Jin, University of Illinois at Urbana-Champaign, United States

14:00 151.3 A Fast O(1) Solution for Eliminating the Low-Frequency Breakdown Problem of Fullwave Solvers
L. Zhu, D. Jiao, Purdue, United States

14:20 151.4 On the Sampling of Moderate Dimension Parametric Spaces for FEM Model Reduction
W. Wang, M. N. Vouvakis, University of Massachusetts Amherst, United States

14:40 151.5 A Minimal Order Model from Zero to High Frequencies and Its Fast Generation for Finite-Element Based 3-D Electromagnetic Analysis
F. Sheng, D. Jiao, Purdue, United States

15:00 Break

15:20 151.6 Mesh Morphing Strategies for Robust Geometric Parameter Model Reduction
W. Wang, M. N. Vouvakis, University of Massachusetts Amherst, United States

15:40 151.7 A Theoretical Study on the Rank’s Dependence with Electric Size of the Inverse Finite Element Matrix for Large-Scale Electrodynamics Analysis
H. Liu, D. Jiao, Purdue, United States

16:00 151.8 Application of a Nonconformal FETI-DP Method in Antenna Array Simulations
M. Xue, J. Jin, Center for Computational Electromagnetics, University of Illinois at Urbana-Champaign, United States

16:20 151.9 Combining the LEAP Preconditioner with FETI-DP
G. N. Patrashchov, M. N. Vouvakis, University of Massachusetts, United States

16:40 151.10 A Fast Direct Finite Element Solver for Large-Scale 3-D Electromagnetic Analysis
B. Zhou, D. Jiao, Purdue University, United States

Monday, July 9
13:20-17:00 Chicago VII

Session 152
AP-S/URSI

THz Sources, Systems, and Applications

Session Chairs: Mona Jarrahi, Gokhan Mumcu

13:20 152.1 Plasmonic Waveguide Coupling at Terahertz Frequencies
J. C. Myers, C. S. Meierbachot, J. A. Hejase, P. Chahal, Michigan State University, United States

13:40 152.2 A DGFETD Analysis of a Terahertz-Band Photocative Dipole Antenna
J. C. Young, D. Boyd, S. D. Gedney, University of Kentucky, United States; T. Suzuki, Ibaraki University, Japan

14:00 152.3 Plasmonic Photocative Antennas for High Power Terahertz Generation
C. W. Berry, M. Jarrahi, University of Michigan, United States

14:20 152.4 High-Frequency/high-Power Electromagnetic Wave Generation in Electron Beam-Slow Wave Devices
A. J. Nashed, S. K. Chandhuri, S. Safavi-Naeini, The department of Electrical and Computer engineering / University of Waterloo, Canada

14:40 152.5 Forward-Nulling Passive Millimeter Wave Imaging Using Cooling Dielectric Tube
H. Sato, K. Kuriyama, K. Sawaya, Tohoku university, Japan

15:00 Break

15:20 152.6 Active Matching Networks for Wideband Terahertz Receivers
Y. Karisan, K. Sertel, The Ohio State University, United States

15:40 152.7 Quasi-Optical Imaging Performance of THz Focal Plane Array Antennas
G. C. Triopoulos, K. Sertel, The Ohio State University, United States

16:00 152.8 An Extended-Hemispherical Silicon Lens Backed 100GHz Focal Plane Array with Beam-Tilted Pixels
P. B. Neshy, G. Mumcu, University of South Florida, United States

16:20 152.9 Maximizing THz Amplifier for Improved Pulse Parameters and High Power Applications
1University of Missouri-Columbia, United States; 2University of Mahidol, Thailand; 3Air Force Research Laboratory, United States

16:40 152.10 A Study of Terahertz Scanning Probe Microscopy for Pcb in Speciation.doc
A. Vertic, H. Cetinkaya, M. Tekbas, TUBITAK-MAM, Material Institute, Turkey
### Beamforming, Nulling, and Direction of Arrival Estimation

**Session Chairs:** Yikun Huang, Michael Chryssomallis

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<td>13:20</td>
<td>155.1 Stochastic Beamforming via Compact Antenna Arrays</td>
<td>O. N. Alrabadi, G. F. Pedersen, AAU, Denmark</td>
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<td>13:40</td>
<td>155.2 RF Emitter Location Estimation in the Presence of Antenna Array Manifold Mismatch</td>
<td>A. Kinig, J. J. Gupta, The Ohio State University, United States</td>
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<td>14:00</td>
<td>155.3 Hardware Design and Implementation of a Direction of Arrival Estimation Block</td>
<td>A. Khallayoun, Al Akhawayn University in Ifrane, Morocco; A. Olson, A. Taxinger, Montana State University, USA</td>
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<td>14:20</td>
<td>155.4 A Survey on the Effect of Small Snapshots Number and SNR on the Efficiency of the MUSIC Algorithm</td>
<td>G. A. Ioannoupolou, D. E. Anagnostou, M. T. Chryssomalis, Democritus University of Thrace, Greece; South Dakota School of Mines Technology, USA</td>
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<td>14:40</td>
<td>155.5 Mainbeam Nulling Through Singular Element for Adaptive Array</td>
<td>H. Wang, X. Ruan, Z. Zhang, Z. Feng, Tsinghua University, China; Institute of Chinese Electronic Equipment System Engineering Corporation, China</td>
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<td>15:00</td>
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<td>15:20</td>
<td>155.6 Virtual Receiving Array (VRA) Method for Direction of Arrival (DOA) Estimation</td>
<td>C. Wu, E. Poliakov, A. Young, Y. Antar, Defence R&amp;D Canada, Canada; Royal Military College of Canada, Canada</td>
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### Biomedical Systems

**Session Chairs:** Dimitris Psychoudakis, Francisco Ares-Pena

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<td>13:20</td>
<td>156.1 Microwave Stethoscope, a New Noninvasive Multiple Vital Signs Sensor: Human Clinical Trials</td>
<td>R. R. Gagarin, N. Celik, G. C. Huang, M. F. Iskander, University of Hawaii at Manoa, United States</td>
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<td>13:40</td>
<td>156.2 Wireless Performance of a Fully Passive Neurorecording Microsystem Embedded in Dispersive Human Head Phantom</td>
<td>H. N. Schwedt, J. Chae, Arizona State University, United States; F. A. Miranda, NASA Glenn Research Center, United States</td>
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<td>14:00</td>
<td>156.3 The Response of High Sugar Concentration Laden Blood to Uniform Electromagnetic Fields</td>
<td>N. Bortirkasmitkal, N. E. Islam, K. D. Bhattacharyya, J. A. Viator, University of Missouri-Columbia, United States; P. Kirawanich, Mahidol University, Thailand</td>
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<td>156.4 Experimental Analysis of HSP 90 and 70 in Vivo Changes Induced in the Thyroid by Exposure to Microwave Electromagnetic Fields</td>
<td>M. J. Misa Agustinho, J. M. Leiro, M. T. Jorge Mora, J. A. Rodriguez-González, F. J. Jorge-Barreiro, F. J. Ares-Pena, E. López-Martín, University of Santiago de Compostela, Spain</td>
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<td>14:40</td>
<td>156.5 Experimental Detection of the Leukemia Using UWB Sensor: Human Clinical Trials</td>
<td>M. A. Eldosoky, H. M. Mourati, Helwan University, Egypt</td>
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<td>15:00</td>
<td>Break</td>
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<td>15:20</td>
<td>156.6 Wideband EM Coupler/Applicator Design and Characterization for the Clinical Benchmarking Tests of Microwave Stethoscope (MIST)</td>
<td>G. C. Huang, R. Gagarin, N. Celik, H.-S. Youn, M. F. Iskander, University of Hawaii at Manoa, United States</td>
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<tr>
<td>15:40</td>
<td>156.7 Determining the Relative Permittivity of Masses in the Human Body</td>
<td>S. Salman, D. Psychoudakis, J. L. Volakis, The Ohio State University, United States</td>
</tr>
<tr>
<td>16:00</td>
<td>156.8 Numerical Analysis of High-Voltage Pulsed Thermo-Acoustic System</td>
<td>A. Hajaboli, Safe Engineering and Services, Canada</td>
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<td>16:20</td>
<td>156.9 Computing Mutual Inductance Between Spatially Misaligned Coils for Wireless Power Transmission</td>
<td>R. Jepeadesan, Y.-X. Gao, National University of Singapore, Singapore; M. Je, Agency for Science, Technology and Research (A*STAR), Singapore</td>
</tr>
<tr>
<td>16:40</td>
<td>156.10 A 2.5 GHz Wireless ECG System for Remotely Monitoring Heart Pulsation</td>
<td>E. Palantei, M. Baharuddin, A. Ahmad, D. Utami, A. E. A. Febriani, W. Umar, M. Agus, N. K. Nauman, Universitas Hasanuddin, Makassar, Indonesia</td>
</tr>
</tbody>
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### Microstrip antennas

**Session Chairs:** Joseph Costantine, Ali Kabiri

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<th>Time</th>
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<th>Authors</th>
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<td>13:20</td>
<td>157.1 RF Power Extraction from a Quantum Dot Mode Locked Laser Connected to an Antenna</td>
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Monday, July 9  13:20-17:20  Superior A
Session 159  AP-S/URSI

High Frequency and Asymptotic Methods

Session Chairs: Weng Cho Chew, Jin-Fa Lee

13:20  159.1  EI-MoM-PO Method for Wire Antenna Array with Large-Scale Platform above Infinite Ground
A. Liang, J.-F. Wang, National University of Singapore, Singapore

13:40  159.2  Surface Impedance Characterization for Mutual Coupling Calculation of Patches on a Dielectric-Coated PEC Circular Cylinder
A. Garcia-Aguilera, Z. Sips, M. Sierra-Perez
1st Technical University of Madrid, Spain; 2nd University of Zagreb, Croatia

14:00  159.3  High-Accuracy Localization Based on the Dominant Rays of Ray-Tracing over Fingerprinting Techniques
A. del Corral Valente, O. Gutierrez Blanco, J. M. Gomez Puluio, University of Alcala, Spain

14:20  159.4  Efficient Ray-Optical Scheme for Radiation of Incoherent Sources in Flexible Layered Formations
A. Epstein, N. Tessler, P. D. Einzer, Technion - Israel Institute of Technology, Israel

15:20  159.5  Comparison of Image Method and Refined Ray Tracing Method for Aircraft Cabin Application
B. Choudhury, G. Hirenath, R. M. Jha, CSIR-National Aerospace Laboratories, India; 1st NASA, Boeing Research & Technology, India

15:40  159.6  Comparison of Intersection Algorithms for SBR Ray Tracing on NURBS
F. Weinmann, Fraunhofer FHR, Germany

15:40  159.7  Analysis of On-Body Propagation at W Band by Using Ray Tracing Model and Measurements
P. Usai, A. Monorchio, University of Pisa, Italy; A. Brizzi, A. Pellegrini, L. Zhang, Y. Hau, Queen Mary University of London, United Kingdom

16:00  159.8  On the Location of Creeping Wave Poles
C. Tokelau, United Technologies Research Center, United States

16:20  159.9  An Efficient Method for Highly Oscillatory Physical Optics Integrals
Y. M. Wu, L. J. Jiang, W. C. Chew
1st The University of Hong Kong, China; 2nd University of Illinois at Urbana-Champaign, USA

16:40  159.10  Fast Physical Optics Calculation for SAR Imaging of Complex Scatterers
M. Stephansen, J.-F. Lee, The Ohio State University, United States

17:00  159.11  Bending-Enhanced Side-Lobe Emission of Flexible Organic Light-Emitting Diodes
A. Epstein, N. Tessler, P. D. Einzer, Technion - Israel Institute of Technology, Israel

Monday, July 9  13:20-17:20  Superior B
Session 160  AP-S

Antenna Theory

Session Chairs: Majid Manteghi, Rodney Vaughan

13:20  160.1  Reactively Loaded Antenna Array Design with Characteristic Modes and DE Algorithm
Y. Chen, C. F. Wang, National University of Singapore, Singapore

13:40  160.2  Structural Scattering and the Virtual Aperture of a Half-Wavelength Dipole Antenna
R. Kasteng, A. Avraham, S. Nordebo, Tel Aviv University, Israel

14:00  160.3  Physical Bounds on Small Antennas as Convex Optimization Problems
M. Gustafsson, M. Cismasu, Lund University, Sweden; S. Nordebo, Linnæus University, Sweden

14:20  160.4  Theoretical Zero-Gap Dipole Impedance
M. Dehghani Estarki, R. G. Vaughan, Simon Fraser University, Canada

14:40  160.5  Design of a Dual-Band Metallic Feby-Perot Cavity Antenna Using Dual-Mode Resonances
V. Zhao, F. Liu, Z. Zhang, Z. Feng, Tsinghua University, China
15:00 Break
15:20 160.6 Design of a Compact Patch Antenna Backed by a Multi-Layer EBG Structure Using Multi- conductor Transmission Line Modeling
K. Povyndekho, R. Abhari, McGill University, Canada
15:40 160.7 Bounds on Q for the Short Dipole
M. Delplancke Estark, R. G. Vaughan, Simon Fraser University, Canada
16:00 160.8 Microstrip Fractal Patch Antennas Using High Permittivity Ceramic Substrate
I. M. Mendonça, A. G. Assunção, J. L. G. Medeiros, Federal University of Rio Grande do Norte, Brazil
16:20 160.9 Coupling Similarities Between Rridged Circular Apertures and Half Wavelength Dipoles
J.-E. Park, K. Y. Kim, H.-C. Kim, H. Kim, J.-W. Song, Kyungpook National University, South Korea
16:40 160.10 Miniaturization of Meander Line Slot Antenna
D. Mitra, D. Das, S. R. Bhadra Chaudhuri, Bengal Engineering and Science University, India
17:00 160.11 Compact High Gain Stacked Offset Broadband Microstrip Antennas as an Alternative to Normal Stacked and Array Configurations
S. V. N. V. Kesavath, Dept. of Electronics, Cochin University of Science and Technology, India

Monday, July 9 13:20-15:00 Colorado
Session 161 URSI

Multiband Antennas
Session Chairs: Ronald Johnston, Laila Salman
13:20 161.1 Wide Band Dual Polarized Antenna Array for Base Stations
A. Elshabini, J. Wu, K. Sarabandi, University of Michigan, United States
13:40 161.2 A Unidirectional Antenna Element with Very Wide Bandwidth L. Gg, K. M. Luk, City University of Hong Kong, China
14:00 161.3 Dual Band Dual Polarized Reflectarray Antenna with Close Frequencies in Ku Band
H. Hasani, C. Peixoto, Instituto de Telecomunicacoes, Instituto Superior Tecnico, Technical University of Lisbon, Portugal
14:20 161.4 A Dual-Band Circularly Polarized Antenna for RFID Tag Applications
C.-F. Chen, M.-C. Chang, W.-C. Weng, National Chi Nan University, Taiwan
14:40 161.5 A Compact Dual-Band Aperture-Coupled Microstrip Antenna for Ku Band Applications
M. Soroush, P. Rezaei, Semnan University, Iran

Monday, July 9 13:20-16:40 Missouri
Session 162 AP/S/URSI

Parallel and Special-Processor Based Numerical Methods
Session Chairs: Elia Attard, Leo Kempel
13:20 162.1 A GPU Implementation of Time Domain Integral Equation Solution for Finite Conducting Bodies
Y. Q. Dong, The Catholic University of America, United States; S. M. Rao, Naval Research Laboratory, United States
13:40 162.2 GPU Acceleration of Algebraic Multigrid for Low-Frequency Finite Element Methods
E. A. Attard, A. Borsic, Dartmouth College, USA
14:00 162.3 Impact of GPU Memory Access Patterns on FDTD
M. Livesey, Accenture, United Kingdom; J. F. Stack, Remcom, Inc., USA; F. Costen, the University of Manchester, United Kingdom; T. Nanri, N. Nakashima, S. Fujino, Kyushu University, Japan
14:20 162.4 OpenMP-CUDA Implementation of the Moment Method and Multilevel Fast Multipole Algorithm on Multi-GPU Computing Systems
I. Guan, S. Yan, J.-M. Jin, University of Illinois at Urbana-Champaign, United States
14:40 162.5 Double Precision Performance of Streaming SIMD Extensions Instructions for the FDTD Computation
M. Livesey, Accenture, United Kingdom; F. Costen, the University of Manchester, United Kingdom; N. Yang, Penn State University, USA
15:00 Break
15:20 162.6 FETI-LEAP: Making Domain Decomposition Robust
G. N. Parashos, M. N. Vouvakis, University of Massachusetts, United States
15:40 162.7 On Securing Green’s Function-Based Field Simulation on Public Computing Clouds
A. R. Yu, V. Jandhalya, University of Washington, United States
16:00 162.8 On Real-Time Method-of-Moments Analysis Using Graphics Processing Unit
Z. B. Zuber, D. I. Olcan, A. R. Djordjevic, University of Belgrade, Serbia; D. P. Zoric, B. M. Koldunzija, WIPL-D d.o.o., Serbia
16:20 162.9 Acceleration of the Discrete Green’s Function Computations
T. P. Stefanakis, Gdansk University of Technology, Poland

Monday, July 9 13:20-17:00 Parlor C
Session 163 AP-S

Antenna Measurements and Measurement Systems
Session Chairs: Perry Wilson, Per-Simon Kildal
13:20 163.1 Efficiency Comparison Method
B. R. Mehta, C. S. Lee, M. Ezzat, Southern Methodist University, United States; Y. Zhu, G. Chang, Alwave Corporation, USA
13:40 163.2 Radiation Efficiency of a Coplanar-fed Ultra-Wideband Antenna
N. Pires1,2, C. Mendes1,3, M. Koeshestani1, A. K. Skrivervik1, A. A. Moreira1
1 Instituto Superior Técnico, Portugal; 2 École Polytechnique Fédérale de Lausanne, Switzerland; 3 Instituto Politécnico de Lisboa, Portugal
14:00 163.3 An Enhanced Method to Measure Pulse Dispersion in UWB Antennas
A. Dumoulin, M. John, P. McEvoy, M. Ammann, Dublin Institute of Technology, Ireland
14:20 163.4 A Fast and Accurate Method to Measure the Radiation Characteristics of Probe-fed Circularly-Polarized Antennas in Mm-Wave Bands
D. Titz, F. Ferrero, C. Luxey, G. Jacquemod, Université de Nice-Sophia Antipolis, France
14:40 163.5 An Advanced Method to Measure Pulse Dispersion in UWB Antennas
X. Ren, S. Ebadi, X. Gong, University of Central Florida, United States
15:00 Break
15:20 163.6 Experiment Results of a Two-by-Two Diverse Antenna System over Sea Surface in NLOS Scenario
F. Dong, Y. H. Lee, Nanyang Technological University/School of EEE, Singapore
15:40 163.7 A Wireless Pressure Sensor Design Using a Microwave Cavity Resonator
H. Cheng, S. Ebadi, X. Gong, University of Central Florida, United States
16:00 163.8 Design of a Small MST Probe for EM-Field Measurements and Sensing Applications
S. Capdevila1, J. Romeu1, J.-C. Bolomey2, L. Jofre2
1 Universitat Politecnica de Catalunya, Spain; 2 UPF, Spain
16:20 163.9 A Study of Uncertainty Models in a Reverberation Chamber at NIST
E. Engvall1, P.-S. Kildal2, C. L. Holloway3, J. M. Ladbury4
1 NIST; 2 National Institute of Standards and Technology, United States; 3 Chalmers University of Technology, Sweden
16:40 163.10 Inaccuracies Decrease in Retransmission Meter with Homodyne Conversion
I. L. Vdovchenko, D. A. Velychko, A.Y. Usikov Institute of Radiophysics and Electronics NAS of Ukraine, Ukraine

Monday, July 9 13:20-17:00 Mississippi
Session 164 AP-S/URSI

Radio Communication Systems
Session Chairs: Trevor Bird, Inder Gupta
14:40 164.3 New Method Based on RSSI for Passive UHF RFID Localization System
Y. Duruc, G. Andia Vera, Polytechnic National University of Grenoble, LGCIS, France

14:20 164.4 Impact of Morphology in the Estimation of Power Delay Profiles in Future Indoor Femtocell Scenarios
A. Satos tegui, S. Larripa, L. Azpilicueta, F. Falcone, Universidad Publica de Navarra, Spain

14:40 164.5 Estimation of Wireless Coverage for Utilities in Complex Tunnel Environments
S. Larripa, A. Satos tegui, L. Azpilicueta, F. Falcone, Universidad Publica de Navarra, Spain

15:00 Break

15:20 164.6 Total Radiated Power of Wireless Devices in a Dielectrically Loaded Reverberation Chamber
W. F. Young, C. Dunlap, J. Labud, The National Institute of Standards and Technology, United States

15:40 164.7 Introduction to Reconfigurable Sensing Antennas
F. Yang1,2, Q. Qiao1, Z. Jiang1, A. Elsherbeni1
1Tsinghua University, China; 2University of Mississippi, USA

16:00 164.8 TCM-64 Decoder Implementation for 64 and 128-QAM in Limited Logic Area
E. Muran, A. Eksim, S. Kahraman, M. S. Sagiroglu, TUBITAK-BILGEM, Turkey

16:20 164.9 Traffic Load Balancing and Efficient Carrier Utilization in Cellular Radio Communication Networks
O. W. Atl, Palestine Polytechnic University, via Israel

16:40 164.10 A Novel Approach to Realize Flat Gain Response in Beam-Switching Array
H. Wang1, X. Ruan1, Z. Zhang1, Z. Feng1
1Tsinghua University, China; 2Institute of Chinese Electronic Equipment System Engineering Corporation, China

Monday, July 9
3:20-17:00 Ohio
Session 165

13:20 165.1 A New Integral Equation Based Domain Decomposition Method for Electromagnetic Analysis of Large Multi-Scale Problems
X. Wang, Z. Peng, J.-F. Lee, The Ohio State University, United States

13:40 165.2 Wave Propagation in Complex Structures with LEGO
M. Lancelotti, B. P. de Hon, A. G. Tjibbe, Eindhoven University of Technology, Netherlands

14:00 165.3 Efficient Analysis of Scattering from Large-Scale Aperiodic Tilings by Use of the Characteristic Basis Function Method Combined with the Adaptive Integral Method
N. Wang, D. H. Werner, The Pennsylvania State University, United States

14:20 165.4 Fast H2-Based Integral Equation Solvers with an Optimal H2-Representation for Large-Scale Electromagnetic Analysis
W. Chai, D. Jiao, Purdue, United States

14:40 165.5 A Novel Approach for Evaluating Singular Integrals in Electromagnetic Integral Equations
W. T. Sheng, Z. Y. Zhu, M. S. Tong, Tongji University, China

15:00 Break

15:20 165.6 Reformulation and Combination of Two Fast Integral Equation Solvers for Planar 3D Structures
T. Vaupel, Fraunhofer FHR, Germany

15:40 165.7 Analysis of Scattering from Complex, Electrically Large Structures Using the Generalized Method of Moments
N. Y. Du, M. Vikram, B. Shanker, Michigan State University, United States

16:00 165.8 Integral Equation Solution of 3-D Anisotropic Lossy Dielectrics in Uniaxial Layered Media
K. Yang, A. E. Yilmaz, The University of Texas at Austin, United States

16:20 165.9 A Novel Volume Integral Formulation for Wideband Impedance Extraction of Arbitrarily-Shaped 3-D Lossy Conductors in Multiple Dielectrics
S. Omar, D. Jiao, Purdue, United States

16:40 165.10 Hierarchical LU Decomposition and Its Application in Tangential Equivalence Principle Algorithm
H. Shao, J. Hu, H. Guo, F. Ye, W. Lu, Z. Nie, University of Electronic Science and Technology of China, China

Monday, July 9
15:20-17:20 Michigan B
Session 166

Wireless Communications and Propagation Effects
Session Chairs: Magdalena Salazar-Palma, David Michelson

15:20 166.1 Numerical Estimation of RF Propagation Characteristics of Cellular Radio in a Crowded Aircraft Cabin
T. Hikage, M. Shirafune, T. Nojima, Hokkaido University, Japan; S. Futatsumori, A. Kohmura, N. Yonemoto, Electronic Navigation Research Institute, Japan

15:40 166.2 Effect of Terminal Height on Shadow Fading of Fixed Wireless Channels at 1.9 GHz in Suburban Macrocell Environments
D. G. Michelson, S. Maibohu, University of British Columbia, Canada

16:00 166.3 Real-Time Agile Impedance Tuner Maximizing Radiation Efficiency
N. J. Smith, C.-C. Chen, J. L. Volakis, The Ohio State University, United States

16:20 166.4 Propagation in Cellular Wireless Systems Takes Place Through the Elusive Sommerfeld Surface Waves
T. K. Sarkar, W. Dyab, SYRACUSE UNIVERSITY, United States; M. Salazar, Universidad Carlos III de Madrid, Spain; M. Prasad, National Physical Laboratory, India

16:40 166.5 Simultaneous Information Transfer and Power Transfer/Harvesting over a Transmit/Receive Antenna System
T. K. Sarkar, E. Caspers, SYRACUSE UNIVERSITY, United States; M. Salazar, Universidad Carlos III de Madrid, Spain

17:00 166.6 Analysis and Evaluation of Metropolitan Mesh Machine Networks Performance in Smart Grid and Smart Metering Scenarios
V. Tegi, E. Angiuli, M. Babboni, R. Bottura, University of Bologna, Italy; C. Carciotti, D. Guaducci, G. Riva, Fondazione Ugo Bordoni, Italy

Monday, July 9
15:20-17:20 Colorado
Session 167

Microwave Lens Antennas
Session Chairs: Raj Mittra, Ronan Sauleau

15:20 167.1 A Surface Micromachined High Gain Dielectric Lens Antenna for Millimeter Wave Applications
C. Kim, X. Cheng, D. E. Senior, K. T. Kim, Y.-K. Yoon, University of Florida, United States

15:40 167.2 Ultra-Wideband, True-Time-Delay, Metamaterial-Based Microwave Lenses
M. Li, N. Behdad, University of Wisconsin Madison, United States

16:00 167.3 Compact Rotman Lens Multibeam Antenna in SIW Technology
K. Tekkouk, M. Ettorre, R. Sauleau, M. Casuletti, IETR-University of Rennes1, France

16:20 167.4 A Novel Two Dimensional Circular Lens for Beam Steering Applications
A. Mokhtari, J.-J. Laurin, Ecole Polytechnique de Montreal, Canada

16:40 167.5 A Comparative Study of Flat and Profiled Lenses
T. McMains, R. Mittra, C. Pelletier, The Pennsylvania State University, United States

17:00 167.6 Analysis and Design of Luneberg Lens Antenna with Simultaneous Ku/Ka-Band Feed-System
M. Huang, S. Yang, R. Yao, P. Li, Z. Nie, University of Electronic Science and Technology of China, China
Tuesday, July 10 10:20-12:00  Chicago X

Session 201  AP-S

Spiral and Sinuous Antennas

Session Chairs: Roberto Rojas, Steve Weiss

10:20  201.1 Inkjet Printed Ultra Wideband Spiral Antenna Using Integrated Balun on Liquid Crystal Polymer (LCP)
S. Kim, J. Jim, S. Nikolaou, M. M. Tentzeris
Georgia Institute of Technology, United States; South China University of Technology, China; Frederick University, Cyprus

10:40  201.2 5:1 Wideband High-Power Spiral-Helix Antenna
J. Burgeon, M. Radtay, D. S. Filipovic, University of Colorado, United States

11:00  201.3 Flexible Spiral Antenna with Microstrip Tapered Infinite Balun for Wearable Applications
H. Lee, J. Geiger, M. M. Tentzeris
Georgia Institute of Technology, United States; IEEE, Germany

11:20  201.4 Quasi Frequency Independent High Power Sinuous Antenna
R. Sammata, D. Filipovic, University of Colorado Boulder, United States

Tuesday, July 10 10:20-12:00  Huron

Session 202  AP-S/URSI

Dosimetry and EM Exposure Assessment

Session Chairs: John Volakis, Francisco Falcone

10:20  202.1 SAR Sensitivity Analysis Using Polynomial Chaos Expansions
A. Ghani, N. Varzier, A. Hadjiem, E. Corni, J. Wiart, Orange Labs, France; O. Picon, Université Paris, Est, France

10:40  202.2 Analysis of Dosimetry Estimation in Large Enclosed Vehicles
J. Arpon, E. Aguirre, L. Azpilcueta, V. Ramos, F. Falcone
Universidad Publica de Navarra, Spain; Instituto de Salud Publica Carlon III, Spain

11:00  202.3 SAR in a Human Head Phantom Analyzed under 3T MRI
E. Colebeck, R. Bertucci, K. Sharp, E. Topsakal, Mississippi State University, United States

11:20  202.4 Specific Absorption Rate (SAR) Distribution in Human Tissue with Magnetic Resonance
Q. Jonah, S. Georgakopoulos, FIU, United States

11:40  202.5 An Antenna for Dynamic Environment
S. Seran, J. P. Donohoe, E. Topsakal, Mississippi State University, United States

Tuesday, July 10 10:20-12:00  Michigan A

Session 203  AP-S/URSI

Electronic Devices, Circuits, and Applications II

Session Chairs: Vitaliy Lomakin, Meysm Moallem

10:20  203.1 A Size-Reduced Ring Hybrid Using Common DGS
J. Lim, J. Lee, K. Kwon, Y. Jeon, Y. Jeong, B. Choi, S. M. Han, D. Ahn
Soomchunhyang University, South Korea; Chonbuk National University, South Korea

10:40  203.2 A Broadband Micromachined Cavity-Backed CPW to Rectangular Waveguide Transition for X-Band Applications
M. Moallem, K. Sarabandi, University of Michigan, United States

11:00  203.3 Electromagnetic Design of Heat-Assisted Magnetic Recording System
Q. Ding, M. Escobar, R. Chang, M. Lubarda, S. Li, V. Lomakin, University of California, San Diego, United States

11:20  203.4 A Waveguide-Microstrip Structure for Millimeter-Wave Spatial Power Combining

Tuesday, July 10 10:20-12:00  Michigan B

Session 204  URSI

Scattering and Diffraction

Session Chairs: Makoto Ando, Alberto Toccafondi

10:20  204.1 Scattering by a Finite Cylinder
F. Schettino, F. Di Marzo, M. D. Migliori, University of Cassino, Italy

10:40  204.2 High-Frequency Scattered Field Computations of Complex NURBS Surfaces
M. Balasubramanian, Fraunhofer Institute for High Frequency Physics and Radar Techniques, Germany; A. Toccafondi, S. Maci, University of Siena, Italy, Italy

11:00  204.3 Electromagnetic Scattering from an Array of Cylindrical Rods with Statistically Varying Lengths
K. Chatterjee, Space Dynamics Laboratory, United States; R. Mittra, Pennsylvania State University, United States

11:20  204.4 Miniaturized-Element Frequency Selective Surfaces for Radar Cross Section Reduction
A. Edulati, K. Sarabandi, University of Michigan, United States

11:40  204.5 Scattering of Electromagnetic Waves from a Homogeneous Dielectric Cylinder Using Volume Integral Equations
B. K. Minhas, King Saud University, Saudi Arabia

Tuesday, July 10 10:20-12:00  Superior A

Session 205  URSI

Electromagnetic Environment and Interference

Session Chairs: Gregory Tait, ANDREAS CANGELLARIS

10:20  205.1 Noise Source for Electromagnetic Compatibility Testing of New Wireless Communications Networks
G. Tait, M. Slocum, Naval Surface Warfare Center Dahlgren, United States

10:40  205.2 Application of Team-Based Learning in Electromagnetic Compatibility Education
D. G. Michelon, University of British Columbia, Canada

11:00  205.3 Transient Analysis of Driven Planar Interconnects in the Presence of Uncertainty in Routing and External Electromagnetic Interference
A. C. Cangellaris, R. Jong, University of Illinois, Urbana-Champaign, United States

11:20  205.4 Studies of Electromagnetic Susceptibility Inside a Large Platform Using the Domain Decomposition Methods
Y. Shao, J. Wang, B. Zhao, J.-F. Lee, The Ohio State University, United States

11:40  205.5 Calculation of Electric Fields Radiated from an Electrostatic Discharge Suppressor for IC Protection
H.-Y. Chen, C.-T. Kuo, Yuan Ze University, Taiwan

Tuesday, July 10 10:20-12:00  Superior B

Session 206  URSI

Radar and Imaging Systems

Session Chairs: Qing Liu, Michael Saville

10:20  206.1 Detection of Moving Target on a Moving Platform Using Doppler Radar
Y. Kim, California State University at Fresno, United States

10:40  206.2 Advances in Polariometric Synthetic Aperture Radar
M. A. Spivey, D. F. Fuller, Air Force Research Lab, United States; J. A. Jackson, Air Force Institute of Technology, United States
11:00 206.3 Simulation of High Resolution Image Reconstructed from Low Frequency Array
L.-F. Kiang, M.-M. Chioo, National Taiwan University, Taiwan

11:20 206.4 Inverse Source Solver with Phaseless Field Data Compatibility for High Resolution Near Field Scanner
Z. Yu, M. Chai, J. A. Mix, K. P. Slattery, Q. H. Liu
Duke University, United States; Intel Corporation, United States

11:40 206.5 Simultaneous Reconstruction of Dielectric and Magnetic Contrasts in Axisymmetric Inhomogeneous Media
W. Zhang, Q. H. Liu, Duke University, United States

Tuesday, July 10  10:20-12:00  Colorado
Session 207  AP-S

Electromagnetics Education
Session Chairs: Parveen Wahid, Mike Potter

10:20 207.1 Gender Disparity in Engineering: Results and Analysis from School Counselors Survey and National Vignette
E. T. Isakended, C. Furse, P. Goe, A. Bergherson
University of Utah, United States; University of Utah, United States

10:40 207.2 Labortatoris - a New Approach to Teaching Electricity and Magnetism to Students in Engineering
M. E. Peterson, D. Altmanns, R. I. Thompson, W. J. F. Wilson, University of Calgary, Canada

11:00 207.3 Why Square Antennas Produce Round Beams
M. C. Leifer, Ball Aerospace and Technologies Corp., United States

11:20 207.4 On the "Tunneling" of Full-Vector X-Waves Through a Slab under Frustrated Total Reflection Condition
M. A. Salem, H. Bagei, King Abdullah University of Science and Technology, Saudi Arabia

11:40 207.5 A Low Cost, High Performance Radar for Use by Undergraduate and Post-Graduate Students
A. M. Petroff, B. Dewberry, Time Domain, United States

Tuesday, July 10  10:20-12:00  Missouri
Session 208  AP-S

Time-Domain Numerical Methods
Session Chairs: Shanker Balasubramaniam, Yang Liu

10:20 208.1 Accurate Temporal Discretization of Time Domain Boundary Integral Equations
Y. Beghmen, K. Cools, D. De Zutter
 Ghent University, Belgium; University of Nottingham, UK

10:40 208.2 An O(N x N)_T Log_2(N/4) TIE Solver for Scattering from Periodic Quasiplanar Domains
D. Dauli, B. Shanker, Michigan State University, United States

11:00 208.3 Coupling Electromagnetics with Micromagnetics
R. Chang, V. Lomakin, University of California, San Diego, United States; E. Michielsen, University of Michigan Ann Arbor, United States

11:20 208.4 An Acceleration Technique for Computing Fields from a Periodic Source above a Layered Medium
D. Dauli, J. Gao, S. Balasubramaniam
Michigan State University, United States; Annexys, Inc., United States

11:40 208.5 A Rationale for Using Huygens Absorbing Boundary Conditions in Particle-in-Cell Codes
M. Bonilla, B. Goursaud, EADS Naéraudes, France

Tuesday, July 10  10:20-12:00  Parlor C
Session 209  AP-S

Wireless On-Body and WLAN Antennas
Session Chairs: Peter Hall, Cynthia Furse

10:20 209.1 New Wideband Tunable Printed Antennas for Medical Applications
A. Sabhan, ORT BRAUDE, Israel

10:40 209.2 A Novel Planar Antenna for Wireless Body Area Network
Y.-J. Chi, F.-C. Chen, National Chiao Tung University, Taiwan

11:00 209.3 Printed Dual-Band Loop Antenna for WLAN Applications
L.-F. Chen, C.-M. Peng, J.-W. Yeh, National University of Science and Technology, Taiwan

11:20 209.4 Low Profile Patch Antenna for On-Body Wireless Sensor Application in MBAN Band
T.-W. Ko, Y.-J. Hong, G. Park, K. Shin, J.-G. Yook
Tongji University, South Korea; Samsung Advanced Institute of Technology, South Korea

11:40 210.5 Dual-Band Inductively-Loaded Miniaturized Antenna
M. A. Othman, T. M. Abuelfadl, Cairo University, Egypt; A. M. Safwat, Ain Shams University, Egypt

Tuesday, July 10  10:20-12:00  Mississippi
Session 210  AP-S

Reflector antennas
Session Chairs: Behrouz Khayatian, Daniel Hoppe

10:20 210.1 Strut Shaping of 34m BeamWaveguide Antenna for Reductions in near-Field RF and Noise Temperature
B. Khayatian, D. J. Hoppe, M. J. Britcliffe, E. Gama, JPL, United States

10:40 210.2 Design of an 9m Dual-Offset Reflector Antenna for S-Band Weather Radar Applications
R. Hofeig, R. Schwendlerger, General Dynamics SATCOM Tech, United States; V. N. Bringi, Colorado State University, United States

11:00 210.3 Planar Dual-Antenna System for Blind Spots Elimination in Mobile Communication System
J. Li, Q. Chen, K. Sawaya, School of Engineering, Tohoku University, Japan; Q. Yuan, Sendai National College of Technology, Japan

S. Yun, M. Uhm, J. Choi, I. Yom, ETRI, South Korea

11:40 210.5 Broadside L-Shaped Wire Array
E. H. Lim, K. S. Tang, K. L. Choo, Universiti Tunku Abdul Rahman, Malaysia

Tuesday, July 10  10:20-12:00  Ohio
Session 211  URSI

Antenna Testing
Session Chairs: Ozlem Kilic, Saeed Khan

10:20 211.1 Antenna Cross-Polarization Isolation Impact on the Measurement of Weakly Cross-Polarized Sea Clutter
T. Miller, Naval Surface Warfare Center, Carderock Division, United States; D. Kilic, Catholic University of America, United States; M. Motznik, University of Delaware, United States

10:40 211.2 A Comparative Analysis of the Impact of Different Structures on Multipath Mitigation in the GPS Context
S. M. Khan, Kansas State University, United States

11:00 211.3 Design of a PCD Interface for Advanced Antenna Array Test
Y. Huang, R. J. Weber, Montana State University, United States; C. E. Melendez, University of Puerto Rico, United States

11:20 211.4 Precision Measurement of a High Performance Circularly Polarized Antenna in a Medium Performance Anechoic Chamber
R. H. Johnston, Dept E&CE, University of Calgary, Canada

11:40 211.5 Research on the Small Size Beam Tilt Antenna Using CNT Switch
M. H. Jeong, B. Y. Park, S. O. Park, Korea Advanced Institute of Science and Technology, South Korea

Tuesday, July 10  10:20-12:00  Ontario
Session 212  AP-S

Discontinuous Galerkin Finite Element Methods
Session Chairs: Stephen Gedney, Jian-Ming Jin
<table>
<thead>
<tr>
<th>Time</th>
<th>Session IF21</th>
<th>Location</th>
<th>Description</th>
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| 10:20 | A Design of a Novel Compact Unitcell for DNG Metamaterials Based on Stepped-Impedance Resonator Technique | Mayfair | Design and Simulation of a Novel Compact Unitcell for DNG Metamaterials Based on Stepped-Impedance Resonator Technique
| 10:40 | Design of a Planar Near-Field Plate | Interactive Forum | Design of a Planar Near-Field Plate
| 11:00 | Generalized Additional Boundary Conditions and Analytical Model for Multilayered Mushroom-Type Wideband Absorbers | River Exhibition Hall B | Generalized Additional Boundary Conditions and Analytical Model for Multilayered Mushroom-Type Wideband Absorbers
| 11:20 | Phase Contrainvance Modulated Artificial Metasurface Embedded with Rotated Slot | Interactive Forum | Phase Contrainvance Modulated Artificial Metasurface Embedded with Rotated Slot
| 11:40 | Design Optimization of Nanobowtie Antenna for High-Efficiency Low Bandgap Photovoltaic Cells | Interactive Forum | Design Optimization of Nanobowtie Antenna for High-Efficiency Low Bandgap Photovoltaic Cells
| 12:00 | Wavefront Engineering and Sub-Diffraction Light Control with High Contrast Dielectrics | Interactive Forum | Wavefront Engineering and Sub-Diffraction Light Control with High Contrast Dielectrics
| 12:20 | Properties of CNT Array Scatterers as a Function of Frequency | Interactive Forum | Properties of CNT Array Scatterers as a Function of Frequency
| 12:40 | A Maxwell-Block Solver for the Analysis of Nanovacuity Optics Problems | Interactive Forum | A Maxwell-Block Solver for the Analysis of Nanovacuity Optics Problems
| 13:40 | Discontinuous Galerkin Finite Element Simulations with Polyhedral Elements | Interactive Forum | Discontinuous Galerkin Finite Element Simulations with Polyhedral Elements
Session Chairs: Wireless Systems and RFID in Complex Environments
Tuesday, July 10

IF23.1 Broadband Absorbers for the Mid-IR Based on Multi-Screen Frequency Selective Surfaces
J. A. Bossard, Z. Bayraktar, D. H. Werner, The Pennsylvania State University, United States

IF23.2 Metamaterials with Custom Emissivity Polarization in the Near-IR
J. A. Bossard, D. H. Werner, The Pennsylvania State University, United States

IF23.3 Modeling of Optical Dielectric Nanoantennas at Microwaves
D. S. Filomov, A. E. Krasnok, A. E. Miroshnichenko, A. P. Slobzhanyuk, P. V. Kapitanova, Y. S. Kivshar1,2, P. A. Belov1,3
1National Research University of Information Technologies, Mechanics and Optics (ITMO), Russian Federation; 2Australian National University, Australia; 3Queen Mary University of London, United Kingdom

IF23.4 Antenna Applications of Metasurfaces
Session Chairs: Filippo Capolino, Franco De Flaviis
Tuesday, July 10 10:00-5:00 River Exhibition Hall B
Session IF23 AP-S Interactive Forum

Antenna Applications of Metasurfaces

IF23.1 Octave Bandwidth Monopole Antenna Using Ultra-Thin Anisotropic Metamaterial Coating
Z. H. Jiang, M. D. Gregory, D. H. Werner, The Pennsylvania State University, United States

IF23.2 Planar Spiral AMC's Integrated on 60 GHz Antennas
H. F. Contopoulos, National Center for Scientific Research, Greece; C. A. Kyriazidou, Broadcom Corporation, Greece; F. De Figueiredo, University of California, Irvine, USA; N. G. Alexopoulos, Broadcom Corporation, USA

IF23.3 A Compact Directive Antenna Combining Metamaterial Collimating Lens and Artificial Magnetic Ground Plane
J. P. Turpin, Q. Wu, D. H. Werner, Pennsylvania State University, United States; E. Lier, B. Martin, M. Bray, Lockheed Martin, United States

IF23.4 Tunable and Active Metasurface-Based On-Chip Antennas
S. S. Sadat, H. Mosallaei, Northeastern University, United States

IF23.5 Effect of Ground Plane on Circularly Polarized Microstrip Antenna Using Artificial Ground Structure
T. Fukunaka, R. Nobe, S. Maruyama, Kamei University, Japan

IF23.6 Possible Feeds of the HIS Antenna Without Dipole on Top
C. Guelu, C. Pan, J. Sloan, F. Capolino, University of California, Irvine, USA

IF23.7 Artificial Impedance Surface for Widening the Bandwidth of an Antenna
X. Begaud, A. C. Lepage, J. Sarrazin, Telecom ParisTech, France

IF23.8 Circularly Polarized Metasurface Antennas
G. Minatti, S. Maci, University of Siena, Italy; A. Freini, University of Florence, Italy; P. De Vito, Ingegneria dei Sistemi, Italy; M. Sabbadini, European Space Agency, The Netherlands

IF23.9 CP Metasurfaced Antennas Excited by LP Sources
H. L. Zhu, K. L. Chung, K. L. Sun, S. W. Cheung, T. I. Yuk, The University of Hong Kong, China

IF23.10 Metasurface Transformation
E. Martini, S. Maci, University of Siena, Italy

Tuesday, July 10 10:00-5:00 River Exhibition Hall B
Session IF24 AP-S/URSI Interactive Forum

Wireless Systems and RFID in Complex Environments
Session Chairs: Perry Wilson, YU-JIUN REN

J. Hwang, T. Kang, C. Hyung, S. Kang, Electronics and Telecommunications Research Institute, South Korea

IF24.2 Radar Characterization of Automobiles and Surrogate Test-Targets for Evaluating Automotive Pre-Collision Systems
W. Buller, Michigan Technological University, United States; D. Leblanc, University of Michigan, United States

IF24.3 Experimental Study on the Effects of Groups of People on Magnetoequiautistic Positioning Accuracy
D. D. Arumugam, J. D. Griffin, D. D. Stancl1, D. S. Ricketts1
1Carnegie Mellon University, United States; 2Dynes Research Pittsburgh, United States; 3North Carolina State University, United States

IF24.4 Efficient Ambient WiFi Energy Harvesting Technology and Its Applications
U. Olgun, C.-C. Chen, J. L. Volakis, ElectroScience Lab. The Ohio State University, United States

IF24.5 Measurement of the Distribution of the Electromagnetic Field from Multisource Inside a Car Using a Hook Dipole
R. A. A. Rodrigues, G. Fontagaille, University Federal de Campina Grande- UFCG, Brazil; S. E. Barbin, Universidade de Sao Paulo, Brazil

IF24.6 Measurements and Simulations of Multi-Frequency Human Radar Signatures
J. Park, J. T. Johnson, The Ohio State University, United States

IF24.7 Practical Read Range Evaluation of Wearable Embodied UHF RFID Tag
K. Koski, E. Koski, T. Bjorninen, A. A. Babar, L. Ukkonen, L. Sydhanme, Tampere University of Technology, Finland; Y. Rahmat-Samii, University of California Los Angeles, USA

IF24.8 Fabrication of Embodied UHF RFID Tags
E. Koski, K. Koski, T. Bjorninen, A. A. Babar, L. Ukkonen, L. Sydhanme, Tampere University of Technology, Finland; Y. Rahmat-Samii, University of California Los Angeles, USA

IF24.9 Determining Efficiency of HF Aircraft-Coupled Antennas in Composite Aircraft Using FDTD
C. Amburgy, R. Perela, G. Rigden, T. McDonald, Electro Magnetic Applications, Inc., United States

Tuesday, July 10 10:00-5:00 River Exhibition Hall B
Session IF25 AP-S Interactive Forum

Small Antennas: Low Frequency Applications
Session Chairs: Ashwin Iyer, Peder Hansen

IF25.1 LF Antenna Optimization over High Impedance Ground Plane
A. R. Rodriguez, F. Hansen, L. Koyama, SP/AR Systems Center Pacific, United States; Q. Ding, W. Lomakin, ECE UCSD, United States

IF25.2 Optimized Helical Monopole Antennas for Portable VHF Communication Devices
S. Zhou, C. Fumeaux, C. Coleman, Adelaide University, Australia

IF25.3 Design and Performance of an Integrated Antenna for a 433MHz Car Park Monitoring System
R. Caso, A. Michel, P. Nera, G. Manara, University of Pisa, Italy; R. Masini, Consortium Ubiquitous Technologies (CUBIT), Italy

IF25.4 Chassis Engineering to Enlarge the Bandwidth for GSM-450 Application
F. Ferrero, R. Stajc, J.-M. Ribero, CNRS-University of Nice, France

IF25.5 Driven, Metamaterial-Inspired, 3D Magnetic EZ Antenna for Mesoscale HFMP Applications
J. Ng, R. W. Ziolkowski, University of Arizona, United States; S. Tyo, University of Arizona, USA; M. C. Skipper, M. D. Abdalla, ASR Corporation, USA

IF25.6 Reducing the Size of Monopole Antennas Using Magneto-Dielectric Material Loading
N. V. Venkataraman, M. Idagoda, EADS Innovation Works, Singapore; L. B. Kong, S.-K. Ting, National University of Singapore, Singapore

IF25.7 Electrically Small Magneto-Dielectric Coated VHF Monopole Antenna
Session IF27: Power Conversion Gain as a Design Metric for RFID Systems


IF27.1

Tuesday, July 10 10:00-5:00 River Exhibition Hall B
Session IF27 AP-S Interactive Forum

RFID - Systems

Session Chairs: Xianming Qing, Luca Catarinucci

IF27.1 Power Conversion Gain as a Design Metric for RFID Systems
J. T. Block, L. Bianca-Pimentel, J. L. Gonzalez, M. J. Almada, C. R. Valenta, G. D. Durgin, Georgia Institute of Technology, United States

IF27.2 Location and Tracking of Items Moving on a Conveyor Belt and Equipped with UHF-RFID Tags
P. Nenc, F. Lombardini, A. Buffi, University of Pisa, Italy

IF27.3 Exploiting the Characteristics of Paraffin as a Substrate for UHF RFID and Antenna Applications
A. A. Babur1, S. Manzari2, A. E. Elsherbeni2, L. Saldanha2, G. Marrocco1, L. Ukkonen1
1Tampere University of Technology, Finland; 2University of Rome, Tor Vergata, Italy; 3University of Mississippi, USA

IF27.4 A UHF Near-Field/Far-Field RFID Metamaterial-Inspired Loop Antenna
X. Qing, Z. N. Chen, C. K. Goh, Institute for Infocomm Research, Singapore, Singapore

IF27.5 Analysis of the RFID Antenna with the Nonlinear Component
W. Kang, J. Kim, K. Lee, Y. Chang, Kwangwoon University, South Korea

IF27.6 A Flexible, Wideband RFID Tag Antenna for Metallic Surfaces
J. H. Cho1, H.-W. Son1, Chonbuk National University, South Korea; S.-H. Jeong2, W.-K. Choi2, C.-W. Park3, Electronics and Telecommunications Research Institute (ETRI), South Korea

IF27.7 On the Use of UHF RFID Antenna Systems Customized for Robotic Applications
L. Catarinucci, S. Tedesco, L. Tarricone, University of Salento, Italy

IF27.8 Passive UHF Tag-to-Tag Communications Properties
G. Marrocco1, S. Cazzone1,2 1University of Roma Tor Vergata, Italy; 2German Aerospace Center (DLR), Germany

IF27.9 Application of Rectennas for Contactless Energy Transfer
M. M. Maglio, R. E. Zich, Politecnico di Milano, Italy

IF27.10 Range Improvement of Backscatter Radio Systems at 5.8GHz Using Tags with Multiple Antennas
M. B. Akkar, M. M. Moray, C. R. Valenta, G. D. Durgin, Georgia Institute of Technology, United States

Tuesday, July 10 13:20-17:20 Chicago VIII
Session 251 AP-S Special Session

Antenna Feed Systems for Space and Terrestrial Applications

Session Chairs: Sudhakar Rao, Nuria Llobhart Juan, Isamu Chiba
Session Organizers: Sudhakar Rao, Nuria Llobhart Juan, Isamu Chiba

13:20 251.1 Omnidirectional Antenna Bypassed Feeding Using a Turnstile Junction
F. Mayol Soler, M. Padilla Pardo, Rymsa, Spain

13:40 251.2 An S/X-Band Feed Design for a 9m Dual-Offset Reflector Antenna for Weather Radar Application
R. Hofman, R. Schwerdtfeger, General Dynamics SATCOM Tech, United States; V. N. Bringi, Colorado State University, United States

14:00 251.3 Leaky Wave Enhanced Phased Array for the Reduction of the Gating Lobe Level
N. Llobhart, Universidad Complutense de Madrid, Spain; D. Blanco, E. Rajo-Iglesias, Universidad Carlos III, Spain; J. Campuzano, A. Montesano-Benito, EADS CASA Espacio, Spain

14:20 251.4 A Dual-Polarized, Dual-Frequency, Corrugated Feed Horn for SMAP
P. Focardi, P. R. Brown, NASA Jet Propulsion Laboratory, California Institute of Technology, United States

14:40 251.5 The Proposed DESynd Array-Fed Reflector Feed
N. F. Chamberlain, R. E. Hodges, J. D. Vacchione, M. S. Zawadzki, Jet Propulsion Laboratory, California Institute of Technology, United States

15:00 Break

15:20 251.6 Terahertz Antenna for Arrays of Hundreds of Pixels
17:00 251.7 A Ku-Band Dual-Polarization Connected Array of Dipoles with Wide-Scan Capability for in-Flight Entertainment
D. Cavallaro,1,2, A. Neto,1, G. Gerini,1, R. Bolt,1, R. Grooters1, D. Deurloo1, B. van Zalk1, G. Toso1, R. Midhasselt1
1TNO, Netherlands; 2Delft University of Technology, Netherlands; 3Thales Netherlands B.V.; 4European Space Agency, Netherlands

16:00 251.8 Design of Profiled Circular Horn Feed with High Efficiency
T. S. Bird, CSIRO ICT Centre, Australia; C. Granat, BAE Systems Australia Ltd, Australia

16:20 251.9 A Sloped Waveguide Array Antenna Covered by a Dielectric Slab with a Post-Wall Cavity
S. Yamaguchi, Mitsubishi Electric Corporation, Japan

16:40 251.10 A Reverse-Diplexing RF Chain Architecture for Space Telecom Antennas
G. Addamo1,2, O. A. Peverini1, P. Cecchini2, R. Mizzi2, R. Tascone1, G. Vironi1
1IEIIT-CNIT, Italy; 2Thales Alenia Space Italy, Italy

17:00 251.11 S-Band Feeder for Balloon Ground Station System
L. J. Foged, A. Giacomin, A. Potenza, R. Morbidini, SATIMO, Italy; J. P. Abadie, ELTA, France; J. Mongis, CNES, France

Tuesday, July 10 13:20-17:20 Chicago IX
Session 252 AP/SURSI Special Session

Prof. Robert Kouyoumjian Memorial Session: Asymptotic HF and Hybrid Methods

Session Chairs: Giuliano Manara, Prabhakar Pathak
Session Organizers: Giuliano Manara, Prabhakar Pathak

13:20 252.1 The Contribution of Prof. Robert Kouyoumjian to Edge Diffraction and Field Transition at and near Shadow Boundaries Using UTD
C. A. Balanis, Arizona State University, United States

13:40 252.2 Uniform Geometrical Theory of Diffraction for a Curved Wedge Excited by an Electromagnetic Beam
P. H. Pathak, Ohio State University, United States; Y. Kim, Loral, SSD, United States

14:00 252.3 A UTD Analysis of Inhomogeneous Plane Wave Diffraction
G. Manara, Pol. Nera, University of Pisa, Italy

14:20 252.4 Large Complex Modeling Using UTD: in Memory of Prof. Robert Kouyoumjian
R. J. Marks II, The Ohio State University, United States

14:40 252.5 Input Impedance and Mutual Coupling of Dipoles Close to the Edge of a Half-Plane
L. Aberbou1, H. Rimili1, C. Cruey1, S. Masi1
1Université Catholique de Louvain, Belgium; 2University of Moaistir, Tunisia; 3University of Siena, Italy

15:00 Break

15:20 252.6 UTD for Wedge Double Diffraction: from Prof. Kouyoumjian’s Early Contributions to the Most Recent Results
M. Albani, G. Carluccio, F. Puggelli, University of Siena, Italy

15:40 252.7 Learning Electromagnetics and Diffraction Theory from Prof. Robert Kouyoumjian
J. L. Volakis, Ohio State University, United States

16:00 252.8 From Keller’s 50-Year Old GTO to Its Modern Applications in Reflector Antenna Design: a Historical Perspective
Y. Rahmat-Samii, UCLA, United States

16:20 252.9 Rapid Antenna Coupling Analysis Tool for Arbitrary Antennas Using UTD
H. Z. Zhang, J. A. Catton, J. H. Morrill, Boeing, United States; P. H. Pathak, The Ohio State University, United States

16:40 252.10 Further Studies of Scattering by a Lossless DNG Metamaterial Wedge
P. L. E. Uslenghi, University of Illinois at Chicago, United States; V. G. Daniele, Politecnico di Torino, Italy

17:00 252.11 A Review of the Incremental Theory of Diffraction for Complex Source Points
D. Erricolo, University of Illinois at Chicago, United States; S. M. Canta, Space Systems/Loral, United States; A. Toccafondi, Universita di Siena, Italy

Tuesday, July 10 13:20-17:20 Chicago X
Session 253 URSI

Antenna Arrays: Theory and Design
Session Chairs: Robert MacPhie, Benjamin Braaten

13:20 253.1 A Phase Only Excitation Law for Omnidirectional Linear Arrays of Dipoles Including Coupling Effects
G. Toso, P. Angeletti, D. Petrolati, European Space Agency, Netherlands

13:40 253.2 Reconfigurable Wave Velocity Transmission Lines for Phased Arrays
N. Host, C.-C. Chen, J. L. Volakis, Ohio State University, United States

14:00 253.3 Phase-Amplifying Architecture for Coupled-Oscillator Arrays
P. Moussouna, R. G. Rojas, The Ohio State University, United States

14:20 253.4 Beam Steering Body-Worn Smart Antenna Array
R. Islam, M. Ali, University of South Carolina, United States

14:40 253.5 Design of Multiple-Element, Closely-Spaced Parasitic Array
Y. Li, Baylor University, United States

15:00 Break

15:20 253.6 A Linear Receiver Array Which Combines Two-Square-Law Detector Outputs to Increase the Array Directivity
R. H. MacPhie, L. Yuan, University of Waterloo, Canada

15:40 253.7 Minimum Q for Arrays above a Ground Plane
J. P. Doane, K. Sertel, J. L. Volakis, Ohio State University, United States

16:00 253.8 Antenna Array Thinning and Selective Excitation Techniques for Side Lobe Level Reduction and Power Management
S. D. Keller, US Army Research Laboratory, United States

16:20 253.9 Measurement and Analysis of a Wireless Phased Array Antenna Prototype
M. A. Stoneback, M. I. Stoneback, Y. Kuga, University of Washington Dept. of Electrical Engineering, United States

16:40 253.10 Low Sidelobe Substrate Integrated Waveguide (SIW) Series Slot Array Antenna for 45°-Inclined Linear Polarization
D.-Y. Kim, S. Nam, Seoul National Univ., South Korea

17:00 253.11 The 12-Beam Switching System with Adjustable Phase Shift Array
C.-J. Chang, H.-P. Lin, National Taipei University of Technology, Taiwan; M.-C. Tseng, Industrial Technology Research Institute, Taiwan; S.-S. Jeng, National Dong Hwa University, Taiwan

Tuesday, July 10 13:20-15:00 Huron
Session 254 AP/SURSI

Electromagnetic Imaging and Sensing Applications in Biology and Medicine
Session Chairs: Elise Fear, Malta Moghaddam

13:20 254.1 Microwave Tomography via Domain Decomposition for Finite Element Methods
E. A. Attarde, Istituto Superiore Mario Boella, Italy; G. Vecchi, Politecnico di Torino, Italy

13:40 254.2 High-Permittivity Dielectric Materials for Optimum Transmittance in MRI Systems
G. Carluccio1,2, O. X. Yang1, D. Erricolo1, C. M. Collins2
1University of Illinois at Chicago, United States; 2Pennsylvania State University, United States

14:00 254.3 Shielded UWB Sensor for Biomedical Applications
J. Bouriquet, E. C. Fear, University of Calgary, Canada

14:20 254.4 Feasibility Study of Microwave Tomography for In Vivo Characterization of Tissue as a Diagnostic Technique for Human Disease
C. Kaye, J. LoVetri, A. Zakaria, M. Ostudahimi, University of Manitoba, Canada

14:40 254.5 Thermoooustic Imaging and Spectroscopy for Enhanced Materials Differentiation
X. Wang, D. Bauer, R. Witte, H. Xin, University of Arizona, United States
Microstrip antennas and printed devices

Session Chairs: Vasudevan Kesavath, Jennifer Bernhard

13:20 255.1 Conformal Biomimetic Antenna Array for Direction Finding
G. Fontgalland, UFCG, Brazil; J. L. Volakis, OSU, United States

13:40 255.2 Light-Responsive, Heat-Activated, Reconfigurable Microstrip Structures
G. J. Hayes, North Carolina State University, United States; Y. Liu, M. D. Dickey, Chemical and Biomolecular Engineering, United States; G. Lazzi, University of Utah, United States

14:00 255.3 A Reconfigurable Circularly-Polarized Microstrip Antenna Using Micro-Pneumatic Control
B. Wu, M. Okomiewski, C. Hayden, University of Calgary, Canada

14:20 255.4 A Center-Fed Half-Wide Microstrip Leaky-Wave Antenna with an Adjustable Principal Beam

14:40 255.5 Investigation of Resonance Properties of Modified Microstrip Patch Antennas
K. R. Schab, J. T. Bernhard, University of Illinois at Urbana-Champaign, United States

15:00 Break

15:20 255.6 Dual-Band Planar Microstrip Butler Matrix
J. Shao, H. Ren, B. Arigong, H. Zhang, University of North Texas, United States

15:40 255.7 Miniaturized Handset and Tablet Internal Antennas for 3G and Long Term Evolution Applications
Y.-J. Ren, Research In Motion Corp., United States

16:00 255.8 Analytical and Simulated Resonances of a Helmet-Mounted Conformal Patch Antenna
B. Amang, G. Wilkins, Morgan State University, United States; S. Weiss, Army Research Laboratory, United States

16:20 255.9 Microstrip Antennas Based on Small Fertive Particles
M. L. Sigalas1,2,3, Z. Bragimov1,2, M. Berezin4, R. Shavi1, E. Kamenetskii1
1Applied Electromagnetics Ltd, Israel; 2Gosip Israel Ltd, Israel; 3Ben-Gurion University of the Negev, Israel

16:40 255.10 Millimeter-Wave Printed Yagi-Uda Antennas
H. Y. D. Yang, S. S. Zhao, University of Illinois at Chicago, United States

17:00 255.11 Enhanced Axial-Ratio Bandwidth of a Probe-Fed Microstrip Antenna
T.-N. Chang, E.E. department, Tatung University, Taiwan

Tuesday, July 10 13:20-17:00 Michigan B

Session 256 URSI

Random and Complex Media Effects

Session Chairs: Saba Mudaliar, Akira Ishimaru

13:20 256.1 Effect on Solid Objects of Non-Linear High Energy Pulse Propagation Through Turbulent Environments
M. A. Stoneback, A. Ishimaru, Y. Kuga, University of Washington Dept. of Electrical Engineering, United States

13:40 256.2 Precursor Fields Reflected from Low Observables
C. L. Palombini, K. E. Oughtust, University of Vermont, United States

14:00 256.3 Application of the Mutual Coherence Functions and Interference Gating in Increasing Signal Intensity in Imaging Through Discrete Random Media
E. H. Bleszynski, M. K. Bleszynski, T. Jaroszewicz, Monopole Research, United States

14:20 256.4 Analysis of Depolarized Electromagnetic Waves Propagated Through Random Medium
Y. Nahta, Sasebo National College of Technology, Japan; M. Tateiba, Araihe National College of Technology, Japan; H. El-Ocla, Lakehead University, Canada

14:40 256.5 Coherent Wavefront Synthesis in a Wave-Diffusive Medium
A. Cozor, SUPELEC, France

15:00 Break

15:20 256.6 On the Nature of Multiple Scattering Processes in Radiative Transfer Model for Layered Random Media
S. Mudaliar, Air Force Research Laboratory, United States

15:40 256.7 Sensitivity Analysis on Simulated Backscattering Cross Section from Vegetated Area Due to Changes in Environments
S. Jarwnatanadluk, S. Saatchi, Jet Propulsion Laboratory, California Institute of Technology, United States

16:00 256.8 Calculation of VLF Wave Propagation Using a Multi-Physics FDTD/SAMI3 Simulator of the Earth-Ionosphere System
J. Niu, J. J. Simpson, University of New Mexico, United States

16:20 256.9 Effective Medium Theory of Forest
Y. Li, Baylor University, United States

16:40 256.10 Millimeter-Wave Imaging Systems at 200 and 300 GHz
J. M. Mower, Y. Kuga, University of Washington, United States

Tuesday, July 10 13:20-17:00 Superior A

Session 257 AP-S

Dual-Polarized and Circularly Polarized Antennas

Session Chairs: Chi-Chih Chen, Yongxin Guo

13:20 257.1 A Compact Dual-Band (L1/L2) GPS Antenna Design
M. Chen, C.-C. Chen, The Ohio State University, USA

13:40 257.2 A Single Layer Dual-Polarization Printed Bow-Tie Broadband Antenna
C.-M. Peng, I.-F. Chen, C.-J. Wu, Jinwen University of Science and Technology, Taiwan

14:00 257.3 Miniaturized Cavity-Backed Dual-Polarized Slot Antenna
Y. Dong, T. Itoh, University of California at Los Angeles, United States

14:20 257.4 Gain Improvement Topology Using Conical Structure for Jamming Resilient GPS Antennas
Y.-K. Chiu, H.-D. Kang, S.-Y. Hyun, J.-G. Yook, Yonsei University, South Korea

14:40 Break

15:20 257.5 Design of Cavity-Backed Circularly-Polarized Cylindrical Microstrip Antennas
A. F. Timoco-S., D. C. Nascimento, J. C. D. S. L. S. Lacava, Instituto Tecnologico de Aeronautica, Brazil; O. M. C. Pereira-Filho, Federal University of Pernambuco, Brazil

15:40 257.6 GPS+GLONASS Active Antenna for Extremely High Temperature Aerospace Applications
D. R. Jahagirdar, Research Center Imarat, India

16:00 257.7 Generation of Circular Polarization Using Electric and Magnetic Current Elements
A. R. Harish, T. Kumar, Indian Institute of Technology Kumpur, India

16:20 257.8 2.45GHz Dual Polarized Aperture-Coupled Antennas with High Isolation Performance
M. M. Morry, Sensor Networks and Cellular System (SNCS) Research Center, Saudi Arabia

16:40 257.9 Compact Circular Polarization Microstrip Antenna Design
Y.-L. F. Yang, C. Wu, P. Yang, J. Ouyang, University of Electronic Science and Technology of China, China

Tuesday, July 10 13:20-17:00 Superior B

Session 258 AP-S

UWB Antennas

Session Chairs: John Papapolymerou, Christos Christodoulou

13:20 258.1 60GHz Wire-Bond Helical Antennas in 130nm CMOS Technology
K. K. Huang, D. D. Wentzloff, University of Michigan Ann Arbor, United States

13:40 258.2 An Ultra-Wideband Planar Slot Antenna with WLAN Band Rejection
M.-C. Chang, M.-Y. Dmng, W.-C. Weng, National Chi Nan University, Taiwan

14:00 258.3 Millimeter-Wave Ultra-Wide-Band Antenna Array Integrated on Silicon with BCB Membranes
Tuesday, July 10 13:20-17:00 Missouri
Session 260 URSI

Finite Difference Time Domain Techniques

Session Chairs: Fumie Costen, Mike Potter

13:20 260.1 Accuracy and Robustness of FDTD Simulation of Devices Characterized by Measured S-Parameters
Y. Wang, S. Langdon, Remcom, Inc., United States

13:40 260.2 Using the FDTD Method to Accurately Model Staircased Thin Wires
T. P. Montoya, South Dakota School of Mines & Technology, United States; G. S. Smith, Georgia Institute of Technology, United States

14:00 260.3 Hygen's Absorbing Boundary Condition for the 3D FDTD Method
H. Almeir, E. Costen, University of Manchester, United Kingdom; J-P. Berenger, Centre d'Analyse de 'Defense, France

14:20 260.4 Parallel Implementation of 3D Locally One-Dimensional FDTD Method on Distributed Memory Architectures
M. Mustafa, F. Cosguy, T. Henmi, The University of Manchester, United Kingdom; S. G. Garcia, University of Granada, Spain

14:40 260.5 Development of Accurate and Efficient FDTD Dispersive Algorithm for Human Body in 400 MHz – 3 GHz S-G. Ha1, J. Cho1, J. Choi1, Y. B. Park2, K.-Y. Jung1 1Hanyang University, South Korea; 2Ajyu University, South Korea

15:00 Break

15:20 260.6 FDTD Modeling of Graphene-Based RF Devices: Fundamental Aspects and Applications
X. Yu, C. D. Sarris, University of Toronto, Canada

15:40 260.7 FDTD Method on a Lebedev Grid for Anisotropic Materials
M. D. Nauta, M. E. Potter, M. Okoniewski, University of Calgary, Canada

16:00 260.8 FDTD Analysis of Stochastic Variations in Periodic Structures Using Periodic Boundary Conditions
C. D. Sarris, J. Gu, University of Toronto, Canada

16:20 260.9 A Frequency Dependent 3D Locally One-Dimensional FDTD Method
T. Hemmri, F. Costen, The University of Manchester, United Kingdom; S. G. Garcia, University of Granada, Spain

16:40 260.10 Investigation of anti-Aliasing Methods in Ftdt Simulation of Electromagnetic Problems
A. Eroglu, B. Westrick, Purdue University Fort Wayne, United States

Tuesday, July 10 13:20-17:00 Parlor C
Session 261 AP-S/URSI

Near-Field Techniques and Applications

Session Chairs: Kamal Sarabandi, Yuanxun Wang

13:20 261.1 Antenna near-Field Coupling for Accurate RF Power Measurement of Radio Transmitters
J. Shen, Aeroflex, Inc., United States

13:40 261.2 SAF Analysis of Antennas Operating in Complex near-Field (NF) Scattering Environments
B. J. Crow, GEMTECH Microwaves +, United States; J. P. Estrada, Satimo-USA, United States

14:00 261.3 Capacity Performance of an Inductively Coupled near-Field Communication Link
U. Azad, Y. Wang, University of California, Los Angeles, United States

14:20 261.4 Impact of Receiver Coil Misalignment on near-Field Communication System Performance
U. Azad, Y. Wang, University of California, Los Angeles, United States

14:40 261.5 Design of Radio Repeater System Using a Near-field Cancellation Technique
Y. J. Song, K. Sarabandi, University of Michigan, United States

15:00 Break
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<td>15:20</td>
<td>261.6</td>
<td>In-Phase Resonant Inductive Coupling for Multi-Layer Vertical Communication in 3D-ICS</td>
<td>S. Han, D. D. Wentzloff, University of Michigan, United States</td>
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<td>16:00</td>
<td>261.8</td>
<td>A Preliminary Investigation of Miniature Loudspeaker High Frequency Resonance and Its Impact to Antenna Radiation Performance</td>
<td>X. L. Chen, N. Chavannes, N. Kustet, ETHE ITIS Foundation for Research on Information Technologies in Society, Switzerland; G. H. Ng, Y. S. Tay, AAC Technologies Pte Ltd, Singapore</td>
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<td>16:40</td>
<td>261.9</td>
<td>SIR of Interleaved Excitation of an MIR Array</td>
<td>M. Kozlov, R. Turner, Max Planck Institute for Human Cognitive and Brain Sciences, Germany</td>
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<td>16:40</td>
<td>261.10</td>
<td>Broadband, Efficient Small Antennas and MIMO for Near Field Communication Systems</td>
<td>R. H. Goult, K. F. Warnick, Brigham Young University, United States</td>
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**Tuesday, July 10 13:20-15:00 Mississippi**

**Session 262 URSI**

**Reflectarrays**

Session Chairs: Fan Yang, Jianfeng Li

13:20 262.1 **Beam-Scanning Reflectarray Antennas: an Overview**

P. Nayyeri, F. Yang, A. Z. Elsherbeni, The University of Mississippi, United States

13:40 262.2 **An Investigation of Beam Squint in Offset-Fed Reflectarrays**

E. Almuaial, D. McNamara, University of Ottawa, Canada; J. Shaker, M. R. Chaharmir, Communications Research Centre Canada, Canada

14:00 262.3 **Feed-Image Lobes in Offset-Fed Reflectarrays**

E. Almuaial, D. McNamara, University of Ottawa, Canada; J. Shaker, M. R. Chaharmir, Communications Research Centre Canada, Canada

14:20 262.4 **A Varactor-Loaded Cross Dipole Unit Cell for Circularly Polarized Beam-Steering Reflectarray**

W.-T. Hung, S.-Y. Chen, National Taiwan University, Taiwan

14:40 262.5 **Experimental Investigation of Elimination Blindness Propagation Channel Using Reflectarray**

Q. Chen, J. Li, Y. Kurhara, K.-H. Chen, K. Sawaya, School of Engineering, Tohoku University, Japan; Q. Yuan, Sendai National College of Technology, Japan; N. Tran, Y. Oda, NTT DOCOMO, INC., Japan

**Tuesday, July 10 13:20-16:40 Ohio**

**Session 263 AP-S**

**Advances in Integral Equation Methods**

Session Chairs: Levent Gurel, Branislav Notaros

13:20 263.1 **IE Analysis of Scattering from Multilayered Doubly Periodic Array of 3-D General Objects Using Equivalence Principle and Connection Scheme**

F.-G. Hu, Temasek Labs @NUS, Singapore; J. Song, Iowa State University, USA; T. Kamgnaing, Intel Corporation, USA

13:40 263.2 **Efficient Higher Order Volume-Integral-Equation Modeling of Dielectric Scatterers**

E. Chaharmi, M. Ilic, M. Djordjevic, B. Notaros

14:00 263.3 **Analysis of Linear Antenna near Dielectric Object by CBFM**

K. Komu, Q. Chen, K. Sawaya, Graduate School of Engineering, Tohoku University, Japan; T. Sezai, Japan Aerospace Exploration Agency, Japan

14:20 263.4 **A Nyström Solution of the Quasi-Magnetostatic Volume Integral Equation for Eddy Current Analysis**

I. C. Young, S. D. Gedney, R. J. Adams, University of Kentucky, United States

14:40 263.5 **Analysis and Augmentation of the Duffy Transformation for Near-Singular Integrals**

M. M. Botha, University of Stellenbosch, South Africa

15:00 Break
**Design and Analysis of Dielectric Resonator Antennas**

**Session Chairs:** Satish Sharma, Stuart Long

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<td>302.1</td>
<td>M. Yazdani, M. A. El Sabbagh</td>
<td>Syracuse University, United States</td>
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<td>08:40</td>
<td>302.2</td>
<td>Y. Coulibaly, M. Nedil, A. Hagra, D. Hammou, L. Talbi</td>
<td>University of Quebec en Outaouais, Canada</td>
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<td>09:00</td>
<td>302.3</td>
<td>A. P. Hovash, D. R. Jackson, S. A. Long, D. R. Wilton</td>
<td>University of Houston, United States</td>
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<td>09:20</td>
<td>302.4</td>
<td>M. Garg, S. K. Sharma, San Diego State University</td>
<td>United States</td>
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<td>09:40</td>
<td>302.5</td>
<td>Y. Gao, S. Ogurtsov, Reykjavik University</td>
<td>Iceland</td>
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<td>10:00</td>
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<td>302.6</td>
<td>M. Yazdani, M. A. El Sabbagh</td>
<td>Syracuse University, United States</td>
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<td>10:40</td>
<td>302.7</td>
<td>M. Abdel-Wahab, S. Safavi-Naeini</td>
<td>University of Waterloo, Canada</td>
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<td>11:00</td>
<td>302.8</td>
<td>M. Vernia, R. W. Bailet, Y. Yazdani</td>
<td>Georgia Institute of Technology, United States</td>
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<td>11:20</td>
<td>302.9</td>
<td>Y. Gao, Z. Peng, Tsinghua University</td>
<td>China</td>
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**Flexible 2D and 3D Printed Antennas**

**Session Chairs:** Cynthia Furse, Manos Tentzeris

**Session Organizers:** Reyan Baktur, Cynthia Furse

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<td>B. Willis, L3 Communications</td>
<td>United States</td>
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<td>08:40</td>
<td>303.2</td>
<td>S. Palacios, S. Kim, S. Ertürk, A. Rida, S. Nikolau, M. Tentzeris</td>
<td>Georgia Institute of Technology, United States; Frederick University, Cyprus</td>
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<td>09:00</td>
<td>303.3</td>
<td>L. Zhang, W. Zhang, J. L. Volakis</td>
<td>The Ohio State University, United States</td>
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<td>303.4</td>
<td>J. A. Arellano, R. Baktur, J. Yang</td>
<td>Utah State University, United States</td>
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<td>303.5</td>
<td>Z. Wang, W. Zhang, D. Psychoudakis, J. L. Volakis</td>
<td>The Ohio State University, United States</td>
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<td>10:20</td>
<td>303.6</td>
<td>T. Kaufmann, A. Verma, S. F. Al-Sarawi, V.-T. Truong, C. Fumesax</td>
<td>The University of Adelaide, Australia; Defence Science and Technology Organisation (DSTO) Melbourne, Australia</td>
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**Future Trends in Radar**

**Session Chairs:** Lorenzo Lo Monte, Gary Scalzi

**Session Organizers:** Lorenzo Lo Monte, Gary Scalzi

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<td>G. J. Scalzi, Air Force Research Laboratory</td>
<td>United States</td>
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<td>304.2</td>
<td>R. Vela, University of Dayton Research Institute</td>
<td>United States</td>
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<td>304.3</td>
<td>P. Roccia, R. Chirikov, ELEDMA Research Center</td>
<td>University of Trento, Italy</td>
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<td>304.4</td>
<td>A. C. O'Connor, Sensors Directorate</td>
<td>United States</td>
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<td>304.5</td>
<td>J. P. Browning, Air Force Research Laboratory</td>
<td>United States</td>
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<td>304.6</td>
<td>L. Lo Monte, R. Vela, University of Dayton Research Institute</td>
<td>United States</td>
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<td>10:40</td>
<td>304.7</td>
<td>M. C. Wicks, L. Lo Monte, R. Vela</td>
<td>University of Dayton, United States</td>
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<td>11:00</td>
<td>304.8</td>
<td>M. C. Wicks, L. Lo Monte, R. Vela</td>
<td>University of Dayton, United States</td>
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<td>11:20</td>
<td>304.9</td>
<td>V. T. Truong, C. Fumesax</td>
<td>The University of Adelaide, Australia; Defence Science and Technology Organisation (DSTO) Melbourne, Australia</td>
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**Phased Array Antennas I**

**Session Chairs:** Andrea Massa, Kubilay Sertel

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<td>305.1</td>
<td>S. Livingston, G. Show, J. Lee, Raytheon Co.</td>
<td>United States</td>
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Wednesday, July 11

**Microstrip Circuits I**

**Wednesday, July 11 8:20-12:00 Michigan A**

**Session 307 AP-S**

**Microstrip Circuits I**

Session Chairs: Dimitris Anagnostou, George Eleftheriades

**08:20** 307.1 Design of a Miniaturized Branch Line Coupler Using Common Defected Ground Structure
J. Lin, J. Lee, Y. Jeon, K. Kwon, S.-M. Han, D. Ahn, Soonchunhyang University, South Korea; Y. Jeong, Chonbuk National University, South Korea

**08:30** A Novel Heptagonal Microstrip Rat-Race Hybrid Coupler with Harmonic Suppression and Size Reduction
W. Song, H. Deguchi, M. Tsuji, Doshisha University, Japan

**09:00** 307.3 Low Loss II-Shape SIW Hybrid Coupler for Millimeter-Wave Phased Arrays Antenna Systems
W. M. Abdel-Wahab, S. Safavi-Naeini, University of Waterloo, Canada

**09:20** 307.4 Exponentially-Decaying Traveling-Wave Resonators by Coupled Positive-Index/Negative-Index Guides
H. Mirzaei, G. V. Eleftheriades, University of Toronto, Canada

**09:40** 307.5 Tunable Bandpass and Bandstop Filter Cascade for Dynamic Pole Allocation
H. H. Siguran, University of Oklahoma, United States; E. I. Naglich, J. Lee, D. Peroulis, W. J. Chappell, Purdue University, United States

**10:00** Break

**10:20** 307.6 Sectoral Horn Printed Power-Combiner
L. Boccia, A. Emanuele, E. Amiri, A. Shamsafar, G. Amendola, University of Calabria, Italy

**10:40** 307.7 CCTL Implementation Using Two-Section Microstrip Transmission Lines
S. Limsaengruel, P. Silapwong, D. Turrungreung, King Mongkut's University of Technology Thonburi, Thailand

**11:00** 307.8 Design and Analysis of Dual-Band Unequal-Split Bagley Power Dividers
G. A. Abu-Alnadi, N. I. Dib, Jordan University of Science and Technology, Jordan

**11:20** 307.9 Tri-Band Branch-Line Coupler with T-Type and Additional Port Impedance Transformers
F. Lin, Q.-X. Chu, School of Electronic and Information Engineering, South China University of Technology, China

**11:40** 307.10 Design and Analysis of a 3-Way Unequal Split Ultra-Wideband Wilkinson Power Divider
D. F. Hawatme, K. A. Al Shamaileh, N. I. Dib
1Jordan University of Science and Technology, Jordan; 2Waveела for Integrated Telecommunications Solutions, Jordan

**Wednesday, July 11 8:20-12:00 Michigan B**

**Session 308 AP-S**

**Scattering by Random or Complex Media**

Session Chairs: Silvio Barbin, ismail jouy

**08:20** 308.1 Scattering Features for Target Recognition Using Finite Rate of Innovation Model
I. Jouy, Lafayette College, United States

**08:40** 308.2 Scattering from an Object above a Rough Surface Using the Extended PILE Method Hybridized with PO Approximation
M. Kousi, C. Bourlier, IETR, France; G. Kubicke, DGA Information Superiority, France

**09:00** 308.3 Scattering from Spherical Particles with Negative Permeability
Z. Ren, O. M. Ramahi, University of Waterloo, Canada

**09:20** 308.4 Estimation of Side-Hole Location Using Circular Wavefront of Scattering Waves Visualized by Pulsed Laser Scanning
### Measurements of Antennas and Wireless Systems

Session Chairs: Tapan SARKAR, Michael Francis

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<td>08:20</td>
<td>309.1 Validation of the Slepian Approach to Truncation-Error Reduction in Spherical Near-Field Scanning</td>
<td>K. T. Kim, Air Force Research Laboratory, United States</td>
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<td>08:40</td>
<td>309.2 Probe Pattern Inaccuracy in Fully Probed Corrected Multilevel Plane Wave Based near-Far-Field Transformed Planar near-Field Measurements</td>
<td>M. A. Qureshi, C. H. Schmidt, T. F. Ebert, Technische Universität München, Germany</td>
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<td>309.3 Sub Spectra Representation of Antennas for Plane Wave Based Near-Field Far-Field Transformation at Short Measurement Distances</td>
<td>C. H. Schmidt, T. F. Ebert, Technische Universität München, Germany</td>
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<td>309.4 Estimating Far-Field Errors Due to Mechanical Errors in Spherical near-Field Scanning</td>
<td>M. H. Francis, National Institute of Standards and Technology, United States</td>
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<td>09:40</td>
<td>309.5 Retrieval of Free Space Radiation Pattern Through Non-Anechoic Data</td>
<td>W. Zhao, HongSik, T. K. Sarkar, Syracuse University, United States</td>
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<td>309.6 Accuracy Improvement of a Positioning System by Using Software Algorithms</td>
<td>J. R. Almagro Clemente, L. Hernandez Garcia, J. Carrillo Melo, University of Alcalá, Spain, UPM Europe, Spain</td>
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<td>309.7 An Effective Algorithm for the Synthesis of a Plane Wave Generator for Linear Array Testing</td>
<td>O. M. Bucci, Naples University, &quot;Federico II&quot;, Italy, M. D. Migliore, G. Panariello, D. Pinchera, University of Cassino, Italy</td>
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<td>309.8 Evaluation of Laboratory Equipments as Channel Sounding System for Mobile Radio Propagation</td>
<td>Y. K. Lee, Nanyang Technological University, Singapore; Y. S. Meng, National Metrology Centre, A*STAR, Singapore</td>
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<td>309.9 Small-Scale Fading Determination with a Ray-Tracking Model, and Statistics of the Field</td>
<td>T. P. C. Leip, C. W. Trueman, Concordia University, Canada</td>
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<td>309.10 Implementation and Measurement of Millimeter-Wave on-Chip Multi-Antenna Systems with High Isolation</td>
<td>K. Payandehjoo, R. Abhari, McGill University, Canada</td>
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### UWB Antennas in Communications

Session Chairs: Wajih Elsallal, Yazid Yusuf

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<td>310.1 Experimental Characterization of the Underground UWB Channel</td>
<td>M. M. Montatour, G. Y. Delisle, N. Kandil, LRTCS-UQAT, Canada</td>
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<td>310.2 An Integrated Antenna for Cognitive Radios</td>
<td>G. Augustin, T. A. Denidni, National Institute of Scientific Research, Canada</td>
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<td>09:00</td>
<td>310.3 Novel Monopole Antenna for Bluetooth and UWB Applications</td>
<td>G. N. Malheiro-Silveira, T. R. Yoshioka, H. E. Hernández-Figueroa, State University of Campinas (UNICAMP), Brazil; Elaborado Research Institute, Brazil</td>
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<td>310.4 Design and Analysis of a Compact Antenna for UWB RFID Applications</td>
<td>A. Toccofondi, C. Della Giovampaola, University of Siena, Italy</td>
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<td>09:40</td>
<td>310.5 IR-UWB Wide-Beam Antenna for Indoor Home Security Service</td>
<td>I. Moon, J. Ha, Y. Lee, J. Choi, Hanyang University, South Korea</td>
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<td>10:20</td>
<td>310.6 Effect of Spiral Antennas Pulse Distortion on the Performance of Ultra-Wideband Impulse Radio Systems</td>
<td>M. A. Elmansoury, D. S. Filipovic, University of Colorado at Boulder, United States</td>
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<td>10:40</td>
<td>310.7 Time Reversal Compared to Inverse Filtering</td>
<td>W. M. Dyah, T. K. Sarkar, Syracuse University, United States; M. Salazar-Palma, Universidad Carlos III de Madrid, Spain</td>
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<td>11:00</td>
<td>310.8 Time-Reversal Techniques Applied to Ultra-wideband Indoor Wireless Communication Systems: A Comparative Study</td>
<td>A. E. Fouda, F. L. Teixeira, The Ohio State University, United States</td>
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<td>11:20</td>
<td>310.9 Transient Radiation Properties of Tapered Slot Antenna</td>
<td>K. Ebjobadi, NORTHEASTERN UNIVERSITY, United States; S. Scyszlo, Ruhr-Universität, GERMANY</td>
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<td>11:40</td>
<td>310.10 Integrated Dual-Purpose Narrow/Ultra-Wide Band Antenna for Cognitive Radio Applications</td>
<td>Y. Li, W. Li, Harbin Engineering University, China; R. Mittra, The Pennsylvania State University, USA</td>
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### Optimization Techniques

Session Chairs: Sembiam Rengarajan, Ahmad Hoorfar

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<td>08:20</td>
<td>311.1 A Novel Methodology for the Shape Optimization of Electromagnetic Scattering Targets</td>
<td>N. V. Nair, B. Shunkler, Michigan State University, United States</td>
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<td>08:40</td>
<td>311.2 Modified BBO Algorithm for Electromagnetic Optimization</td>
<td>Y. Wang, M. Mussetta, P. Pirmoli, Politecnico di Torino, Italy; Politecnico di Milano, Italy</td>
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<td>311.3 Application of CMA Evolution Strategies for Multilayer Wall Parameter Estimation in Through-the-Wall Radar Imaging</td>
<td>A. Hoorfar, C. Thajudeen, Villanova University, United States</td>
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<td>311.4 Meta-Particle Swarm Optimization for Frequency Selective Surface</td>
<td>H. M. Lim, M. Mussetta, F. Grimaccia, R. E. Zich, POLITECNICO DI MILANO, Italy</td>
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<td>09:40</td>
<td>311.5 Design of Dual-Band GPS Antennas for Small Controlled Reception Pattern Antenna Applications</td>
<td>G. Byun, H. Kim, S. M. Seo, I. Park, H. Cho, Hongik University, South Korea; Agency for Defense Development, South Korea; Ajou University, South Korea</td>
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<td>10:00</td>
<td>Break</td>
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<td>10:20</td>
<td>311.6 Genetic Algorithm Optimization of a Slot Array with Full Wave Method-of-Moments Analysis</td>
<td>S. R. Rengarajan, T. Nakada, Tokyo University, Japan; T. Nakada, Tokyo University, Japan</td>
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**Wednesday, July 11**

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<td>8:20-12:00</td>
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10:40 311.7 Novel Antenna Designs Using Level-Set Based Topology Optimization
G. Kizilbas, Sabanci University, Turkey

Wednesday, July 11 8:20-11:40 Missouri
Session 312 AP-S

Advances in FDTD Methods and Analysis
Session Chairs: Tengmeng Tan, Jamesina Simpson

08:20 312.1 An Analytical Expression for FDTD Solution to the Problem of TM Oblique Incidence on a Dielectric Thin Film
S.-K. Jeng, Department of Electrical and Computer Engineering, National Taiwan University, Taiwan

08:40 312.2 Accuracy of Source Models With Coincident Phase
J. Overmars, A. de Zeeuw, University of Stellenbosch, South Africa

09:00 312.3 Local Crank–Nicolson Procedure for Short Thin Wire in the FDTD Method
C. M. Guiffaut, J. L. Guiffaut, XLIM Institute - UMR CNRS - University of Limoges, France; B. B. Pecqueux, CEAM DAE GRAMAT, France

09:20 312.4 FDTD Analysis of Dispersive Periodic Structures with Skewed Grids
K. ElMahgoub1, A. Z. Elsherbeni1, F. Yang2
1The University of Mississippi, United States; 2Tsinghua University, China

09:40 312.5 Implementation of a PECM Boundary Condition in the 2-D FDTD Technique
Y. Nayyeri, M. Soleimani, Iran University of Science and Technology, Iran; M. Dehmollaian, University of Tehran, Iran

10:00 Break

10:20 312.6 An Efficient Implementation of a 3D Spatially-Filtered FDTD Subgridding Scheme
C. Chang, C. D. Sarris, University of Toronto, Canada

10:40 312.7 Improvement of FDTD Simulation Accuracy Using the Oversampling Method of Rasterization
A. Eroglu, B. Westrick, Purdue University Fort Wayne, United States

11:00 312.8 Moving Sources, FDTD and Reciprocity
J. L. Young, C. L. Wagner, University of Idaho, United States

11:20 312.9 High-Fidelity FDTD Modeling of Far-Field TE Scattering from a PEC Cylinder
D. H. Davidson, University of Stellenbosch, South Africa

Wednesday, July 11 8:20-12:00 Mississippi
Session 314 AP-S

Experimental Performance Analysis of Urban and Terrestrial Wireless Systems
Session Chairs: Anatoliy Ioffe, Magdy iskander

08:20 314.1 Rain Attenuation Fade-Slope Characteristics of 120-GHz-Band Wireless Links
A. Hirata, J. Takeuchi, H. Takahashi, N. Kukutsu, NTT Corporation, Japan

08:40 314.2 Radio Channel Sounding Using a Circular Horn Antenna Array in the Horizontal Plane in the 2.3 GHz Band
A. Yamamoto, T. Sakata, Panasonic Corporation, Japan; K. Ogawa, Toyama University, Japan; K. Olesen, J. O. Nielsen, G. F. Pedersen, Aalborg University, Denmark

09:00 314.3 Study of Path Loss for Ground Based Communication in Military UHF Band
X. H. Mao, Y. H. Lee, S. H. Ting, Nanyang Technological University, Singapore

09:20 314.4 Impact of Antenna Pattern and Handset Rotation on Macro-Cell and Pico-Cell Propagation in Heterogeneous LTE Networks
E. Melling, Z. Mansor, G. S. Hilton, A. R. Nix, J. P. McGeehan, University of Bristol, United Kingdom

09:40 314.5 Experimental Study of Fading Characteristics for Wireless Communications in High-Speed Railway Environments
M.-C. Tseng, M.-H. Cheng, Industrial Technology Research Institute, Taiwan

10:00 Break

10:20 314.6 Bivariate Analysis of Indoor Radio Measurements
A. S. IoIg, G. Monghal, A. Papathanassiou, C. Rom, H. Yaghoobi, Intel Corporation, United States

10:40 314.7 Determination of the Delay Spread of an Indoor Channel Measurement Campaign in the UHF Band
S. Scredbo, S. D. H. H. Rolfes, Ruhr-Universität Bochum, Germany

11:00 314.8 Investigation of Inter-User Interference of Wireless Body Area Networks at 60 GHz
X. X. Wu, Y. I. Neechayev, C. C. Constantinou, P. S. Hall, University of Birmingham, United Kingdom

11:20 314.9 Measurement-Based Ray-Tracing Models Calibration in Urban Environments
A. Navarro Cadavid, N. Cardona, D. Guevara, J. Lopez
1Universidad Icesi, Colombia; 2Universitat Politècnica de Valencia, Spain; 3Universidad Francisco de Paula Santander, Colombia

11:40 314.10 Statistical Adjustment of Empirical Propagation Path Loss Models to the COST 2100 Call Reference Scenario
A. Navarro Cadavid, C. A. Aridia, Marín, Universidad Icesi, Colombia
IF31.4 MIMO Channel Characterization and Performance Evaluation

Session Chairs: Andrew Peterson, Francesco Andriulli

08:20 315.1 MFIE Impedance Matrix Integral Calculation to Prescribed Precision
J. S. Aestas, D. W. Richardson, O. E. Allen, NAVAIR, United States

08:40 315.2 Impact of Spherical Dots and Galerkin Testing on the Accuracy of Volume Integral Equation Numerical Solutions for Dielectric Bodies
A. F. Peterson, Georgia Institute of Technology, United States

09:00 315.3 Volume Integral Equation Method for Highly Anisotropic Media
J. Markkanen, P. Ylä-Oijala, S. Järvenpää, A. Sihvola, Aalto University, Finland

09:20 315.4 Combined Source Integral Equation for Electromagnetic Scattering by Homogeneous Lossy Objects
P. Ylä-Oijala1, S. P. Kiminki1, K. Cools2, F. P. Andriulli2, S. Järvenpää3
Aalto University, Finland, University of Nottingham, UK, TELECOM Bretagne, France

09:40 315.5 A Sparse Direct Solution of an Augmented Formulation for Dielectric Scattering
J. Cheng, R. J. Adams, University of Kentucky, United States; X. Xu, Sigrity, Inc., United States

10:00 Break

10:20 315.6 A Non-Conformal Integral Equation Domain Decomposition Method for Electromagnetic Scattering Analysis of Large Multi-Scale Objects

10:40 315.7 A Hybrid Basis Function Technique for the Solution of Scattering from Complex Structures Using the Generalized Method of Moments
D. Dauli, N. V. Nair, B. Shanker, Michigan State University, United States

11:00 315.8 Novel Mode-Matching Technique for the Efficient Analysis of Complex Multi-Layer SIW and SISW-Based Structures
J. Seljan, M. Casaletti, G. Valero, M. Finore, R. Sauleau, University of Rennes 1, France; S. Maci, University of Siena, Italy

11:20 315.9 A Macro Basis-Function-Based Technique for the Analysis of Thin Penetrable Scatterers over a Wide Frequency Band
C. Pelletti, R. Mitra, G. Bianconi, The Pennsylvania State University, United States

11:40 315.10 Alternate Integral Equations for Simple Obstacles in Guides
C. M. Butler, Clemson University, United States

IF31.6 Performance Evaluation of MIMO Pattern Reconfigurable Antennas
Y. Zhou, R. S. Adve, S. V. Hum, University of Toronto, Canada

IF31.7 LTE Throughput Evaluation of MIMO Antenna Handset in the Presence of User’s Body
T. Yoshida1, A. Miyata1, M. Sakurai2, E. Hankui3
1 NEC Corporation, Japan; 2 NEC CASIO Mobile Communications, Ltd., Japan

IF31.8 A Parameter Estimation Algorithm for Propagation Channels Based on Two-Layer Evidence Framework
X. Yin, Y. Hu, Z. Zeng, J. Zhou, M. Tong, Tongji University, China; Z. Zhong, S. X. Lu, Huawei Technology Company, China

IF31.9 Channel Capacity Improvement Dependency of Antenna Separation Lengths for Aeronautical 2x2 MIMO System
N. Kamada, Y. Sumiya, N. Yonemoto, S. Futatsuarumi, E. Izokazi, Electronic Navigation Research Institute, Japan

IF31.10 Investigations on Wideband MIMO Indoor Channel Characteristics at 2.35GHz with Multiple Polarized Antennas
N. Zhang, H. Wang, W. Hong, J. Zhou, G. Yang, H. Zhang, C. Yu, Southeast University, China

IF31.11 Effect of Antenna Configuration on Performance of MIMO-Based Access Points in a Service Tunnel
A. Emami Forooshani, D. G. Michelson, University of British Columbia, Canada

IF31.12 Cooperative MIMO Beamforming with a Per-Antenna Power Constraint
A. L. Anderson, Tennessee Technological University, United States; M. A. Jensen, Brigham Young University, United States
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<td>IF33.1</td>
<td>Low Profile Rigid UHF RFID Tags</td>
<td>K. Ral, S. F. Lam, P. V. Nikitin, Intermec Technologies Corporation, United States</td>
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<td>Low Profile UHF RFID Antenna Design with EBG Structures</td>
<td>A. Erosa, N. Reynolds, C. Pomalaza-Raez, Purdue University Fort Wayne, United States</td>
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<td>IF33.3</td>
<td>Microstrip-Line-Fed Circularly-Polarized Circular Slot Antenna with a Square Slot</td>
<td>J.-Y. Jan, K.-Y. Chiu, C.-Y. Pan, H.-M. Chen, C.-H. Chen, National Kaohsiung University of Applied Sciences, Taiwan</td>
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<td>Planar Inverted F Antenna Circularly Polarized for RFID Applications</td>
<td>S. Plass, R. Staj, G. Kossivas, LEAT, University of Nice Sophia-Antipolis, France</td>
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<td>IF33.5</td>
<td>Chipless RFID System Based on Magnetoinductive-Wave (MIW) Delay Lines</td>
<td>F. J. Herraez-Martinez, J. Ugarte-Muñoz, D. Segovia-Vargas, Universidad Carlos III de Madrid, Spain; F. Paredes, G. Zamora, M. Martin, J. Bonache, Universidad Autonoma de Barcelona, Spain</td>
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<td>IF33.6</td>
<td>Compact Quasi-Yagi Antenna Loaded with Artificial Transmission Lines for RFID Applications</td>
<td>P. Hajizadeh, H. R. Hassani, Shahed University, Iran; S. H. Sedighe, Iran Univ. of Science and Tech, UC Irvine, Iran</td>
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<td>IF33.7</td>
<td>Miniaturized on-Chip Slot Antenna in 90nm CMOS</td>
<td>M. R. Khan, University of Saskatchewan, Canada; H. Gorla, Southern Illinois University, USA</td>
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<td>IF33.8</td>
<td>UHF Bowie RFID Antenna with Resistive and Inductive Stubs</td>
<td>M. M. Masaeli, North Dakota State University, United States; S. Capdevila, Universitat Politècnica de Catalunya, Spain</td>
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<td>Omnidirectional Loop Antenna for a 5.8 GHz Microwave Backscatter RFID Tag</td>
<td>C. R. Valenta, R. Hase, M. B. Akbar, W. Hunskicker, K. Naishadham, G. D. Durgin, Georgia Institute of Technology, United States</td>
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<td>Passive UHF RFID Printed Monopole Tag Antenna for Identification of Metallic Objects</td>
<td>A. E. Abdullah, R. Abhari, McGill University, Canada</td>
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<td>Realizing Huygens Sources Through Spherical Sheet Impedances</td>
<td>C. Pfeiffer, A. Grbic, University of Michigan, Ann Arbor, United States</td>
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<td>IF34.2</td>
<td>Innovative Procedure for Analytical Synthesis of Small Radiators</td>
<td>R. Stefanelli, D. Trinchero, Ixem Labs - Politecnico di Torino, Italy</td>
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<td>IF34.3</td>
<td>Electrically Small Omni-Directional Antenna of Circular Polarization</td>
<td>Y. Yu, S. He, Zhejiang University, China; Z. Shen, Nanyang Technological University, Singapore</td>
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Wednesday, July 11
10:00-5:00
River Exhibition Hall B
Session IF37
AP-S
Interactive Forum

Transmission and Absorption in Metamaterials

Session Chairs: Nader Behdad, Elena Semouchkina
IF37.1 Analysis of Electromagnetic Wave Tunneling Through Stacked Single-Negative Metamaterial Slabs: a Microwave Filter Theory Approach
C-H. Liu, N. Behdad, University of Wisconsin, Madison, United States
IF37.2 High-Power Microwave Filters and Frequency Selective Surfaces Utilizing EM Wave Tunneling Through ε-Negative Layers
C-H. Liu, N. Behdad, University of Wisconsin-Madison, United States
IF37.3 Forward and Backward-Wave Propagation in “Below Cut-off” Waveguides Loaded with Dielectric Resonators
F. Cheng, X. Wang, A. Hosseinzadeh, E. Semouchkina, Michigan Technological University, United States
IF37.4 Investigation of a Microstrip-to-Ridge Gap Waveguide Transition by Electromagnetic Coupling
A. Algaba Brazalez, A. U. Zaman, P-S. Kildal, Chalmers University of Technology, Sweden
IF37.5 A Compact Crossover Using NRI-TL Metamaterial Lines
M. A. Antoniades, B. Henin, A. Abbous, University of Queensland, Australia
IF37.6 Equal Phase Slope Metamaterial Transmission Lines
J. Church, J. Meloling, J. D. Rockaway, SPAWAR SSC-Pacific (Dept. of Navy), United States
IF37.7 A Miniature, Broadband, Non-Dispersive Phase Shifter Based on CRLH TL Unit Cells
J. T. Nassar, A. A. Gheethan, T. M. Wellers, G. Mamec, University of South Florida, United States
IF37.8 On the Design of Perfect Metamaterial Absorbers
F. Costa, S. Genovesi, A. Monorchio, G. Manara, University of Pisa, Italy
IF37.9 An Ultra Thin Metamaterial Absorber Using Electric Field Driven I.C Resonator with Meander Lines
S. Bhattacharyya, H. Baradiya, K. V. Srivastava, Indian Institute of Technology, Kanpur, India, India
IF37.10 Extending the Absorbance Bandwidth of Metamaterial Absorber
H. M. Lee, H. S. Lee, Kyunggi University, South Korea
IF37.11 Diffraction Inspired, Polarization Dependent, Unidirectional Transmission in Thin Fishnets
M. Beruete, A. E. Serebryannikov, V. Torres, M. Navarro-Cia, M. Sorolla, 1Universidad Pública de Navarra, Spain; 2Hamburg University of Technology, Germany; 3Imperial College London, United Kingdom

Wednesday, July 11
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Chicago VI
Session 351
AP-S

Electromagnetic Bandgap Materials 2

Session Chairs: Prem Chahal, Ladislaw Matekovits
13:20 351.1 Plane Wave Scattering from a Curved HIS: Normal Incidence
A. C. Durgun, C. A. Balanis, C. R. Bircher, Arizona State University, United States
13:40 351.2 A Terahertz Photonic Crystal Structure for Sensing Applications
L. C. Acosta Silva, J. A. Hejase, P. Chahal, Michigan State University, United States
14:00 351.3 A Novel HIS with a Perforated Ground Plane for Miniaturization and Bandwidth Enhancement
A. C. Durgun, C. A. Balanis, C. R. Bircher, Arizona State University, United States
14:20 351.4 Miniaturization of Microstrip Band Stop Filter Using a Novel Periodic Structure
K. Y. Park, N. Wiwatcharagoses, P. Chahal, Michigan State University, United States
14:40 351.5 Phenomenology of Resonance Reflectance by Intertwined Spiral Arrays
A. Vallechechi, University of Siena, Italy; A. G. Schuchinsky, Queen’s University of Belfast, United Kingdom

15:00 Break

15:20 351.6 Three-Wave Nonlinear Scattering by Quasiperiodic Dielectric Structure
O. V. Shramkova, A. G. Schuchinsky, Queen’s University Belfast, United Kingdom

15:40 351.7 Parametric Assessment of Properties of a Periodically Patterned Surface with Non-Uniform Rectangular Spiral Metalization in the Unit Cell
L. Matekovits, Politecnico di Torino, Italy; A. De Sabata, "Politecnico" University of Timisoara, Romania

16:00 351.8 A Technique to Extract Dispersion Characteristics of One-Dimensional Periodic Structures
D. N. P. Thakakotu, L. Matekovits, K. Esselle, S. Hay, M. Heilmich, Macquarie University, Australia; ‘Politecnico di Torino, Italy;’ CSIRO ICT Centre, Australia

16:20 351.9 A Thin and Broadband Tunable Radar Absorber Using Active Frequency Selective Surface
Q. Chen, J.-J. Jiang, X.-X. Xu, L. Zhang, L. Miao, S.-W. Bie, Huazhong University of Science and Technology, China

16:40 351.10 Analysis of Mushroom-like EBG Structure Utilizing Spin Sprayed Ni (-Za) - Co Ferrite Films
M. M. Fakharian, P. Rezaei, Department of Electrical and computer Engineering, Semnan University, Iran

Wednesday, July 11 13:20-17:00 Chicago VII

Session 352 AP-S

Non Foster Matching

Session Chairs: Dan Sievenpiper, Filiberto Bilotti

13:20 352.1 A Non-Foster Monopole Array
C. B. White, HRL Laboratories, LLC, United States

13:40 352.2 Broadband Matching of Small Antennas Using Negative Impedance Converters.
O. O. Tade, P. Gardner, P. S. Hall, University of Birmingham, United Kingdom

14:00 352.3 Incorrect Stability Criteria for Non-Foster Circuits
N. D. Stearns, Northrop Grumman Corporation, United States

14:20 352.4 Stability and Implementation of Non-Foster Circuits for Antennas
S. Koulouris, S. Stefanopoulos, University of Patras, Greece, Greece

14:40 352.5 Non-Foster Matching of Electrically Small Antennas. Stability Considerations
E. Ugarte-Mahlug, D. Segovia-Vargas, University Carlos III of Madrid, Spain; V. González-Pousadas, J. L. Jiménez-Martin, Universidad Politécnica de Madrid, Spain

15:00 Break

15:20 352.6 Non-Foster Augmented, Broadband, Efficient, Electrically Small, NFRP Dipole Antenna
N. Zhu, R. W. Ziolkowski, University of Arizona, United States; J. Geng, Shanghui Jiao Tong University, China

15:40 352.7 Design of a Non-Foster Actively Loaded Metamaterial-Inspired Antenna
M. Barbuto, A. Monti, F. Biliotti, A. Toscano, "Roma Tre" University, Italy

16:00 352.8 Broadband Non-Foster Matching of an Electrically Small Loop Antenna
M. M. Jacob, J. Long, D. F. Sievenpiper, University of California, San Diego, United States

16:20 352.9 Two Novel Negative Impedance Converters for a UHF RFID Antenna
N. P. Mohamed, Hassan Salem, King Abdullah University of Science and Technology (KAUST), Saudi Arabia; E. Niver, New Jersey Institute of Technology (NJIT), United States of America

16:40 352.10 Wideband Matching of an Electrically Small Antenna Using a Negative Impedance Converter Technique
W. Li, R. Chen, N. Zhai, S. Li, Harbin Engineering University, China; R. Mittra, Pennsylvania State University, USA

Wednesday, July 11 13:20-17:20 Chicago IX

Session 354 AP-S/URSI

Terahertz Technology

Session Chairs: Hao Xin, Goutam Chattopadhyay

13:20 354.1 Next Generation Solid-State Broadband Frequency-Multiplied Terahertz Sources

13:40 354.2 Coherent Terahertz Radiation Source and User Area at FACET
W. Zhu, J. Fisher, H. Loos, M. Hogan, SLAC National Accelerator Laboratory, United States

14:00 354.3 Non Dispersive Antenna Array Architectures for THz Sensing Systems: Connected Leafy Wave Slots
14:20 354.4 High Efficiency Elliptical-Slot Silicon RFIC Antenna with Quartz Superstrate
J. M. Edwards1, D. Titz2, F. Ferrero1, C. Luxey1, G. M. Rebeiz1
1University of California, San Diego, United States; 2University Nice - Sophia-Antipolis, France

14:40 354.5 A Further Study of THz Photoductive Antennas
Y. Huang, N. Khibani, The University of Liverpool, United Kingdom

15:00 Break

15:20 354.6 Printed 3-D Electromagnetic Crystal (EMXT) Based THz Micro-Systems
M. Liang, W.-R. Ng, M. Gehm, H. Xin, University of Arizona, United States

15:40 354.7 THz Transparent Metamaterials for Spectroscopic Measurements
W.-G. Yao, Y. Sambhugh, N. K. Nahar, J. L. Volakis, The Ohio State University, United States

16:00 354.8 Optically Controlled Frequency Selective Surface for Millimeter-Wave Applications
H. Su, B. Yang, X. Liu, D. Li, X. Chen, R. S. Donman, C. G. Parini, T. Krenzus, Queen Mary, University of London, United Kingdom

16:20 354.9 Validation of CW THz Spectral Measurements
W.-G. Yao, N. K. Nahar, J. L. Volakis, The Ohio State University, United States

16:40 354.10 Dual-Band Optical Bench for Terahertz Radiometer for Outer Planet Atmospheres (TROPA)
E. Schlecht, Jet Propulsion Laboratory, California Institute of Technology, United States

17:00 354.11 Challenges in THz Antenna Technology and Verification
P. de Maagt, L. Rolo, D. Doyle, European Space Agency, Netherlands

Wednesday, July 11
12:00-17:00 Chicago X

Session 355

13:20 Phased Array Antennas II
Session Chairs: Randy Haupt, Amir Mortazawi

13:30 355.1 60 GHz Beam-Steering Slotted Patch Antenna Array Using Liquid Crystal Phase-Shifters
P. Deo, D. Mirshekar-Syahkal, University of Essex, United Kingdom

13:40 355.2 94 GHz Power Amplifier Device Architecture in SiGe for Active Phased Arrays

14:00 355.3 Compact Design of a Planar Filtering Antenna Array Including a Frequency Selective Common-Mode Rejection Module
L. Cortesi, D. Cavallo, G. Gerini, TNO, Defense Security and Safety, Netherlands; A. Mortin, Università Politecnica delle Marche, Italy

14:20 355.4 A Cavity-Backed Dual Polarized Array of Connected Spiral Antennas
R. Guivarch, M. Serhi, Supelec, France; N. Ribiëre-Tharaud, CEAC, France

14:40 355.5 A Dual Polarized Planar Phased Spiral Antenna Array
I. Hinesmore, R. Guivarch, Suplec, France; R. L. Haupt, Haupt Associates, USA

15:00 Break

15:20 355.6 A Corporate Fed Coplanar Folded Slot Antenna Array and Its Application for Beam Steering
M. A. Iskander1, R. Li1, D. E. Anagnostou1, M. T. Chryssolouris1, B. D. Braat1
1South Dakota School of Mines and Technology, United States; 2Democritus University of Thrace, Greece; 3North Dakota State University, United States

15:40 355.7 Ka-Band Phased Patch Antenna Array
Y. Zhang, J. Bai, S. Shi, D. W. Prather, University of Delaware, United States

16:00 355.8 Study of a New 4x3 Beam Forming Network for Triangular Arrays of Three Radiating Elements
J. García-Gasco Trujillo, Á. Noval Sánchez de Toca, I. Montesinos-Ortega, A. García Aguilar, M. Sierra Perez, Technical University of Madrid, Spain

Wednesday, July 11
12:00-17:20 Michigan A

Session 357

13:20 Antennas for Biomedical Applications
Session Chairs: Michal Okoniewski, Michael Jensen

13:30 356.1 Design of a LTCC Compact Implantable Broadband Antenna for Wireless Biotelemetry
N. Vidal, J. M. Lopez-Villegas, S. Curto, J. J. Sieiro, University of Barcelona, Spain; F. M. Ramos, Francisco Albero S.A., Spain

13:40 356.2 High Impedance Surface Based Antenna for Telemetry Applications
H. R. Khaleel, H. M. Al-Rizzo, D. G. Rucker, S. Abushammleh, University of Arkansas at Little Rock, United States

14:00 356.3 Patch Resonator for Non-Invasive Detection of Dielectric Property Changes in Biological Tissues
T. Yilmaz, R. Foster, Y. Hao, Queen Mary College, University of London, United Kingdom

14:20 356.4 Circular Antenna Array for Brain Imaging Systems
B. Mohammad1,2, A. Abbosh, D. Ireland1
1The University of Queensland, Australia; 2Mosul University, Iraq

14:40 356.5 Self-Packaged Wrappable Patch Antenna and Circuit System for a Universal Wireless Endoscope Platform
X. Cheng, G. J. Kim, Y.-K. Yoon, University of Florida, United States

15:00 Break

15:20 356.6 Antenna Design for Wireless Electrocorticography
T. Biorninen1, R. Muller1, P. Ledochowitx2, L. Sydanheimo1, L. Ukkonen1, J. Rabase2
1Tampere University of Technology, Finland; 2University of California at Berkeley, USA

15:40 356.7 Directional in-Quadrature Orthogonal-Coil Antenna and an Array Thereof for Localization Within a Human Body in a Fresnel Region
S. N. Makarov, G. M. Noetscher, Worcester Polytechnic Institute, United States

16:00 356.8 Stroke Detection Based on Variations in Reflection Coefficients of Wideband Antennas
B. Mohammad1,2, A. Abbosh1, D. Ireland1
1The University of Queensland, Australia; 2Mosul University, Iraq

16:20 356.9 A Leaky Wave Antenna for Radar Medical Imaging
K. Vaddagiri1,2, S. Moon1, A. Neto1
1Delft University of Technology, Netherlands; 2TNO, Netherlands

16:40 356.10 Compact Planar UWB Antenna Array for Breast Cancer Detection
T. Sugitani, S. Kubota, A. Toya, T. Kikkawa, Research Institute for Nanodevice and Bio and Systems, Japan

Wednesday, July 11
12:00-17:20 Michigan A

Session 357

13:20 Microstrip Circuits II
Session Chairs: Hongyu Zhou, Djuradj Budimir

13:30 357.1 Surface Roughness Modeling for CPW Filters
A. Sain, K. L. Melde, University of Arizona, United States

13:40 357.2 Compact Ultra-Wideband Single-Ring Bandpass Filter with Sideband and Harmonic Suppression
Y. Ling, K. Chang, Texas A&M University, United States

14:00 357.3 Harmonic Suppression for Planar Ultrawideband Bandpass Filters Employing Broadside-Coupled Microstrip Patches
B. Henin, A. Abbosh, M. Antoniades, University of Queensland, Australia
14:20 357.4 Dual-Band Filters Using Complementary Split-Ring Resonator and Capacitive Loaded Half-Mode Substrate-Integrated-Waveguide
D. E. Senior, X. Cheng, Y. K. Yoon, University of Florida, United States

14:40 357.5 Design of a Miniaturized Butler Matrix in IPD Process for 60 GHz Switched-Beam Antenna Arrays
1Université de Nice-Sophia Antipolis, France; 2ST Microelectronics, France

15:00 Break

15:20 357.6 Compact Dielectric-Filled Waveguide Filters and Diplexers
N. Mohottige, D. Budimir, Westminster University, United Kingdom

15:40 357.7 A Low-Loss CPW to Dielectric Waveguide Transition for Millimeter-Wave Hybrid Integration
A. Zandieh, N. Ranjekhi, M. Basha, S. Safavi-Naeini
University of Waterloo, Canada; 2University of Tabuk, Saudi Arabia

16:00 357.8 Microstrip to Waveguide Transition Dedicated to Wireless Millimeter-Wave Applications
D. Hammad, M. Nadj, N. Kandil, Y. Coulibaly, UQAT-LRCS, Canada; 2INRS-EMT, Canada

16:20 357.9 Wideband Planar Microstrip to Waveguide Transition for Ku-Band Applications
S. Ordek, M. Bilge, K. Yegin, T. Turkkan, M. Sengiz
New Electronic Equipment Ind. Corp., Turkey; 2Yeditepe University, Turkey

16:40 357.10 Efficient Electromagnetic Analysis for Interconnect and Packaging Structures Based on Volume-Surface Integral Equations
M. S. Tong, J. C. Zhou, J. H. Zhou, X. F. Yin, Tongji University, China

17:00 357.11 Spurious Passband Suppression in Microstrip Hairpin-Line Bandpass Filter by Means of Quasi Fractal A. Lalbakhsh, IAU, Kermanshah Branch, IRAN; A. A. Lotfi-Neyestanak, IAU, Shahr Rey Branch, IRAN

Wednesday, July 11 13:20-17:00 Michigan B
Session 358 AP-S/URSI

Scattering, Diffraction, and RCS

Session Chairs: Constantine Balanis, Makoto Ando

13:20 358.1 RCS Analysis of Tree Trunk above Rough Surface Using Reaction Theorem
H. Nejat, K. Sarabandi, University of Michigan, United States

13:40 358.2 Efficient RCS Analysis of Complex Bodies on Infinite Ground Plane
L. Lozano, I. Gonzalez, M. J. Algar, F. Cátedra, Universidad de Alcalá, Spain

14:00 358.3 Physical Optics Formula for the Radar Cross Section of Finite Cylindrical Metallic Shells with Cubic Spine Profile
A. Vallee, University of Siena, Italy

14:20 358.4 Full Pattern Comparison of PO and MER Line Integrations with SGO Correction
P. Lu, M. Ando, Tokyo Institute of Technology, Japan

14:40 358.5 Bessel Beam Scattering by a Conducting Sphere
H. Shouran, D. Soussan, C. Caloé, Ecole Polytechnique, Canada

15:00 Break

15:20 358.6 Extended UTD Solution for Scattered Fields by a Coated Conducting Cylinder
K. Goto, L. H. Loc, T. Kawano, T. Ishihara, National Defense Academy, Japan

15:40 358.7 RCS of a Microstrip Leaky Wave Antenna
S.-T. Yang, H. Ling, The University of Texas at Austin, United States

16:00 358.8 UTD for CAD Models: the Uniform Geometrical Theory of Diffraction in the 21st Century
R. J. Burkholder, 1C. J. Reddy, 2A. Wilhide, 3P. H. Pathak
1The Ohio State University, United States; 2Applied EM, Inc., United States

16:20 358.9 Shadow Radiation for Scalar Problems: Relations Between Babinet Principle and Physics Optics
G. Kubicki, DGA Information Superiority, France; 2C. Bourliert, N. Pinel, IETR Laboratory, France; 3P. Pouliquen, DGA Strategy Direction, France

16:40 358.10 Scattering and Diffraction of a Complex-Source Beam by a Wedge
M. Katsev, E. Heyman, Tel Aviv University, Israel; L. Klinkenberg, Christian-Albrechts-Universität zu Kiel, Germany

Pattern Reconfigurable Antennas

Session Chairs: Hisamatsu Nakano, Tayeb A. Denidni

13:20 359.1 Low-Profile Capacitively Fed Steerable Square Loop Antenna
A. Pal, A. Mehta, Swansea University, United Kingdom; D. Mirshekar-Syahkal, University of Essex, United Kingdom; H. Nakano, Hosei University, Japan

13:40 359.2 A Compact Reconfigurable Antenna with Pattern Diversity
H. Li, S. He, Royal Institute of Technology (KTH), Sweden

14:00 359.3 Dual-Mode L-Band Switched Parasitic Element Antenna for Avionics Applications
I. Akhoondzadeh-Asl, J. J. Laurin, ecole polytechnique de montreal, Canada

14:20 359.4 Design of a New Ultra-Wideband 4x4 Butler Matrix for Beamforming Antenna Applications
M. L. Abdelghani, T. A. Denidni, INRS 800, rue De La Gauchetiere O, bur 6900 H5A 1K6, Canada; M. Nadj, Université du Quebec en Abitibi Temiscamingue, J9P 1Y3, Canada

14:40 359.5 Pattern Reconfigurable Antenna for Adaptive Multi-Input Multi-Output Switching Applications
I. Lim, S. Lim, Chungang univ., South Korea

15:00 Break

15:20 359.6 Theoretical and Experimental Demonstration of Beam Steering of Patch Antenna with Superstrate
H. Attia, O. Siddiqui, O. Ramahi, University of Waterloo, Canada

15:40 359.7 CPWG-Fed Reconfigurable Beam Steering Antenna Using Dipole and Loop Combined Structure
S. Han, 1J. Kim, 2Y. Kim, 3B. Lee, 4C. W. Jung
1Seoul National University of Science and Technology, South Korea; 2Inha Technical College, South Korea; 3Kwangwoon University, South Korea

16:00 359.8 Reconfigurable Microstrip Yagi-Uda Antenna with a Scannable Circularly Polarized Beam
A. Khidir, 1F. Yang, 2A. Elsherbeni
1University of Mississippi, United States; 2Tsinghua University, China

16:20 359.9 Controllable Pattern Reconfigurable Microstrip Disc Antenna
M. Abou Al-alaa, H. Elshemk, E. Abdullah, Electronics Research Institute, Egypt; E. Hashish, Faculty of Engineering, Egypt

Wednesday, July 11 13:20-16:40 Superior B
Session 360 AP-S

UWB Antenna Arrays

Session Chairs: Dejan Filipovic, Max Ammann

13:20 360.1 Limits for Low Complexity Beam-Steering for UWB Antenna Arrays
V. Sipola, D. Edwards, University of Oxford, United Kingdom; B. Allen, University of Bedfordshire, United Kingdom

13:40 360.2 Vivaldi Array for Generation of UWB Circular Polarization
A. Narbudowicz, M. John, X. Bao, M. J. Ammann, Dublin Institute of Technology, Ireland

14:00 360.3 On the Mutual Coupling of UWB Antenna Arrays Using EBG Layers
O. M. Haraz, Concordia University, Canada; A.-R. Sebak, King Saud University - PSAI, Saudi Arabia

14:20 360.4 Rotationally Symmetric Planar Ultra-Wideband Array Design Techniques
M. D. Gregory, D. H. Werner, The Pennsylvania State University, United States

14:40 360.5 An Eight-Element Dielectric Rod Antenna Array Integrated to a Substrate Integrated Waveguide Feed for Wide Band Applications
R. Kazem, K. N. Toosi University of Technology, Iran; A. Fathy, University of Tennessee, USA

15:00 Break
15:20 360.6 Design of Wideband Stepped-Notch Arrays Using Multi-Section Impedance Transformer Design Rules

15:40 360.7 Monolithically Integrated K/Ka Array-Based Direction Finding Subsystem
N. Israen, D. Filipovic, University of Colorado, United States

16:00 360.8 Wideband Circularly-Polarized Aperture Antenna Arrays Utilizing UWB Directional Coupler
K.-H. Lg, C.-C. Lin, Graduate Institute of Communication Engineering, National Taiwan University, Taiwan; Y.-C. Lin, Department of Electrical Engineering, National Taiwan University, Taiwan

16:20 360.9 Unipolar UWB Antenna for Diversity Applications
B. P. Chacko, G. Augustin, T. A. Denidin, National Institute of Scientific Research(INRS), Canada

**Wednesday, July 11 13:20-17:00**

**Electromagnetic Design Optimization**
Session Chairs: Yahya Rahmat-Samii, Matthew Bray

G. Oliveri, P. Rocca, A. Musso, ELEDA Research Center - University of Trento, Italy

13:40 361.2 Evaluation of Stochastic Algorithm Performance on Antenna Optimization Benchmarks
I. Briotier, P. De Wagter, I. Lohn, Carnegie Mellon University, United States

14:00 361.3 Comparison of Different Optimization Techniques in Antenna Design – Part I

14:20 361.4 Comparison of Different Optimization Techniques in Antenna Design – Part II

14:40 361.5 Modified Bayesian Optimization Algorithm for Microstrip Filter Design
B. V. Ha', M. Mussetta', P. Pirimoli', R. E. Zich'
POLITECNICO DI MILANO, Italy; *Politecnico di Torino, Italy

15:00 Break

15:20 361.6 Efficient Simulation-Driven Design Optimization of Antennas Using Co-Kriging
S. Koziel, S. Ogurtsov, Reykjavik University, Iceland; I. Coughytl, T. Dhaene, Ghent University - IBBT, Belgium

15:40 361.7 Selecting Model Fidelity for Antenna Design Using Surrogate-Based Optimization
S. Koziel, S. Ogurtsov, Reykjavik University, Iceland

16:00 361.8 Space Mapping Design Exploiting Library Antenna Models
S. Tu, Q. S. Cheng, J. W. Bandler, N. K. Nikolova, McMaster University, Canada

16:20 361.9 A Matlab Based Universal CEM CAD Optimizer
A. Borovannko, A&E Partnership, United States; N. Hescovici, Air Force Research Laboratory, Wright Patterson Air Force Base, United States

16:40 361.10 General Rules for Objective Functions in Wide- and Multi-Band Pixelized Antenna Design
Y.-S. Chen, Y.-C. Chan, H.-J. Li, S.-Y. Chen, National Taiwan University, Taiwan

15:40 362.2 A Time-Domain Discretisation of Maxwell's Equations in Nontrivial Media Using Collocated Fields
W. Tierens, D. De Zutter, Ghent University, Belgium

14:40 362.3 3D and 4D Space-Time Grids for Electromagnetic Wave Computation Using Finite Integration Method
T. Matsuo, S. Shimizu, T. Milane, Kyoto University, Japan

14:20 362.4 Fast Analysis of Scattering from Inhomogeneous Dielectric Bodies of Revolution Embedded in Layered Media and Application to Lens Design
X. Wang, Q. Wu, D. H. Werner, The Pennsylvania State University, United States

14:40 362.5 Nearly PML for an Unconditionally-Stable Six-Stages Split-Step FDTD Method
Y.-D. Kong', Q.-X. Chu'²
¹School of Electronic and Information Engineering, South China University of Technology, China; ²The State Key Laboratory of Millimeter Waves, Southeast University, China

15:00 Break

15:20 362.6 A Hybrid 2D/3D Cylindrical FDTD Method Based on Azimuthal Mode Decomposition
S. Kirsch, R. Schuhmann, Technische Universität Berlin, Germany

15:40 362.7 Cylindrical FDTD Grid-Compatible Green's Functions
O. Markish, R. Kastner, Tel Aviv University, Israel

16:00 362.8 Evaluation of the Numerical Accuracy of Overset Grid Generation Method for a Rotating Body
S. Sahraei, M. Kiaroda, Tokyo University of Technology, Japan

16:20 362.9 Unconditionally Stable High-Order Picard Iteration Algorithm for Computational Electromagnetics
A. Ghassaei, K. Sreenivas, L. K. Taylor, National Center for Computational Engineering, United States

16:40 362.10 A Quasi Three-Dimensional Subgrid Technique for the Geodesic FDTD Algorithm
Y. Wang, Q. Cao, Nanjing University of Aeronautics and Astronautics, China

16:40 363.10 Ground Plane Effects on Planar Inverted-F Antennas
N. Bohannon, J. Bernhard, University of Illinois at Urbana-Champaign, United States

14:20 363.4 Low-Cost 60 GHz Printed Yagi Antenna Array
Z. Bregeh, Concordia University, Canada; A.-R. Sebak, King Saud University, Saudi Arabia

14:40 363.5 Multiband Printed-IFA on Electromagnetic Band-Gap
D. M. N. Elshahed, E. A. Abdallah, Electronics Research Institute, Egypt

15:00 Break

15:20 363.6 Two Types of Planar Inverted-F Antennas Fed at the Edge
A. Matsui, K. Fujimaki, B. He, Saitama Institute of Technology, Japan

15:40 363.7 Size Reduction of a Rear Radiating Microstrip Fed Printed Dipole Antenna
M. Q. Mala, L. Shaffa, University of Manitoba, Canada

16:00 363.8 A High-Sensitivity 2.45 GHz Rectenna for Low Input Power Energy Harvesting
H.-C. Sun, Y.-X. Guo, Z. Zhong, NUS, Singapore

16:20 363.9 High Isolation Antenna Based on Super Coupling of Electromagnetic Energy from a Waveguide to Free Space
S. Seran, J. P. Donohoe, Mississippi State University, United States

16:40 363.10 Wideband Directive Dipole Antenna with Integrated Balun
T. H. Gan, E. L. Tan, NTU, Singapore

**Session 361 13:20-17:00**

**Printed Dipole, Slot, and Planar Inverted-F Antennas**
Session Chairs: Dimitrios Peroulis, Huiliang Zhang

13:20 363.1 Radiation Efficiency Enhancement for Dipoles Placed Adjacent to Lossy Silicon Substrates
D. Kim, D. Peroulis, Purdue University, United States

13:40 363.2 A Frequency Reconfigurable Monopole Antenna Based on Complementary Split-Ring Resonators
S. C. Basaran, K. Sertel, ELECTROSCIENCE LABORATORY, United States

14:00 363.3 Ground Plane Effects on Planar Inverted-F Antennas
N. Bohannon, J. Bernhard, University of Illinois at Urbana-Champaign, United States

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Z. Bregeh, Concordia University, Canada; A.-R. Sebak, King Saud University, Saudi Arabia

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D. M. N. Elshahed, E. A. Abdallah, Electronics Research Institute, Egypt

15:00 Break

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A. Matsui, K. Fujimaki, B. He, Saitama Institute of Technology, Japan

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M. Q. Mala, L. Shaffa, University of Manitoba, Canada

16:00 363.8 A High-Sensitivity 2.45 GHz Rectenna for Low Input Power Energy Harvesting
H.-C. Sun, Y.-X. Guo, Z. Zhong, NUS, Singapore

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S. Seran, J. P. Donohoe, Mississippi State University, United States

16:40 363.10 Wideband Directive Dipole Antenna with Integrated Balun
T. H. Gan, E. L. Tan, NTU, Singapore

**Session 362 13:20-17:00**

**Advances in Non-Standard FDTD Methods**
Session Chairs: Raphael Kastner, David Davidson

13:20 362.1 Divergence of Electric Field for the two-dimensional (2-D) Leapfrog ADI-FDTD method.

**Wednesday, July 11 13:20-17:00**

**Session 362 13:20-17:00**

**Missouri**

**Advances in Non-Standard FDTD Methods**
Session Chairs: Raphael Kastner, David Davidson

13:20 362.1 Divergence of Electric Field for the two-dimensional (2-D) Leapfrog ADI-FDTD method.
Reflectarray elements and synthesis
Session Chairs: Fan Yang, Paola Pirinoli
13:20 364.1 Reflection Coefficient Analysis of a TEM-Excited Reflectarray Unit Cell Using Quality Factors
K. K. Karnati1, Y. Yusuf2, S. Ebadi1, X. Gong1
1University of Central Florida, United States; 2University of Wisconsin-Madison, US
14:30 364.2 A New CPSS Element
I. Roy, Communications Research Centre, Canada, Canada
14:00 364.3 Validation of a S-Beam Reflectarray Prototype with Square Ring Resonators
G. C. Vietti, P. Pirinoli, M. Oreluce, G. Dassano, Politecnico di Torino, Italy; M. Mussetta, POLITECNICO DI MILANO, Italy
14:20 364.4 Design of Single Layer RA with Enhanced Bandwidth
B. V. Ha1, P. Pirinoli1, M. Mussetta2, R. Zich1
1Politecnico di Milano, Italy; 2Politecnico di Torino, Italy
14:40 364.5 Ka-Band Tunable Reflectarray Unit Cell Using BST Technology
Y. Shen, S. Ebadi, X. Gong, University of Central Florida, United States
15:00 Break
15:20 364.6 Dual-Band MEMS-Tunable Slotted-Cross Reflective Unit Cell with Orthogonal Polarization
H. Moghaddas1,2, M. Daneshmand1,2, P. Mousavi1,2, M. R. Chaharmir2, J. Shaker2
1University of Alberta, Canada; 2TRLabs, Canada; 3Communication Research Center, Canada
15:40 364.7 Dual-Band Orthogonally-Polarized Slotted-Lozenge Reflective Unit Cell Tuned by MEMS Varactor
D. Oloomi1,2,3, H. Moghaddas1,2, P. Mousavi1,2
1University of Alberta, Canada; 2TRLabs, Canada; 3Bleckinge Institute of Technology, Sweden
16:00 364.8 Phase-Only Synthesis of Aperiodic Reflectarrays with Multi-Frequency Specifications
A. Capozzoli, C. Curcio, A. Liseno, Università di Napoli Federico II, Italy; M. Migliorelli, Space Engineering S.p.A., Italy; G. Toso, European Space Agency, ESA ESTEC, The Netherlands
16:20 364.9 Design of Single-Feed Reflectarrays with Asymmetric Multi-Beams
P. Naveji, F. Yang, A. Z. Elsherbeni, The University of Mississippi / Student, United States
16:40 364.10 A New Reflectarray Panel Design Concept for Interferometric SAR
R. E. Hodges, R. C. Hughes, M. W. Thomson, M. S. Zawadzki, Jet Propulsion Laboratory, United States

Wednesday, July 11 13:20-17:00 Ohio
Session 365

Integral Equation Methods II
Session Chairs: Eric Michielssen, David Jackson
13:20 365.1 Low-Frequency Regularization of the Mixed-Discretized Calderon CIE
F. P. Andriulli, École nationale supérieure des telecommunications de Bretagne (TELECOM Bretagne), France; K. Coils, University of Nottingham, UK; I. Bogaert, Gent University, Belgium; H. Bagci, KAUST, Saudi Arabia; P. Yla-Oijala, Aalto University, Finland; E. Michielssen, University of Michigan, Michigan
13:40 365.2 Projection Based Quasi-Helmholtz Decompositions: Loop/Star-Like Schemes Without the Search for Global Loops
F. P. Andriulli, École nationale supérieure des telecommunications de Bretagne (TELECOM Bretagne), France; I. Bogaert, Gent University, Belgium; K. Coils, University of Nottingham, UK; E. Michielssen, University of Michigan, Michigan
14:00 365.3 Issues in the Evaluation of Strongly near-Singular Integrals Involving Curvilinear Triangles
E. Vippola, Politecnico di Torino, Italy; D. R. Wilton, University of Houston, USA; W. A. Johnson, Private Consultant, USA
14:20 365.4 Dual Basis for the Fully Linear LL Functions
S. P. Kiminki1, I. Bogaert1, P. Yla-Oijala1
1Aalto University, Finland; 2Ghent University, Belgium
14:40 365.5 On the Low Frequency Behavior of the Mixed Discretized Time Domain Magnetic Field Integral Equation
H. A. Elki1, I. Bogaert1, K. Coils1, P. P. Andriulli1, H. Bagci1
1King Abdullah University of Science and Technology, KSA; 2Ghent University, Belgium; 3University of Nottingham, UK; 4TELECOM Bretagne, France
15:00 Break
15:20 365.6 Computation of a Conformal Phased Array on an Aircraft Fuselage
Q. Carayol, Dassault Aviation, France
15:40 365.7 Current Continuity Enforcement in First Order Locally Corrected Nystrom Method via RWG Moment Method
M. Shafiipour, V. Okhmatovski, University of Manitoba, Canada
16:00 365.8 Discretization of Surface Integral Equations Using Conforming and Non-Conforming Basis Functions
E. Ubeda1, P. Yla-Oijala1, J. M. Tamayo1, S. P. Kiminki2, J. M. Rius1, S. Järvenpää1
1Aalto University, Finland; 2Univestat Politecnica de Catalunya, Spain; 3Université de Toulouse, France
16:20 365.9 Integral Representations of the 1D Periodic Layered-Media Green’s Function for Periodic Printed Leaky-Wave Antennas
G. Valerio, Université de Rennes, France; D. R. Jackson, University of Houston, USA; A. Galli, Sapienza University, Italy
16:40 365.10 Non-Uniform Time Stepping Scheme for the Explicit Solution of the Time Domain Volume Integral Equation
A. Al-larraj, H. Bagci, King Abdullah University of Science and Technology, Saudi Arabia

Thursday, July 12 8:20-12:00 Chicago VI
Session 401

Applications of Frequency Selective Surfaces
Session Chairs: Kamal Sarabandi, George Shaker
08:20 401.1 Frequency Selective Surface for Reflector Antenna with Multiple Feeds
C. C. Hsu, N.-W. Chen, Yuan Ze University, Taiwan
08:40 401.2 Circularly Polarized Resonant Cavity Antenna Using Single-Layer Double-Sided FSS Superstrate
S.-C. Chiou, S.-Y. Chen, Graduate Institute of Communication Engineering, Taiwan
09:00 401.3 Frequency Selective Surfaces for High-Power Microwave (HPM) Applications
M. Li, N. Behdad, University of Wisconsin Madison, United States
09:20 401.4 A Frequency Selective Surface with Integrated Limiter for Receiver Protection
09:40 401.5 A Spatial Image Reflection Filter Based on Miniaturized-Element FSS for J-Band Radar Applications
M. Moalem, K. Sarabandi, University of Michigan, United States
10:00 Break
10:20 401.6 Inkjet-Printed Cylindrical EBG for Low-Cost, Omnidirectional Antennas Using Split-Ring Resonators
H. Leg1, G. Shaker2, F. Bush1, M. M. Tentzeris1
1Georgia Institute of Technology, United States; 2University of Waterloo, Canada
10:40 401.7 Low Loss FSS Polarizer for 70 GHz Applications
G. I. Kani, V. Dyadyuk, CSIRO, Australia
11:00 401.8 A Broadband Flat Lens Based on Aperture-Coupled Patch FSSs with Four-Pole Resonant Behaviour
N. Wang, H. Duguchi, M. Tsuji, Doshisha University, Japan
11:20 401.9 Novel FSS Filters in Ka Band
V. Samphuang, N. K. Nahar, J. L. Volakis, The Ohio State University, United States
11:40 401.10 An EMI Shielding FSS for Ku-Band Applications
Absorbers and Scattering Control

Session Chairs: Zhongxiang Shen, Yikun Huang

08:20  402.1 A Dual-Polarized Switchable Microwave Absorber
Q. Zhang, Z. Shen, Nanyang Technological University, Singapore

08:40  402.2Circularly Polarized Receiving Antenna Systems With Zero Backscattering
A. O. Karlikainen, S. A. Tretyakov, Aalto University, Finland

09:00  402.3 Electromagnetic Choking of PEC Cylinders with a Single Isotropic and Homogeneous Layer
C. A. Valagiannopoulos, P. Alitalo, Aalto University, Finland

09:20  402.4 Metasurface Mantle Cloak for Antenna Applications
A. Monti, A. Toscano, F. Bilotti, "Roma Tre" University, Italy

09:40  402.5 Arbitrary Irregular Polygonal Electromagnetic Superabsorber
S. H. Sedghi1,2, M. Khalaji-Amirhosseini1
Iran Univ. of Science & Tech, UC Irvine, Iran; 1University of California, Irvine, USA

10:00 Break

10:20  402.6 Performance Analysis of the Effective Dielectric Model for Perfect Electric Conducting Objects
Y. Huang, Montana State University, United States; Y. Zhao, G. Wan, Northeastern Polytechnic University, China

10:40  402.7 Thin Wave Absorber Composed of Mushroom Structures
J. Shinohara, N. Michishita, Y. Yamada, National Defense Academy, Japan; H. Hada, Fujitsu Limited, Japan

11:00  402.8 Electromagnetic Power Absorption in Cylindrical Models
F. Keshmiri, C. Creuse, Université Catholique de Louvain, UCL, Belgium

11:20  402.9 RCS of Phased Array with Parallel Feed Network
H. Singh, S. H. R. M. Jha, CSDL-National Aerospace Laboratories, Bangalore, India, India

11:40  402.10 Fractal Dimension Effect in Scattering of the Multi-layered Sphere
L. Xu, G. Liu, School of Science, XIDIAN University, China

Evaluation Techniques for Compact Multi Element Antennas for MIMO

Session Chairs: Rodney Vaughan, Jane Yun

08:20  404.1 Theoretical Models for Improving OTA Measurement Quality of Throughput of LTE Devices with MIMO and OFDM in Reverberation Chamber
P.-S. Kildal, Chalmers University of Technology, Sweden; C. Olenius, Bluebit AB, Sweden

08:40  404.2 Evaluation of the MIMO Performance of LTE Handsets
I. Diousi1, A. Diafo2, S. M. Farooq1, C. Lapeyre1
1University of Cheikh Anta Diop, Senegal; 2University of Nice Sophia-Antipolis, France

09:00  404.3 Design and Verification of MIMO 2x2 Reference Antennas
J. Szim1, G. F. Pedersen1, J. Estrada1, A. Scammell2, L. J. Foged3
1Monarda Mobility Inc, USA; 2Aalborg University, Denmark; 3SATIMO, USA; 4SATIMO, Italy

09:20  404.4 Multiplexing Efficiency of MIMO Antennas with User Effects
R. Tian, B. K. Lau, Lund University, Sweden; Z. Ying, Sony Ericsson Mobile Communications AB, Sweden

09:40  404.5 Modeling System Throughput of Single and Multi-Port Wireless LTE Devices
A. Hussain, P.-S. Kildal, G. Durisi, Chalmers University of Technology, Sweden

10:00 Break

10:20  404.6 Testing MIMO Devices over the Air
J. O. Nielsen, O. N. Alrabadi, W. Fan, A. Yamamoto, AAU, Denmark; T. Sakata, G. F. Pedersen, Panasonic Corporation, Japan

10:40  404.7 A Method to Evaluate the Compactness of MEA
L.X. Yan, R. G. Vaughan, Simon Fraser University, Canada

11:00  404.8 A New Self-Interference and Self-Noise Evaluation Method for MIMO Cellular Devices
Y. Jing, H. Kong, Agilent Technologies, China; S. Duffy, Agilent Technologies, USA; M. Rumney, Agilent Technologies, UK; P. Jensen, Agilent Technologies, Denmark

11:20  404.9 Noise-Based Antenna Terms for Active Receiving Arrays
K. F. Warnick, BYU, United States; M. Iwashina, R. Maaskant, Chalmers University of Technology, Sweden; B. Woestenburg, ASTRON, The Netherlands

11:40  404.10 Evaluation of Multi Element Antennas in Reverberation Chamber
C. Olenius, C. Lönback Patané, A. Skårbratt, J. Åsberg, Bluetest AB, Sweden; P.-S. Kildal, Chalmers University of Technology, Sweden

AMTA Special Session - Advances in RF Measurement Technology

Session Chairs: Chris Coleman, Ivan LaHaie
Session Organizers: Ivan LaHaie, Chris Coleman

08:20  403.1 Operator Processing
C. M. Coleman, Integrity Applications Inc., United States

08:40  403.2 Equivalent Current Approach as an Advanced Field Interpolation Technique
L. J. Foged, L. Scalalqua, F. Saccardi, SATIMO, Italy; J. Araque Quijano, Universidad Nacional de Colombia, Colombia; M. Sbradini, ESA/ESTEC, The Netherlands; G. Vecchi, Politecnico di Torino, Italy

09:00  403.3 The NASA Debris Radar for Characterizing Static and Dynamic Ascent Debris Events for Safety of Flight
B. M. Kent, P. Ryan, C. Thomas, Air Force Research Laboratory - Sensors Directorate, United States

09:20  403.4 Reflector Surface Distortion on a Sub-Reflectarray Cassegrain System: Simulations, Measurements, and Microwave Holographic Diagnostics
H. Rajagopalan, Y. Rahmat-Samii, University of California Los Angeles, United States

09:40  403.5 Optimal Mode Filtering in Probe Corrected Cylindrical Near-Field Measurements
R. J. Pozorzelski, L. R. Amaro, California Institute of Technology, United States

10:00 Break

10:20  403.6 Parametric Study of Probe Positioning Errors in Spherical Near-Field Test Systems for Millimeter-Wave Applications
D. Janse van Rensburg, Nearfield Systems Inc, USA

10:40  403.7 Free Space Scattering Measurements of Scale 3D Structures
J.-M. Gelfrin, C. Eyraud, A. Litman, Institut Fresnel, France; R. Vaillen, B. Lacroix, Cefir, France

11:00  403.8 A Cone Shaped Taper Anechoic Chamber for Antenna Measurements in the 200 MHz to 18GHz Frequency Range
V. Rodriguez, ETS-Lindgren, United States
Thursday, July 12
8:20-12:00

Huron

Session 406

**Microstrip Antenna Arrays**

Session Chairs: Atif Shamim, Sean Han

08:20 407.1 Linear Array of 2x2 Dual-Polarized X-Band Microstrip Patch Sub Arrays for off-the-Grid Radar Array Antenna

P. Sharma, R. A. Rodriguez-Solis, University of Puerto Rico Mayaguez, United States

08:40 407.2 Linear Aperiodic Array of Microstrip Patch Antennas with Grating Lobes Reduction

G. Leon, M. Arrebolba, S. Suarez, L. F. Herran, F. Las-Heras, Universidad de Oviedo, Spain

09:00 407.3 Fast Solution for the Radiation of Microstrip Antenna Arrays Covered with Metamaterial Superstrates

O. Siddiqui, H. Attia, N. Sunwan, O. Ramahi, University of Waterloo, Canada

09:20 407.4 Low Profile Multibeam Dual Polarization Array Antenna with Compensated Mutual Coupling

L.-P. Shen, H. Trigui, S. Dean, B. Yan, Ultra Electronics-TCS, Canada

09:40 407.5 Study of LCP Based Flexible Patch Antenna Array

F. A. Ghaffar, A. Shamim, King Abdullah University of Science and Technology (KAUST), Saudi Arabia; L. Roy, Carleton University, Canada

10:00 Break

10:20 407.6 A 24-GHz Microstrip Grid Array Antenna

L. Zhang, Y. P. Zhang, Y. Lu, Nanyang Technological University, Singapore

10:40 407.7 A Narrow Beamwidth Array Antenna Design for Indoor Non-Contact Vital Sign Sensor

T.-C. Tang, Y.-R. Chuang, K.-H. Lin, National Sun Yat-sen University, Taiwan

11:00 407.8 A Dual Band and Dual Polarization Array Antenna for AMRFC Application

Y. Lee, D. Gu, T. Song, J. Choi, Hanyang University, South Korea

11:20 407.9 Wide Bandwidth Dual-Frequency Dual-Polarized Microstrip Array Antenna for Ka-Band Applications

W. Li, D. Ren, X. Liang, R. Jin, J. Geng, S. Ye, W. Wang, Q. Guo, Shanghai Jiao Tong University, China

**Thursday, July 12**
8:20-12:00

**Michigan B**

**Session 408**

**Inverse Scattering and Imaging: Methods and Algorithms**

Session Chairs: Andrea Massa, Magda El-Shenawee

08:20 408.1 Minimum-Norm Current Formulation for MT-BCS Inversion of Scattering Data

G. Oliver, L. Poli, A. Massa, ELEDIA Research Center - University of Trento, Italy

08:40 408.2 Two-Step (Estimate and Detect) Sparse Imaging

M. Nikolos1, A. Nehorai1, A. Djordjevic1
1University of Belgrade, Serbia

09:00 408.3 A Contrast Source Inversion Method Using Truncated Wavelet Representations

O. Semerci, M. Li, A. Abubakar, T. M. Habashy, Schlumberger-Doll Research, United States

09:20 408.4 Inversion of EM Scattering Data Through a Multiresolution Regularization Approach Within the Contrast Source Formulation

O. Semerci, M. Li, A. Abubakar, T. M. Habashy, Schlumberger-Doll Research, United States
Reconfigurable Antennas

Session Chairs: Fan Yang, Greg Huff

08:20 409.1 A Reconfigurable Patch Antenna with Quadri-Polarization States Using Dual Feed Ports
N. Yang¹, B. Gong¹, F. Yang², A. Z. Elsherbeni³
¹Shanghai Institute of Technology, China; ²The University of Mississippi, USA; ³Tsinghua University, China

08:40 409.2 Microstrip Antennas with Full Polarization Diversity Using Packaged RF MEMS Switches
K. M. Hu, G. M. Rebeiz, University of California, San Diego, United States

09:00 409.3 Annular Ring Monopole Antenna with Switchable Polarization
S.-P. Phang, N.-W. Chen, Yuan Ze University, Taiwan

09:20 409.4 Circular Polarization Switchable Single Layer Microstrip Array Antenna
T. Ushijima, E. Nishiyama, I. Toyoda, M. Aikawa, Saga University, Japan

09:40 409.5 Single-Feed Polarization Reconfigurable Patch Antenna

10:00 Break

10:20 409.6 Ultra Stretchable Fluidic Crossed Dipoles with Mechanical Coupling
S. C. Desai¹, G. J. Hayes¹, J.-H. So¹, G. Lazzar², M. D. Dickey³
¹North Carolina State University, United States; ²University of Utah, United States

10:40 409.7 A Reconfigurable Dielectric Resonator Antenna Using Movable Dielectric Slabs
T. Kappeler, M. Okoniewski, University of Calgary, Canada

11:00 409.8 Microvascular Conductive Liquid Switches for Frequency Reconfigurable Slot Antenna
A. J. King¹, J. F. Patrick¹, N. R. Sottos¹, S. R. White¹, G. H. Huff²
¹University of Illinois at Urbana-Champaign, United States; ²Texas A&M University, United States

11:20 409.9 A Reconfigurable Antenna with Magnetically-Coupled Switches
E. A. Fenner, K. E. Lenz, J. M. Tomasic, Loyola University Maryland, United States

11:40 409.10 Multi-Scale Modeling of Antenna Reconstructions Mechanisms Based on Fluidic Dispersions of Nanoparticles
G. H. Huff, J. D. Barrera, S. A. Long, Texas A&M University, United States

Thursday, July 12
8:20-12:00
Superior A

Session 409
AP-S/URSI

Thursday, July 12
8:20-12:00
Colorado
1 Politecnico di Torino, Italy; 2 Universidad Nacional de Colombia, Colombia

10:40 411.7 A Miniaturized Circularly Polarized, Parasitic Array Antenna for Ground Station Communication with Cube Satellites
C. Cato, S. Lim, Georgia Southern University, United States

11:00 411.8 Quad Band CPW-Planar IFA with Independent Frequency Control for Wireless Applications
D. M. N. Elsheikh, A. M. M. Soliman, E. A. Abdallah, Electronics Research Institute, Egypt

11:20 411.9 Multi Band Microstrip Slot Antenna for Mobile Base Station
M. S. El-gendy, H. H. Abdulrahman, E. A. F. Abdallah, Electronics Research Institute, Egypt

11:40 411.10 A Penta-Band Two Elements Bow-Tie Patch Array Antenna
S. M. Razavi zadah, IRIB University, Iran

Thursday, July 12  8:20-12:00  Missouri

Session 412  AP-S

Transients and Time-Domain Techniques
Session Chairs: Shanker Balasubramaniam, Tapan SARKAR

08:20 412.1 A Stable Higher Order TDIE Solver Using a Separable Approximation for Convolution with the Retarded Potential
A. J. Pray, N. V. Nair, B. Shanker, Michigan State University, United States

08:40 412.2 A Hybrid Method of Moment (MoM) and Physical Optics (PO) Technique in the Time Domain
Z. Mei, Z. Yu, T. K. Sarkar, M. Salarz-Palma
Syracuse University, United States; Xi’an University, China; Universidad Carlos III de Madrid, Spain

09:00 412.3 A Random-Plane-Wave Model for Short-Pulse-Excited Ray-Chaotic Enclosures
G. Castaldi, V. Guidi, I. M. Pinto, University of Sannio, Italy

09:20 412.4 A Novel Time Delay Controlling UWB Array Based on Analytical Algorithm
P. Li, J. Pan, D. Yang, UESTC, China

09:40 Break

10:20 412.5 A Comparative Study of Volumetric Vs. Subcell Modeling of Thin-Wire Structures in FVTD
I. Jeffrey, J. LoVetri, University of Manitoba, Canada; C. Fumeaux, University of Adelaide, Australia

10:40 412.6 Time Domain Integral Equation Solver for Composite Scatterers Using a Separable Expansion for Convolution with the Retarded Potential
A. J. Pray, N. V. Nair, B. Shanker, Michigan State University, United States

11:00 412.7 Self-Consistent Modeling of Higher Pressure Microwave PACVD Reactors
C. S. Meierbach, T. A. Grotjohn, B. Shanker, Michigan State University, United States

11:20 412.8 Analysis of Two Methods of Poles Extraction for Antenna Characterization
F. Surrazz, A. Shariati, Institute of Electronics and Telecommunications of Rennes (IETR), France; P. Poulious, P. Potier, J. Chauveau, Direction Générale de l’Armement (DGA), France

11:40 412.9 Time-Domain Method of Moments Accelerated by Adaptive Cross Approximation Algorithm
Y. Yan, Y. Zhang, X.-W. Zhao, Xi’an University, China; Z. Mei, W. Zhao, T. K. Sarkar, Syracuse University, United States

Thursday, July 12  8:20-12:00  Parlor C

Session 413  AP-S

Millimeter Wave Printed Antennas
Session Chairs: Duxian Liu, Mohammad Fakharzadeh

08:20 413.1 An Aperture-Coupled Patch Antenna in RFIC Package for 60 GHz Applications
D. Liu, S. Reynolds, IBM, United States

08:40 413.2 Antenna-in-Package Solution for Millimeter-Wave Applications: Slotted-Patch in a Multi-layer PCB
A. Enayati, G. A. E. Vandenbosch, W. D. Raedt
IMEC, Belgium; 2KU Leuven, Belgium

09:00 413.3 HDI Organic Technology Integrating Built-in Antennas Dedicated to 60 GHz SIP Solution
STMicroelectronics; France, LEAT-CREMENT, France; IM2NP, France; Orange Labs-CREMENT, France

09:20 413.4 Broad E-Plane Beamwidth Zeroth-Order Resonance Patch Antenna
S. -T. Ko, J.-H. Lee, Hongik University, South Korea

09:40 413.5 A Compact Dual-Band Aperture-Coupled Microstrip Antenna for Ku-Band Applications
M. Sasan, P. Rezaei, Semnan University, Iran

10:00 Break

10:20 413.6 A Compact 4 by 1 Patch Array Antenna-in- Package for 60 GHz Applications
M. Fakharzadeh, Peraso Technologies, Canada

10:40 413.7 Simultaneous Optimization of Aperture and Feed Line of a Microstrip Patch Antenna
P. Duk, C. Wan, Mentor Graphics, United States

11:00 413.8 Numerical Comparison of Exact and Asymptotic Methods for Sommerfeld Integral Evaluation with Applications to Microstrip Antennas
D. Chatterjee, University of Missouri Kansas City (UMKC), United States; S. M. Rao, M. S. Khusksin, Naval Research Laboratory, United States

11:20 413.9 Wideband Shorted Higher-Order Mode Millimeter-Wave Patch Antenna
D. Wang, H. Wong, K. B. Ng, C. H. Chan, City University of Hong Kong, China

11:40 413.10 A High Selectivity Band-Notched UWB Antenna with Controllable Notched Bandwidths
G. Yang, Q.-X. Chu, School of Electronic and Information Engineering, South China University of Technology, China

Thursday, July 12  8:20-12:00  Mississippi

Session 414  AP-S

Propagation in Complex Environments
Session Chairs: Benjamin Bush, DaHan Liao

08:20 414.1 Practical Modeling of Radio Wave Propagation in Shallow Seawater
B. F. Bush, K. Naishadham, V. K. Tripp, Georgia Institute of Technology, United States

08:40 414.2 Evaluation of Ricean K-Factor of an Ultra-Wideband Channel in an Underground Mine
B. Nikakos, Université Laval, Canada; N. Hakem, G. Y. Delisle, LRTCS-UQAT, Canada

09:00 414.3 Characterization of the 60 GHz Channel in Underground Mining Environment
C. Lounis, N. Hakem, G. Y. Delisle, LRTCS-UQAT, Canada

09:20 414.4 Experimental Characterization of MIMO-UWB Multipath Underground Mine Radio Channels
I. Ben Mabrouk, L. Talbi, M. Nedil, K. Hettak
Underground Communication Research Laboratory, Canada; UQO, Canada; Communications Research Centre Canada, Canada

09:40 414.5 Antenna Directivity Impact on MIMO System Performance
A. Salim, N. Kandili, M. Nedil, UQAT, Canada; I. Ben Mabrouk, L. Talbi, UQO, Canada

10:00 Break

10:20 414.6 Peer to Peer Propagation in Vegetation Media for Wireless Sensor Networks
J. A. Gay-Fernández, I. Cufí, Universidade de Vigo, Spain

10:40 414.7 Radar Target Discrimination for Infrastructure-Based Navigation
C. O. Hargray, CSIRO, Australia; A. Abbas, V. Clarkson, N. V. Shuley, The University of Queensland, Australia
11:00 414.8 Further Investigation of Empirical Path-Loss Modeling for Short Forested Paths
Y. H. Lee, Nanyang Technological University, Singapore; Y. S. Meng, National Metrology Centre, A*STAR, Singapore

11:20 414.9 RF Leakage Radiation from Microwave Oven for Aircraft Interior Applications
S. Narayan, A. K., R. M. Iba, CSIR-National Aerospace Laboratories, India; J. P. Bonner, Boeing Research & Technology, USA

11:40 414.10 Channel Model for in-Body WBAN
Y. Y. Hsu, Kunning University, China; D. Shen, Yunnan University, China; E. Dutkiewicz, G. Fang, Macquarie University, Australia

Thursday, July 12 8:20-12:00 Ohio
Session 415 AS-SP

Fast Integral Equation Solvers and Stable Discretizations
Session Chairs: Francesco Andriulli, Levent Gurel

08:20 415.1 Stable Discretization of the Electric-Magnetic Field Integral Equation with the Divergence Taylor-Orthogonal Basis Functions
E. Ubeda1, J. M. Tamayo2, J. M. Rius1 1Universitat Politècnica de Catalunya (UPC), Spain; 2Université de Toulouse, France

08:40 415.2 A Singularity Cancellation Technique on Arbitrary Higher Order Patch Descriptions
N. V. Nair1, A. J. Pray1, J. Villa-Giron2, B. Shanker1, D. R. Wilton3 1Michigan State University, United States; 2AFRL, United States; 3University of Houston, United States

09:00 415.3 A Theoretical Proof on the Error-Bounded Low-Rank Representation of Integral Operators for Large-Scale 3-D Electrodynamic Analysis
W. Chai, D. Jiao, Purdue, United States

09:20 415.4 A Provably Stable MoT Scheme Based on Quadratic Spline Basis Functions
E. van’t Wout, H. van der Ven, National Aerospace Laboratory NLR, Netherlands; D. R. van der Heul, C. Vaik, Delft University of Technology, Netherlands

09:40 415.5 New Preconditioning Methods Based on Calderon's Formulae for PMCHWT Formulation
K. Nino, N. Nishimura, Kyoto University, Japan

10:00 Break

10:20 415.6 Low-Frequency CMF-EFIE with Perturbation Method for Open Capacitive Problems
Q. S. Liu1, S. Sun2, W. C. Chew1,2 1The University of Hong Kong, China; 2University of Illinois at Urbana-Champaign, USA

10:40 415.7 A Helmholtz Subspaces Preserving Fast Solver Based on Multigrid Inversions of the Loop-Star Decompositions
S. B. Adrian, F. P. Andriulli, Ecole nationale superieure des telecommunications de Bretagne (TELECOM Bretagne), France

11:00 415.8 Fast Wideband Integral Solution for Hybrid Finite Element / Boundary Integral Problems with Higher Order Boundary Functions
D. T. Schobert, T. F. Eibert, TU Munchen, Germany

11:20 415.9 An Hp-Refinement Scheme for Surface Integral Equations Using the Generalized Method of Moments
N. V. Nair, B. Shanker, Michigan State University, United States

11:40 415.10 Integral Equation Methods at Very Low Frequency
F. Vigo, M. Ferrando-Bataller, A. Valero-Nogueira, D. Sanchez-Escudero, Universidad Politecnica de Valencia, Spain

Antennas for MIMO and Diversity Systems
Session Chairs: Buon Kiong Lau, Marco Migliore

09:00 IF41 414.2 Design of a MIMO Antenna to Enhance Channel Capacity for Indoor Base Stations
D. Uchida, H. Arai, Yokohama National University, Japan

09:10 IF41.3 A Broadband E-Plane Omnidirectional Antenna for 4G LTE Applications with MIMO
E. Fojani, Y. Yu, Z. D. Chen, Dalhousie University, Canada

09:20 IF41.4 Discrete Lens Array Modeling and Design for Optimum MIMO Communications at Mm-Wave
J. Brady, N. Behdad, A. Sayeed, University of Wisconsin - Madison, United States

09:30 IF41.5 A Novel 4-Shaped Dual-Band 780/2450 MHz 4-Element MIMO Antenna for Handheld Devices
M. S. Sharawi, M. A. Jan, King Fahad University of Petroleum and Minerals (KFUPM), Saudi Arabia; D. N. Aloi, Oakland University, USA

09:40 IF41.6 Exploiting ADS-Arrays for the Synthesis of MIMO Systems
G. Oliveri, A. Massa, ELEDIA Research Center - University of Trento, Italy; M. D. Migliore, Microwave Laboratory - University of Cassino, Italy

09:50 IF41.7 Effective Degree-of-Freedom of a Compact Six-Port MIMO Antenna
R. Tian, B. K. Lau, Lund University, Sweden

10:00 IF41.8 A Systematic Spherical Vector Wave Approach for Multi-Antenna Systems
M. Mohajer, S. Chaudhuri, S. Safavi-Naeini, University of Waterloo, Canada

10:10 IF41.9 A Slot Dipole Antenna with Polarization Diversity for WLAN Application
W.-Y. Chen, Graduate Institute of Communication Engineering National Taiwan University, Taiwan; P. Hu, Department of Electrical Engineering National Taiwan University, Taiwan

10:20 IF41.10 Multi-Band MIMO Antenna for Wireless Devices
M. M. Morsy, M. Basha, Sensor Networks and Cellular System (SNCS) Research Center, Saudi Arabia; M. Khan, University of Saskatchewan, Canada

10:30 IF41.11 Design of Dual-Band B-Shaped Monopole Antenna for MIMO Application
H. U. Udhi, M. R. Kamarudin, T. A. Rahman, R. A. Dewan, Universiti Teknologi Malaysia (UTM), Malaysia

Thursday, July 12 10:00-16:00 River Exhibition Hall B
Session IF42 AS-SP Interactive Forum

Chirality and Biaxiality in Metamaterials
Session Chairs: Douglas Werner, Marco Antoniades

09:00 IF42.1 Polarization Rotation by Multilayered Helix Metamaterial
N. Burford, S. Marsh, Y. Zhang, J. N. Dahya, Southeast Missouri State University, United States

09:10 IF42.2 Experimental Verification of Substrate-Induced Biaxiality in Optical Metamaterials

09:20 IF42.3 Statistical Analysis of Affected Parameter Variations on Double-Negative Behavior of Metamaterials
Y. Li, N. Bowler, Iowa State University, United States

09:30 IF42.4 A Controllable Chiral Metamaterial Resonators with Four Cut Wires
Z. Mozavi Razi, I. Arghand Lafmajani, P. Rezaei, Semnan university, Iran

09:40 IF42.5 Multifaceted Frequency-Selective Split Ring Resonators (SRR)
I. Arghand Lafmajani, Z. Mozavi Razi, P. Rezaei, Semnan university, Iran

09:50 IF42.6 Effects of Magnetic Resonance on the Band Structure of 3D Dielectric Metamaterial Arrays
A. Hosseinzadeh, E. Semouchkina, Michigan Technological University, United States
IF42.7 Effect of Complementary Rose Curve Resonator (CRCRs) on the Effective Negative Permeability
B. Saviri, I. Sass, L. Talbi, Université de Quèbec en Outaouais, Canada; K. Hettuk, Communication Research Center (CRC), Canada; A. Kabiri, Harvard University, USA

IF42.8 Longitudinal Chirality, Particle Clusters, and Planar Nanoscale One-Way Guiding
V. Mars, B. Z. Steinberg, Tel-Aviv University, Israel

IF42.9 Asymptotic Evaluation of Field of a Magnetic Dipole over a Chiral Half-Space Medium
H. Hariti, M. Deholla, K. Sarabandi
1Radiation Laboratory, University of Michigan, Ann Arbor, MI, United States; 2ECE Department, University of Tehran, Iran

Thursday, July 12 10:00-5:00  River Exhibition Hall B
Session IF43 AP-S Interactive Forum

Circuit-Based Metamaterials

Session Chairs: John Donohoe, Dan Sievenpiper

IF43.1 Extremely Low-Profile Metamaterial-Based Curl Antenna
H. Nakano, J. Miyake, T. Sakurada, M. Oyama, Y. Iitsu, J. Yamauchi, Hosei University, Japan

IF43.2 Metamaterial-Inspired Circularly Polarized Slot Dipole Antenna Fed by Coplanar Waveguide
Y.-J. Lu, Graduate Institute of Communication Engineering, National Taiwan University, Taiwan; P. Hsu, Department of Electrical Engineering, National Taiwan University, Taiwan

IF43.3 Beam Scannable Patch Array Antenna Employing Tunable Metamaterial Phase Shifter
Y.-K. Jung, B. Lee, Kyunghee Univ., South Korea

IF43.4 Reconfigurable Zero-Order Loop Antenna
M. Facco1,2, D. Piazza2
1University of Padova, Italy; 2Adant Srl, Italy

IF43.5 Control of Radiation on Metamaterial Leaky Wave Antennas with Wing-Shaped Structures
D. Jeon, B. Lee, Kyung Hee University, South Korea

IF43.6 Electronically Steerable Antenna Using Superluminal Waveguide and Tunable Negative Capacitors
J. Long, M. Jacob, D. Sievenpiper, University of California, San Diego, United States

IF43.7 The Memristor in Reconfigurable Radio Frequency Devices
M. D. Gregory, D. H. Werner, The Pennsylvania State University, United States

IF43.8 Matching Elements and a Directional Coupler Based on ENZ Narrow Channels
S. Seren, J. P. Donohoe, Mississippi State University, United States

IF43.9 A Metamaterial-Inspired High-Q X-Band Oscillator
K. Y. Park, N. Wiwatcharagos, P. Chahal, Michigan State University, United States

IF43.10 Parametric Signal Behaviour in a Nonlinear Left-Handed Transmission Line
G. N. Milford, L. Chen, University of New South Wales, Australia

Thursday, July 12 10:00-5:00  River Exhibition Hall B
Session IF44 AP-S Interactive Forum

Plasmonics

Session Chairs: Andrea Alu, Ali Kabiri

IF44.1 Wideband Absorbers in the Visible Spectrum Based on Optimizing Quasicrystal Nanosphere Arrays
F. A. Namir, X. Wang, D. H. Werner, Pennsylvania State University, United States

IF44.2 Influence of Disorder on the Optical Properties of Spherical Plasmonic Nanoclasters
A. Vallecchi, M. Albani, University of Siena, Italy; F. Capolino, University of California Irvine, USA

IF44.3 Subwavelength Imaging of Plasmon Superlens with 3-Dimensional Small Surface Roughnesses
S. Huang, L. Tsang, University of Washington, United States

IF44.4 Enhanced Local Fields in Aperiodic Rotationally Symmetric Nanosphere Arrays
F. A. Namir, X. Wang, D. H. Werner, Pennsylvania State University, United States

IF44.5 Optical Properties of Quasicrystalline Gold Nanoparticle Arrays in the Visible Spectrum
F. A. Namir, S. Yin, X. Wang, D. H. Werner, T. S. Mayer, Pennsylvania State University, United States

IF44.6 Multi-Layered Plasmonic Cloaks to Engineer the Scattering Signature of Resonant Nanoparticles
F. Monticone, A. Ali, The University of Texas at Austin, United States

IF44.7 Leaky Wave Antennas Based on Spoof Surface Plasmons Transmission Waveguides
O. Quevedo-Teruel, Y. Hao, Queen Mary, University of London, United Kingdom

IF44.8 One-Way Optical Waveguides for Perfectly Matched Non-Reciprocal Nano-Antennas
Y. Hadad, B. Z. Steinberg, Tel-Aviv University, Israel

IF44.9 An Ultrathin Quarter-Wave Nano-Plate Based on Detuned Plasmonic Nanoantennas
Y. Zhao, A. Ali, The University of Texas at Austin, United States

IF44.10 Angle-Independent Antireflective Layer Based on Buried IR Nanonanotips
A. Kabiri, F. Capasso, Harvard University, United States

RFID antenna performance on materials

Session Chairs: Leena Ukkonen, Jasmin Grosinger

IF45.1 Investigation on Placement Sensitivity of Meandered Dipole Performance for RFID Systems
J. E. Rayle, University of Oklahoma, United States

IF45.2 The Effect of Lossy Dielectric Objects on a UHF RFID Meander Line Antenna
M. Kanesan, D. V. Thiel, S. G. O’Keefe, Griffith University, Australia

IF45.3 Small Slot Antenna for Metal Mountable UHF RFID Tags
T. Bjorninen, L. Ukkonen, Tampere University of Technology, Finland

IF45.4 A Bend Transducer for Backscatter RFID Sensors
J. Grosinger, J. D. Griffin, Disney Research Pittsburgh, USA

IF45.5 Read Range and Sensitivity Study of RFID Temperature Sensors
O. Qiao1, F. Yang2, A. Elsherbeni1
1The University of Mississippi, United States; 2Tsinghua University, China

IF45.6 Reconfigurable RFID Tag Antenna for Wireless Temperature Monitoring
Z. Jiang; Tsinghua University, China; F. Yang, The University of Mississippi, USA

IF45.7 Multi-Loop-Bridge Antenna for Improved Positioning Using HF-RFID
M. Y. Ahmad, A. S. Mohan, University of Technology Sydney, Australia

IF45.8 Precise Positioning of RFID Tags Using a Phased Array Antenna
C. C. Bantin, C.C. Bantin & Associates Ltd., Canada; C. Schwellnus, W. Kinio, Thales Rail Signalling Solutions, Canada; A. Luttgen, University of Toronto, Canada

IF45.9 RFID-Grids for Deformation Sensing
S. Cazz ozone1, G. Marrocco2
1German Aerospace Center (DLR), Germany; 2University of Roma Tor Vergata, Italy
Thursday, July 12 10:00-5:00  River Exhibition Hall B  Session IF46  AP-S  Interactive Forum

Small Antennas: Designs and Applications

Session Chairs: Nicholas Buris, Mats Gustafsson

IF46.1  Sum Rule for Conductor-Backed Thin-Wire Dipole Antennas  D.-H. Kwon, University of Massachusetts Amherst, United States

IF46.2  Optimal Charges and Currents on Small Wire Antennas  M. Ciamarra, M. Gustafsson, Lund University, Sweden

IF46.3  2-Port Antenna Based on the Selective Excitation of Characteristic Modes  R. Martens, D. Mantuffel, University of Kiel, Germany

IF46.4  Characteristic Mode Analysis of a Shorted Microstrip Patch Antenna  C. Van Nierkerm, J. T. Bernhard, University of Illinois at Urbana-Champaign, United States

IF46.5  Direct Pulse Generation and Radiation Through Small Antennas Weakly Coupled to Switched Circuits  X. Wang, Nanjing University of Aeronautics and Astronautics, China

IF46.6  Capacitively Excited and Fully Planar Small Size Printed Antenna  G. Fortin de la Guerinière, UFCG, Brazil; C.-C. Chen, J. L. Volakis, OSU, United States

IF46.7  A Study of Planar Folded Dipole Antenna with Feed line for MIMO  T. Ito, M. Nagatohsi, H. Morishita, National Defense Academy, Japan

IF46.8  A Compact Folded Ring Resonator Antenna with Multiband Characteristics  N. R. Labadig, S. K. Sharma, San Diego State University, United States; G. Rebeiz, University of California, San Diego, United States

IF46.9  Compact Pentamode, Tri-Band Metamaterial Antenna for Wireless Applications  S. K. J., P. K. Sahu, N.I.T. ROORKEA, India; S. K. Behera, National Institute of Technology, India; N. Dakhil, (6Tel) Sup'Com, Tunisia

IF46.10  CPW Fed Elliptical Zeroth Order Resonant Antenna for WiMax Applications  S. K. J., P. K. Sahu, N.I.T. ROORKEA, India

IF46.11  Spherical Mode Coupling in Multimode Electrically Small Antennas  J. J. Adams, J. T. Bernhard, University of Illinois at Urbana-Champaign, United States

Thursday, July 12 10:00-5:00  River Exhibition Hall B  Session IF47  AP-S/URSI  Interactive Forum

Wireless Power Transfer

Session Chairs: Majid Manteghi, Karl Warnick

IF47.1  Investigation of Material Effects on Near-Field Wireless Power Transfer  J.-Y. Yoon, H. Ling, The University of Texas at Austin, United States

IF47.2  Wireless Powering Based on Strongly Coupled Magnetic Resonance with SRR Elements  H. Hu, S. V. Georgakopoulos, Florida International University, United States

IF47.3  Wireless Power Transmission to Device in Concrete via Magnetic Resonance  O. Jonah, S. Georgakopoulos, FIU, United States

IF47.4  Wireless Power Transmission to Sensors in Reinforced Concrete via Magnetic Resonance  O. Jonah, S. V. Georgakopoulos, FIU, United States

IF47.5  Analysis of Misalignments in Efficiency of Mid-Range Magnetic Resonance Wireless Power Link  K. Y. Kim, Y.-H. Ryu, E. Park, K.-S. Song, C.-H. Ahn, Samsung Advanced Institute of Technology, South Korea

IF47.6  A Phased Coil Array for Efficient Wireless Power Transmission  D. Liang, H. T. Hsu, T. S. Yeo, National University of Singapore, Singapore

IF47.7  Adaptive Impedance Matching of Wireless Power Transfer Using a Multi-Loop Feeding  B. C. Park, J.-H. Park, J.-H. Lee, Hongik University, South Korea

IF47.8  Near-Field Antenna Systems for Wireless Power Transfer to Embedded Sensors  X. Jin, J. M. Caicedo, M. Ali, University of South Carolina, United States

IF47.9  A Study on Power Transmission Through the Human Body for Implantable Device  J. Kim1, J.-H. Hwang2, S. Kang3, Y. T. Kim1
1Chosun University, South Korea; 2Electronics and Telecommunications Research Institute, South Korea

IF47.10  Power Transmission Through the Human Body Using Magnetic Coupling  M. Jeong1, J.-H. Hwang2, S. Kang3, Y. T. Kim1
1Chosun University, South Korea; 2Electronics and Telecommunications Research Institute, South Korea

IF47.11  Tri-Loop Antenna for Impedance Matching and Frequency Tuning of High-Q Resonators in Wireless Power Transfer  D. S. Ricketts, A. Hillenius, Carnegie Mellon University, United States

IF47.12  Impact of Pitch and Ground Plane on Helical Antennas in near Field Wireless Power Transfer System  S. M. Khan, N. D. Maresch, Kansas State University, United States

Thursday, July 12 13:20-17:20  Chicago VI  Session 451  AP-S/URSI  Analysis and Design of Frequency Selective Surfaces

Analysis and Design of Frequency Selective Surfaces

Session Chairs: Raj Mittra, Juan Mosig

13:20  451.1 Three-Dimensional FSS Elements with Wide Frequency and Angular Responses  R. Mittra, C. Pelletti, The Pennsylvania State University, United States

13:40  451.2 Dichroic FSS Design for Angularly Stable Response Using Homogenization  C. D. Emiroglu, D.-H. Kwon, University of Massachusetts Amherst, United States

14:00  451.3 A New Technique for Efficient and Accurate Analysis of Arbitrary 3D FSSs, EBGs and Metamaterials  R. Mittra, R. K. Arya, C. Pelletti, The Pennsylvania State University, United States

14:20  451.4 Reconfiguration Schemes of Parallel Metallic Strips for Nimble Antennas  M. N. Jari, T. A. Denidni, University of Quebec, EMIT-INS, Canada

14:40  451.5 Scattering of Cylindrical FSS with Rectangular Patch Array  Y.-R. Jeong1, K.-W. Lee2, J.-P. Hong2, H.-J. Chun1, M.-G. Lee1, J.- G. Yook1
1Yonsei University, South Korea; 2Kongju National University, South Korea; 3Agency for Defense and Development, South Korea

15:00  Break

15:20  451.6 Fully Conformal FSS via Rapid 3D Prototyping  I. M. Elhennawy, S. E. Sarma, MIT, United States; B.-A. Wu, Air Force Research Laboratory, United States

15:40  451.7 Design of a Bandpass Fss on Dual Layer Energy Saving Glass for Improved RI Communication in Modern Buildings  I. S. Syed, K. Esselle, G. Kiani, Macquarie University, Australia


16:20  451.9 Design of Customized Fractal FSS  A. Sonker1, A. Patnak1, S. N. Sinha1, J. R. Mosig1
Antennas with Novel Materials

Session Chairs: Steve Weiss, Per-Simon Kildal

13:20 452.1 Development of Magnetodielectric Materials for Antenna Applications
L. Zhu, S. Stoyanov, M. B. McLaughlin, Spectrum Magnetics LLC, United States; J. Q. Xiao, University of Delaware, United States

13:40 452.2 A Dual-Polarized Antenna Excited by a Meta-Surface Lens
M. Sabatini, E. Martini, G. Minatti, S. Magi, University of Siena, Italy

14:00 452.3 Comparison of Negative Impedance Inverters and Converters in the Design of Non-Foster Reactive Elements
A. M. Efremov, R. G. Rojas, The Ohio State University, United States

14:20 452.4 Circular Polarization Metamaterial Superstrate Excited by a CRLH Antenna
K. Kahng, S. Kang, I. Yang, University of Incheon, South Korea; J. Ja, ETRI, South Korea

14:40 452.5 Electromagnetic Analysis on Arbitrary Material Coated Slot Antenna
B. K. Kim, S. O. Park, Korea Advanced Institute of Science and Technology (KAIST), South Korea

15:00 Break

15:20 452.6 Ultra-Wide-Band Slot Antenna with Graded Index Superstrate
H. Bahram, K. Sarabandi, University of Michigan - Ann Arbor, United States

15:40 452.7 A Novel Antenna for Thru-Wall Communications
F. Schettino, D. Pinchera, University of Cassino, Italy

16:00 452.8 Evaluation of Losses in Microstrip Gap Waveguide for Slot Antennas Applications
F. Pucci, E. Rajo-Iglesias, M.-P. Kildal
Chalmers University of Technology, Sweden; ’University Carlos III of Madrid, Spain

16:20 452.9 Self-Filtering Low-Noise Horn Antenna
F. Bilotti, L. Di Palma, D. Ramaccia, A. Toscano, ‘Roma Tre’ University, Italy

16:40 452.10 Radiation from a Vertical Electric Dipole above an Optically Plasma-Induced Semiconductor Layer Superimposed on a Dielectric Slab
K. Nishimura, Rikkyo University, Japan

Thursday, July 12 13:20-17:00 Chicago VII
Session 452 AP/S/URSI

Challenging canonical scattering problems and new EM problems involving special materials

Session Chairs: Guido Lombardi, Andrea Alu
Session Organizers: Guido Lombardi, Andrea Alu

13:20 453.1 Electromagnetic Scattering by a Circular Impedance Cone: Diffraction Coefficients and Surface Waves
M. A. Lvalnov, Saint Petersburg University, Institute in Physics, Russian Federation

13:40 453.2 Spectral Properties of Wedge Problems
V. Daniele, G. Lombardi, Politecnico di Torino, Italy

14:00 453.3 Reduction of RCS of a Canonical Shape with a Metamaterial Coating
A. Osipov, E. Canalupi, Microwaves and Radar Institute, German Aerospace Center (DLR), Germany

14:20 453.4 Zero Scattering from a Finite Homogeneous DNG Metamaterial Body
P. L. E. Uslenghi, University of Illinois at Chicago, United States; V. G. Daniele, Politecnico di Torino, Italy

14:40 453.5 Passive and Active Cylindrical and Spherical Coated Nano-Particle Systems at IR and Visible Wavelengths and Their Applications
R. W. Ziolkowski, S. D. Campbell, University of Arizona, United States; S. Arlanagis, Technical University of Denmark, Denmark

15:00 Break

15:20 453.6 Coated Nano-Particle Jamming of Quantum Emitters
S. Arlanagis, Technical University of Denmark, Denmark; R. W. Ziolkowski, University of Arizona, USA

15:40 453.7 Resonances and Fields near Metamaterial Inclusions
R. C. McPhedran, CUDOS, University of Sydney, Australia; J. Helsing, Lund University, Sweden; G. W. Milton, University of Utah, USA

16:00 453.8 Large Absorption Efficiency in Ultralow Loss, Composite Plasmonic Nanoparticles
N. Mohammadi Estahelker, A. Ali, The University of Texas at Austin, United States

16:20 453.9 Scattering vs. Absorption Tradeoff Revisited in the Presence of Transformation Media
G. Castaldi, Y. Galda, University of Sannio, Italy; A. Ali, The University of Texas at Austin, USA; N. Engheta, University of Pennsylvania, USA

16:40 453.10 An Overview of Techniques for the Efficient Solution of Multilayered Media Problems Using the MIE
D. R. Wilton, D. R. Jackson, University of Houston, United States; G. Valerio, Université de Rennes, France; M. A. Francavilla, Istituto Superiore Mario Boella, Italy

17:00 453.11 Comparisons of Heterogeneous Multiscalar Finite Element Method and Localized Homogenization Process for Modeling Aperiodic Metamaterials
L. F. Lee, Z. Peng, The Ohio State University, United States

Thursday, July 12 13:20-17:20 Chicago IX
Session 454 AP/S/URSI

Slotted and Guided Wave Antennas I

Session Chairs: BARKA Andre, Alejandro Valero-Nogueira

13:20 454.1 Design, Fabrication and Performance Tests of Horn Elliptical Antennas with Low Side Lobe and Coupling Levels
A. Barka, ONERA French Aerospace Lab, France; O. Seguin, C. Breuil, ONERA, France

13:40 454.2 Analysis of a Longitudinal Slot Excited by a Metal Support on a Hollow Rectangular Coaxial Line
M. Sano, J. Hirokawa, M. Ando, Tokyo Institute of Technology, Japan

14:00 454.3 Waveguide-Fed Cavity Backed Slot Antenna Array with High Efficiency in the Ku-Band
G.-L. Humph, S.-G. Zhou, T.-H. Chio, Temasek Laboratories@NUS, Singapore

14:20 454.4 Shaped Beam Synthesis Technique for Linear Arrays of Waveguide Longitudinal Slots
G. A. Casula, G. Mazzarella, G. Montisci, Università di Cagliari, Italy

14:40 454.5 Reduced-Cost Bayesian Support Vector Regression Modeling and Optimization of Planar Slot Antennas
P. Jacobs, University of Pretoria, South Africa; S. Kariel, S. Ongurtsov, Reykjavik University, Iceland

15:00 Break

15:20 454.6 Receptional Area Enlargement in MMW Short Range Communication Using Waveguide Slot Antennas with Large Number of Elements
M. Zhang, J. Hirokawa, M. Ando, Tokyo Institute of Technology, Japan

15:40 454.7 Equivalent-Admittance Slot Representation in Periodic Waveguides
A. Valero-Nogueira, J. J. Herranz-Herruzo, M. Baquero-Escudero, R. Hernández-Muñoz, Universidad Politecnica de Valencia, Spain

16:00 454.8 A Broad Angle Frequency Scanning Antenna Based on a Meandre Waveguide
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<th>Session</th>
<th>Title</th>
<th>Authors</th>
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<td>14:00</td>
<td>456.3</td>
<td>Accurate and Conforming Mixed Discretization of the Chiral Müller Equation</td>
<td>Y. Besheim1, K. Cools3, F. P. Andriulli1, D. De Zutter2, E. Michielssen1</td>
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<td>1Gent University, Belgium; 2University of Nottingham, UK; 3TELECOM Breteuil, France; 4University of Michigan, USA</td>
</tr>
<tr>
<td>14:20</td>
<td>456.4</td>
<td>Fast Monostatic Radar Imaging by Hierarchical Disaggregation</td>
<td>G. Schnaittinger, T. F. Ebert, TUM, Germany</td>
</tr>
<tr>
<td>14:40</td>
<td>456.5</td>
<td>PEMC-Backed Perfectly Matched Layer as a Truncation Boundary</td>
<td>V. Nayyeri, M. Soleimani, Iran University of Science and Technology, Iran; M. Dehmlolaie, University of Tehran, Iran</td>
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Thursday, July 12  

13:00-17:00  

**Chicago X**

### Phased Array Antennas IV

Session Chairs: Paul Werntz, Laila Salman  

#### 455.1  
**Dual-Polarized, X-Band, Flat-Panel Phased Array**  
J. N. Hansen, D.-J. Jung, K. Chang, Texas A&M University, United States

#### 455.2  
**Application of Phased Array Antenna for Radar Respiration Measurement**  
H. Ren, J. Shao, B. Arigong, H. Zhang, University of North Texas, United States; C. Gu, C. Li, Texas Tech University, United States

#### 455.3  
**Phased Array Scanning with Sequential Commands**  
J. Huang, B. Thrall, A. Lyons, M. B. Davis, R. Fitzgerals, Ball Aerospace, United States

#### 455.4  
**Beam Steering Performance of a C- and X-Band Compact Spirograph PMA (SPMA) Array**  
J. T. Rayno, S. K. Sharma, San Diego State University, United States

#### 455.5  
**A Comparison of Microstrip Patch ESPAR Array and Uniformly-Illuminated Array Performance**  
J. J. Luther, S. Ebadi, X. Gong, University of Central Florida, United States

15:00 Break

#### 455.6  
**Efficient Time Domain Method for Calculating Phased Array Dispersive Effects**  
P. C. Werntz, Boeing Space Systems El Segundo, United States

#### 455.7  
**A Broadband Phased Array Antenna with Wide Angular Coverage in a Low-Cost Organic Laminar Package for 60-GHz Wireless Chipsets**  
M. Spella, A. de Graauw, S. Drago, NXP Semiconductors, Netherlands

16:00 **Schelkunoff Multi Diagrams Receive Arrays**  
J. Euzière, R. Gainvitch, Supélec, France; B. Ugwun, R. Gillard, European University of Brittany, France

#### 455.9  
**Calibration Quality Analysis of Phased Array Antennas**  
O. Klici, A. Yalim, C. Cetinetepe, S. Demir, Middle East Technical University, Turkey

#### 455.10  
**Effect of Mutual Coupling in Active RCS Reduction**  
H. Singh, R. Rathore, R. Jha, CSIR-National Aerospace Laboratories, Bangalore, India, India

### Advances in Numerical Methods

Session Chairs: Jian-Ming Jin, Robert Adams  

#### 456.1  
**Improve the Accuracy of the Second-Kind Integral Equations for Generally Shaped Objects**  
S. Yan, J.-M. Jin, University of Illinois at Urbana-Champaign, United States; Z. Nee, University of Electronic Science and Technology of China, China

#### 456.2  
**Symmetric Coupling of Finite Element Method and Method of Moments Using Higher Order Elements**  
A. B. Manic1, M. M. Ilie2, B. M. Notaro3  
1Colorado State University, United States; 2University of Belgrade, Serbia
### Thursday, July 12

#### Session 458 13:20-17:00 Michigan B

**Inverse Scattering and Imaging: Technologies and Applications**

**Session Chairs:** Joe LoVetri, Sima Norghahanian

- **13:20** 458.1 13:30 Retina Design for 100GHz MST Imaging System
  M. Alonso del Pino, V. Garg, E. Nováč, J. Abel, J. Romeu, N. Llobart, L. Jofre
  ‘Technical University of Catalonia, Spain; ’Complutense University of Madrid, Spain

- **13:40** 458.2 A Study of Terahertz Scanning Probe Microscopy for PCB Inspection
  H. Cinikaya, M. Tekbas, A. Vertyi, TUBITAK-MAM, Material Institute, Turkey

- **14:00** 458.3 The Blade Beam Reflector Antenna for Stacked Nearfield Millimeter-Wave Imaging
  C. M. Rappaport, B. González-Valdés, Northeastern University, United States

- **14:20** 458.4 Correcting Mutual Coupling and Poor Isolation of a 1-D Microwave Imaging Array
  J. T. Craig, M. T. Ghaz, R. Zoughi, Missouri University of Science and Technology, United States

- **14:40** 458.5 Enhancement of Near-Field Probing in a Microwave Tomography System
  M. Ostadahmim, P. Mojabi, J. LoVetri, L. Shafai, University of Manitoba, Canada; S. Norghahanian, University of North Dakota, USA

- **15:00** Break

- **15:20** 458.6 Evaluation of a Microwave Tomography System for Animal Tissue Imaging
  M. Ostadahmim, A. Zakaria, P. Mojabi, J. LoVetri, L. Shafai, University of Manitoba, Canada

- **15:40** 458.7 Theory and Experiment on Imaging of Walls’ Interior Structures Using Diffraction Tomography
  C. Khan, W. Zhang*, A. Hoorfar*‘Villanova University, United States; ’Duke University, United States

- **16:00** 458.8 Three-Dimensional Real-Time Through-the-Wall Imaging
  W. Zhang*, A. Hoorfar*, Q. H. Liu
  ‘Duke University, USA; ’Villanova University, USA

- **16:20** 458.9 Tunnel Detection Using Underground-Focusing Spotlight SAR and Rough Surface Estimation
  B. Gonzalez-Valdes, F. Quivira, J. A. Martinez-Lorenzo, C. M. Rappaport, Northeastern University, United States

- **16:40** 458.10 A Clutter Cancellation Method for Through-Wall SAR Imaging
  B. Yektahasa, M. Dehmeshkand, University of Tehran, Iran

### Thursday, July 12 13:20-17:00 Superior A

**Frequency Configurable Antennas I**

**Session Chairs:** Harish Rajagopalan, Atef Elsherbeni

- **13:20** 459.1 A Planar Ultrawideband Antenna with Photonically Controlled Notched Bands
  D. Drakovic, I. R. O. Fernandez, C. Briso-Rodriguez, Universidad Politecnica de Madrid, Spain; D. Budimir, University of Westminster, UK

- **13:40** 459.2 Reconfigurable Slotted Microstrip Patch Using VO2
  1University of Puerto Rico, United States; 2Michigan State University, United States

- **14:00** 459.3 Reconfigurable Dual-Band Patch Antenna Using Varactor Loaded Slot
  A. Khandelwal, F. Yang*, A. Elsherbeni*, X. Liu
  1University of Mississippi, United States; 2Tsinghua University, China

- **14:20** 459.4 Frequency-Tunable CMOS-MEMS Slot Antenna
  C. C. Liu, C.-Y. Hsueh, C.-C. Chang, National Chung Cheng University, Taiwan

- **14:40** 459.5 A Tunable Slot Loop Antenna Using Interdigitated Ferroelectric Varactors
  H.-Y. Li, H.-P. Chen, S.-C. Chen, C.-H. Tai, J.-S. Fu, National Central University, Taiwan

- **15:00** Break

- **15:20** 459.6 Miniaturized and Reconfigurable Notch Antennas Using a BST Thin Film Varactor
  V. H. Nguyen*, C. Borderon, R. Benzaoua, C. Delaveaud*, A. Sharaïba, H. W. Guendel
  1JETR, UMR-CNRS 6164, France; 2CEA-LETI, MINATEC, France

- **15:40** 459.7 Reconfigurable Notched Tapered Slot Ultra Wideband Antenna for Cognitive Radio Applications
  T. Ahmed, A. Alomany, Queen Mary University Of London, United Kingdom

- **16:00** 459.8 Frequency Reconfigurable Wideband E-Shape Patch Antenna
  Design, Fabrication, and Measurements
  H. Rajagopalan, J. M. Kozivit, Y. Rahmat-Samii, University of California, Los Angeles, United States

- **16:20** 459.9 Design of a Broadband Reconfigurable Antenna for Cognitive Radio
  D. T. Le, Y. Karasawa, The University of Electro-Communications, Japan

- **16:40** 459.10 Switchable UWB Antenna with Defected Ground Plane
  A. Tan*, M. R. Kamarudin*, M. F. Jamlos*, M. H. Jamalluddin*, M. R. Hamid*, M. Jusoh*
  1Universiti Teknologi Malaysia, Malaysia; 2Universiti Malaysia Perlis, Malaysia

### Thursday, July 12 13:20-17:00 Superior B

**Broadband/wideband antennas**

**Session Chairs:** JaeHoon Choi, Yousef Tawk

- **13:20** 460.1 Two-Arm Power-Spiral Antennas
  M. A. Elmanouari, M. A. Filipovic, University of Colorado at Boulder, United States

- **13:40** 460.2 A Novel Polygonal Spiral Antenna
  N. Rahman, M. N. Afsar, Taufs University, United States; R. Cheung, Microwave Engineering Corporation, United States

- **14:00** 460.3 Compact Broadband Tapered Slot Antennas
  A. Borjeson, P. Borjesen, A&E Partnership, United States

- **14:20** 460.4 Wideband Stepped Reflector for Archimedean Spiral Antenna
  C. Dholakia*, X. Bogaad*, A.-C. Lepage, S. Mallegol*, M. Jousset
  1Institut TELECOM, TELECOM ParisTech - LTCI CNRS UMR 5141, France; 2THALES Systèmes Aéronautiques, France

- **14:40** 460.5 Boresteal Gain Enhancement of an UWB Planar Monopole Antenna
  W. Zhang, A. Hoorfar, C. Thaideen, Villanova University, United States

- **15:00** Break

- **15:20** 460.6 An Investigation on the Transmission Response of a Miniaturized Double-Ridedged Horn Antenna for Radar-Based Imaging
  S. Latif*, D. Flores-Tapia*, L. Shafai*, S. Pistorius
  1CancerCare Manitoba, Canada; 2University of Manitoba, Canada

- **15:40** 460.7 Circularly Polarized Broadband Antenna Using Waveguide and an L-Shaped Feed Probe
  S. Yamamura, T. Fukusako, Graduate School of Science & Technology, Kumamoto University, Japan

- **16:00** 460.8 Hybrid Equi-Angular to Archimedean Spiral Antenna
  K. Losertian, T.-H. Chio, Temasek Laboratories, NUS, Singapore
Thursday, July 12 13:20-17:00  Colorado
Session 461  AP-S/URSI

Advances in Adaptive and Smart Antenna Systems

Session Chairs: liang zhang, Jon Wallace

13:20  461.1 Integrated Board-Level Phased Array Antenna Solution for 60 GHz Radio
W. Hong, K.-H. Back, A. Goudele, Samsung Electronics, South Korea

13:40  461.2 60 GHz Multi-Antenna in Multi-Core System
H.-H. Yeh, K. L. Melde, University of Arizona, United States

14:00  461.3 Energy Efficiency for Implanted Wireless Communication Sensor Nodes
Y. Huang, Montana state University, United States; D. Qiao, Y. Li, H. Li, Y. Zhang, L. Wang, Shenzhen Institutes of Advanced Technology, China

14:20  461.4 Novel Wideband Multiblade Butler Matrix Using CPW Technology
M. BEN Ktidj, M. Nedil, N. Kandil, Université de Québec en Abitibi-Témiscamingue (UQAT), Canada; T. A. Denidni, Université de Québec, Canada

14:40  461.5 A Novel Optimized Broadband Reconfigurable RHCP/LHCP E-shaped Patch Antenna
I. M. Kovitz, H. Rajagopalan, Y. Rahmat-Samii, University of California Los Angeles, United States

15:00  Break

15:20  461.6 Linear-to-Circular Polarization Transformer Using Electrically Small Antennas
M. Barbuto, F. Bilotti, A. Toscano, Roma Tre University, Italy

15:40  461.7 X-Band Substrate Integrated Waveguide (SIW) Active Antenna Self-Oscillating Mixer (SOM)
A. Collado, R. Diaz, A. Georgiadis, Centre Tecnologic de Telecomunicacions de Catalunya, Spain

16:00  461.8 An Active Discrete Lens Antenna for Ka-Band Multibeam Applications
G. Ruggerini, P. Nicolaci, Space Engineering SpA, Italy; G. Tozo, P. Angeletti, European Space Agency, Netherlands

16:20  461.9 Design of Conformal Microstrip Butler Matrix at 2.4 GHz
M. BEN Ktidj, M. Nedil, N. Kandil, Université de Québec en Abitibi-Témiscamingue (UQAT), Canada; T. A. Denidni, Université de Québec, Canada

Thursday, July 12 13:20-17:00  Missouri
Session 462  URSI

Time-domain techniques and analysis

Session Chairs: Costas Sarris, Abdullah Eroglu

13:20  462.1 A Post-Processing Procedure for the Efficient Calculation of Resonant Fields from Time Domain Simulations
R. Schulmann, C. Classen, Technische Universität Berlin, Germany

13:40  462.2 A New Formulation of the MRTD Technique with Sub-Cellular Resolution
C. D. Sarris, A. C. M. Austin, University of Toronto, Canada

14:00  462.3 Progress in Space, Time, and Spectrally Adaptive Time-Domain Integral Equation Solvers
E. Michielsen, University of Michigan, United States

14:20  462.4 Alternative TDIE Formulations for Lossy Inhomogeneous Dielectrics
G. Kaur, A. E. Yilmaz, University of Texas at Austin, United States

14:40  462.5 Analysis of Time Domain Integral Equations Using the Frequency Domain Techniques
M. E. Ozuruc, E. Korkmaz, Fatih University, Turkey; A. A. Ergin, Goethe Institute of Technology, Turkey

15:00  Break

15:20  462.6 Construction of an hp-refinement Technique for Transient Scattering Using the Generalized Method of Moments
A. J. Przy, N. Nair, B. Shanker, Michigan State University, United States

15:40  462.7 A Circuit-Driven Subcell Thin-Wire Model for the Discontinuous Galerkin Time Domain Method
I. Jeffrey, J. LoVetri, University of Manitoba, Canada

16:00  462.8 Adaptive Load Balancing for the MPI Application in Non-Conformal Discontinuous Galerkin Finite Element Time-Domain Method
B. Zhao, J. Wang, Y. Shao, J.-F. Lee, The Ohio State University, United States

16:20  462.9 Conformal PML Modeling in DGD Using Continuous Material Properties
I. Wang, Z. Peng, J.-F. Lee, The Ohio State University, United States

16:40  462.10 Time Domain Discontinuous Galerkin Method with Exact Absorbing Boundary Conditions for Analyzing Three-Dimensional Diffraction Gratings
K. Sirenko, A. Krivichikova, Y. Sirenko, H. Bagci
Kang Abdulrah University of Science and Technology (KAUST), Saudi Arabia; Institute of Radiophysics and Electronics of National Academy of Sciences of Ukraine (IRE NASU), Ukraine
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<td>Mississippi</td>
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**Communication Channel Management**

Session Chairs: Jean-Francois Chamberland, Kevin Sowerby

13:20 464.1 Analyzing the Impact of Delays from Antenna Reconfiguration on Virtual Channel Management
J.-F. Chamberland, G. H. Huff, S. S. Shakkottai, A&M University, United States

14:00 464.3 Uplink Spectrum Sharing for Heterogeneous Networks Based on Reconfigurable Antenna System
R.-T. Huang, Automotive Research & Testing Center, Taiwan; D.-B. Lin, H.-P. Lin, National Taiwan University of Technology, Taiwan

14:20 464.4 The Effects of Modified Building Propagation on Frequency Reuse in a Single Channel Indoor Wireless Communication System
K. W. Sowerby, M. J. Neve, The University of Auckland, New Zealand

14:40 464.5 Monitoring of HF Spectral Occupancy over the Eastern Mediterranean
H. Haralambous, P. Vronides, Frederick University, Cyprus; L. Economou, Intercollege, Cyprus

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<tr>
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</table>

**Sensor Networks and Sensor Arrays**

Session Chairs: Mohammad Ali, Hao Xin

15:20 465.1 A near-Isotropic Pattern 3-D Loop Antenna for Networked Sensors
X. Jin, M. Ali, University of South Carolina, United States

15:40 465.2 Direction of Arrival Estimation with Two Planar Inverted-F Antennas and a Scatterer
X. Yu, H. Xin, University of Arizona, United States

16:00 465.3 Array Calibration for a Sequential Beamshape Device
Y. Huang, W. Tied, Montana State University, United States

16:20 465.4 A Novel Vector Electromagnetic Sensor for Direction Finding HF Applications
R. Shavit, Y. Barash, N. Nevo, Ben-Gurion University of the Negev, Israel; B. Almog, ELTA Sys., Ltd., Israel

16:40 465.5 Through-the-Wall Moving Target Detection with Compressed Sensing
Y. Lu, L. Huang, Nanyang Technological University, Singapore

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</table>

**Hybrid Methods and Method Comparisons**

Session Chairs: Raj Mittra, Shanker Balasubramaniam

08:20 501.1 VFDTD: a Novel Algorithm for Dealing with Curved Objects in the Context of FDTD
K. Panayiopoulos, R. Mittra, The Pennsylvania State University, United States

08:40 501.2 A Fourier Envelope Hybrid Field-Circuit Simulator for Transient Simulation of Microwave Circuits and Antennas
V. Subramanian, A. E. Yilmaz, The University of Texas at Austin, United States

09:00 501.3 Method of Moments Analysis of Microstrip Antennas in Cylindrically Stratified Media Using Closed-Form Green’s Functions
S. Karan, V. B. Ertuk, Bilkent University, Turkey

09:20 501.4 Self-Consistent Modeling of Quantum Electronic Devices in the Presence of Electromagnetic Fields
C. S. Meierbachol, O. Turee, B. Shanker, Michigan State University, United States

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<td>08:20-12:00</td>
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**Electromagnetic Properties of Advanced Materials and Circuits**

Session Chairs: Keith Whites, Christopher Holloway

08:20 502.1 Effects of Cavity Dimensions in Split-Post Dielectric Resonator Technique for Complex Permittivity Measurements
F. Chen, S. Mao, X. Wang, E. Semouchkina, Michigan Technological University, United States; M. Laganan, Pennsylvania State University, United States

08:40 502.2 Complementary Split-Ring Resonator as a High Sensitivity Sensor
A. M. Albish, O. M. Ramahi, M. S. Boybay, University of Waterloo, Canada

09:00 502.3 Non-Contact Probes for THz Circuits and Integrated Devices
K. Topalli, G. Ch. Trichopoulos, K. Sertel, ElectroScience Laboratory, The Ohio State University, United States

09:20 502.4 Optimised Second-Order Debye Parameters for Head Tissues at Microwave Frequencies
D. J. Ireland, A. Abbool, University of Queensland, Australia

09:40 502.5 Modeling-Based Printed Electronics Characterization
R. M. Makinen, A. R. Rasku, H. P. Sillanpaa, Tampere University of Technology, Finland

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**Hybrid Metho**

Session Chairs: Raj Mittra, Shanker Balasubramaniam

08:20 501.1 VFDTD: a Novel Algorithm for Dealing with Curved Objects in the Context of FDTD
K. Panayiopoulos, R. Mittra, The Pennsylvania State University, United States

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V. Subramanian, A. E. Yilmaz, The University of Texas at Austin, United States

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S. Karan, V. B. Ertuk, Bilkent University, Turkey

09:20 501.4 Self-Consistent Modeling of Quantum Electronic Devices in the Presence of Electromagnetic Fields
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**Hybrid Metho**

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**Hybrid Metho**

Session Chairs: Raj Mittra, Shanker Balasubramaniam

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### Friday, July 13

**Session 503**

**Guided Waves and Wave-Guiding Structures**

Session Chairs: Edward Rothwell, Ryan Adams

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<th>Time</th>
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<tr>
<td>8:20</td>
<td>End-Launched Coaxial to Partial H-Plane Waveguide Adapter</td>
<td>K. H. Kloke, J. Jouber, J. W. Odendaal</td>
<td>CMR, South Africa; 2University of Pretoria, South Africa</td>
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<tr>
<td>8:40</td>
<td>Localization and Manipulation of Microwave Fields by Small Resonant Ferrite Particles</td>
<td>M. L. Siegal, E. Kamenetki, M. Berezini, R. Joffe, R. Shavi</td>
<td>Applied Electromagnetics Ltd., Israel; 2Ben-Gurion University of the Negev, Israel; 3Gezi Israel Ltd., Israel</td>
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<tr>
<td>9:00</td>
<td>Computer Simulation for Transmission and Reflection Properties of Dielectric Slab Waveguides Connected with Photonic Crystal Waveguide</td>
<td>M. Tanaka, K. Tanaka, Gifu University, Japan</td>
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<td>9:40</td>
<td>Characterization of Gyromagnetic Material Using a Reduced Aperture Waveguide</td>
<td>B. B. Crowsey, O. Tencer, E. J. Rothwell, B. Shanker, L. C. Kempel</td>
<td>Michigan State Univ, United States; 2M. J. Havrilla, Air Force Institute of Technology, United States</td>
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<tr>
<td>10:00</td>
<td>Study of Losses and High-Order Modes Coupling on Bends for Wire-Type Waveguides at T/H Frequencies</td>
<td>A. Beresnev, M. Baquer-Escudero, D. Sanchez-Escuderos, M. Ferrando-Bataller</td>
<td>Universitat Politecnica de Valéncia, Spain</td>
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**Session 504**

**Antennas for Mobile Handsets**

Session Chairs: Wen-Shan Chen, Kin-Lu Wong

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<th>Time</th>
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<th>Institution(s)</th>
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<tr>
<td>8:20</td>
<td>Internal LTE/WWAN Handset Antenna Integrated with Solar Cells for Performance Improvement</td>
<td>W.-Y. Li, C.-Y. Wu, W.-J. Chen, H.-H. Lin, Industrial Technology Research Institute, Taiwan</td>
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<td>8:40</td>
<td>A Multi-Line Monopole with a Meandered Loop Antenna for 4G Mobile System</td>
<td>W.-S. Chen, J.-W. Wang, Southern Taiwan University, Taiwan; B.-Y. Lee, J. Gong Design University, Taiwan</td>
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<tr>
<td>9:00</td>
<td>A Reconfigurable PIFA Using a PIN-Diode for LTE/GSM850/GSM900/DCS/UMTS</td>
<td>J. H. Lee, Y. Sung, Konkuk University, South Korea</td>
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<td>9:40</td>
<td>Mobile Terminal Antenna with Decreased Specific Absorption Rate in Hand and Head</td>
<td>J. Ryono, R. Valkonen, T. Holopainen, P. Vainikainen, Aalto University School of Electrical Engineering, Finland</td>
<td></td>
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<tr>
<td>10:00</td>
<td><strong>Design of Waveguide Filters at W-Band by Means of Machining Techniques</strong></td>
<td>C. A. Leal-Segovia, J. R. Ruiz-Cruz, J. R. Montejo-Garai, J. M. Rebollar</td>
<td>Universidad Politécnica de Madrid, Spain; 2Universidad Autónoma de Madrid, Spain</td>
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10:40 | Far Field Pattern from Slanted Rectangular Apertures                              | M. C. Gonzalez, B. P. Kumar, G. B. Bramner                               | University of California, Davis, United States; 2Sacramento State University, United States |

11:00 | A Trans-Impedance Green's Function Model for the Dielectric Ring Circulator       | A. K. Harley, R. S. Adams, The University of North Carolina at Charlotte, United States |

11:20 | Localizing Small Apertures in Cable Shielding                                     | L. Thomson, B. Jones, C. Furse, University of Utah, United States         |

11:40 | Equivalent Network Extraction of a Coplanar Waveguide                            | R. Masoud, National Engineering and Scientific Commission, Pakistan, S. A. Mohsin, The Univ of Puluabab, Pakistan |

**Session Organizers:** Daniela Tuninetti, Natasha Devroye, Agostino Monorchio

**Session Chairs:** Natasha Devroye, Agostino Monorchio
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<td>Session 506</td>
<td>Numerical Techniques</td>
<td>8:20-11:40</td>
<td>Huron</td>
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<td>Session Chairs: Amir Boag, Jin-Fa Lee</td>
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<td>URSI</td>
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<td>08:40</td>
<td>506.2 A New Efficient Numerical Technique for the Analysis of Microstrip Circuits Characterized by Rough Profiles</td>
<td>G. Bianconi, C. Pelletti, K. Panayappan, R. Mittra, The Pennsylvania State University, United States</td>
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<tr>
<td>09:00</td>
<td>506.3 Electromagnetic Scattering Analysis of a Large and Deep Inlet Embedded in an Arbitrarily Shaped Host Body</td>
<td>Z. Peng, K.-H. Lim, J.-F. Lee, ElectroScience Lab., United States</td>
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<td>09:20</td>
<td>506.4 Error Analysis for Sparse Factorizations Using Overlapped, Localizing LOGOS Modes on a Shifted Grid</td>
<td>R. J. Adams, University of Kentucky, United States; X. Xu, Sigrity, Inc., United States</td>
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<td>09:40</td>
<td>506.5 A Set of Div-Conforming Shannon Basis Functions</td>
<td>M. A. Francavilla, F. Vipiana, Istituto Superiore Mario Boella (ISMB), Italy; G. Vecchi, Politecnico di Torino, Italy</td>
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<td>10:00</td>
<td>Break</td>
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<td>10:20</td>
<td>506.6 Rapid Fourier Transform Evaluation of Satellite Coverage Performance</td>
<td>S. M. Canta, L. Ersoy, Space Systems/Loral, United States</td>
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<tr>
<td>10:40</td>
<td>506.7 Investigation of the Use of Radial Basis Functions in the Determination of Electromagnetic Scattering by Dielectric Interfaces</td>
<td>R. K. Gordon¹, E. Huchtermann¹, Z. Liu¹, D. Owusu-Bonsu¹</td>
<td></td>
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<tr>
<td>11:00</td>
<td>506.8 Generalized Equivalence Integral Equations</td>
<td>A. Boas, Tel Aviv University, Israel; V. Lomakin, University of California, San Diego, USA</td>
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<tr>
<td>11:20</td>
<td>506.9 Boundary Differential Equations and Their Applications</td>
<td>G. Wen, Fudan University, China</td>
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Friday, July 13 8:20-12:00 Michigan A

Session 507 Microstrip-Fed Arrays

Session Chairs: Benjamin Braaten, Hualiang Zhang

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<td>507.1 Bunny Ear Antenna Array for 60 GHz Applications</td>
<td>M. Jenning, D. Plettemier, Technische Universitaet Dresden, Germany</td>
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<tr>
<td>08:40</td>
<td>507.2 Near-Field Focussed Array with Two Simultaneous and Independent Spots</td>
<td>G. Leon, J. J. Tomas, M. Arrebola, F. Las-Heras, Universidad de Oviedo, Spain</td>
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<tr>
<td>09:00</td>
<td>507.3 Steerable Antenna Array at 24 GHz Using Butler Matrices &amp; MEMS-Switches</td>
<td>M. Aziz-Carrea, W. Simon, R. Baggen, IMS GmbH, Germany</td>
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<tr>
<td>09:20</td>
<td>507.4 Metamaterial-Line Based Feed-Networks for Wideband Circularly Polarized Antennas</td>
<td>K. L. Chung, X. Sun, J. Zhang, H. Zhu, S. Cheung, T. Yuk, University of Hong Kong, China</td>
</tr>
<tr>
<td>09:40</td>
<td>507.5 Design of a Passive Multifaceted Phased Array for Hemispherical Coverage</td>
<td>W. Wang, A. Cao, S. Ye, X. Liang, Q. Guo, W. Li, R. Jin, J. Geng, Shanghai Jiao Tong University, China</td>
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<tr>
<td>10:00</td>
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<tr>
<td>10:20</td>
<td>507.6 Planar Single-Wire Antennas at Millimeter-Wave Frequencies</td>
<td>D. Sanchez-escalante, M. Ferrando-Bataller, J. I. Herranz, A. Berenguer, Universitat Politècnica de València (UPV), Spain</td>
</tr>
<tr>
<td>10:40</td>
<td>507.7 Design of High Gain Microstrip Yagi Array Antenna for Avalanche Radar</td>
<td>F. N. Mohd Isa¹, P. V. Brennan¹</td>
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Friday, July 13 8:20-12:00 Superior A

Session 509 Frequency Configurable Antennas II

Session Chairs: Prem Chahal, Satish Sharma

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<td>08:20</td>
<td>509.1 A Miniature Broadband Printed Reconfigurable Antenna for Cognitive Radio</td>
<td>A. M. Yadav, C. J. Panagamuwa, R. D. Seager, Loughborough University, United Kingdom</td>
</tr>
<tr>
<td>08:40</td>
<td>509.2 Embedding a Reconfigurable Band-Pass/Band-Stop Filter into an Antenna</td>
<td>M. Zarmahdi, Y. Tawk, C. G. Christodoulou, University of New Mexico, United States; J. Costantine, California University Fullerton, United States</td>
</tr>
<tr>
<td>09:00</td>
<td>509.3 Ka-Band Frequency Tunable Patch Antenna</td>
<td>C. Fritzsch, S. Bildik, R. Jakoby, Technische Universitaet Darmstadt, Germany</td>
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Friday, July 13  
8:20-12:00  
Superior B  

**Session 510  
AP-S/URSI**  

**Wideband Antennas**  

**Session Chairs:** Amir Zaghoul, Mauro Ettorre  

**09:20  509.1. Two Designs for Dual/triple Band Patch Antennas**  
K. F. Lee, C. S. R. Kaipa, University of Mississippi, United States; K. M. Luk, City University of Hong Kong, Hong Kong  

**09:40  509.2. Miniaturized Multimode Dielectric Resonator Antenna with Consistent Radiation Patterns for Wideband Applications**  
A. Kashidjan  
D. M. Klymynskaya  
L. Shafai  
University of Manitoba, Canada; University of Saskatchewan, Canada  

**09:00  509.3. Novel Multiport Non-Foster Loading Technique for Wide Band Antennas**  
E. A. Elghamrawi, R. G. Rojas, The Ohio State University, United States  

**09:20  509.4. Short-Time Pulses on Leaky-Wave Antennas**  
I.-T. Williams, L. I. Basilio, J. J. Borchardt, W. L. Langston, Sandia National Laboratories, United States  

**09:40  509.5. An Optically Transparent, Wideband UHF Antenna and Ground Plane System for Radio Communication**  
M. Kashanianlari, K. Sarabandi, University of Michigan, United States  

**10:00 Break**  

A. Mohamed, I. Shafai, University of Manitoba, Canada  

**10:40  509.7. The Planar Lateral Wave Antenna**  
F. Tokan, N. Türker Tokan, A. Neto, TU Delft, Netherlands  

**11:00  509.8. A CMOS Switching-Based UWB Impulse Transmitter with Oscillator Leakage Cancelling Technique**  
J.-F. Kiang, Y.-T. Lu, C.-C. Yui, National Taiwan University, Taiwan  

**11:20  509.9. Exponentially Curved Aperture Antenna for Broadband Circular Polarization Operation**  
F.-Y. Chao, HTCC Corporation, Taiwan; S.-K. Lin, Y.-C. Lin, National Taiwan University, Taiwan  

**11:40  509.10. A Ku Band Dual Frequency Aperture Coupled Microstrip Antenna with a Wideband EBG**  
M. Sorous, Semnan University, Iran  

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**Friday, July 13  
8:20-12:00  
Missouri  

**Session 512  
AP-S**  

**Satellite Communication Antennas**  

**Session Chairs:** Raince Simons, Lorenzo Lo Monte  

**08:20  512.1. A Planar Passive Dual Band Array Feed Antenna for Ku Band Satellite Communication Terminals**  
Z. Yang, K. F. Warnick, Brigham Young University, United States  

**08:40  512.2. A Deployable Quadriplanar Helix Antenna for CubeSat**  
J. Costantine, D. Tran, M. Shiva, California State University Fullerton, United States; Y. Tawk, C. G. Christodoulou, University of New Mexico, United States; S. E. Barbin, Polytechnic University of Sao Paulo, Brazil  

**09:00  512.3. A X/Ka Bands Feeder Antenna for a Planetary Exploration High Gain Reflector Antenna**  
K. Kagoshima, T. Takeda, K. Ikeda, Ibaraki University, Japan; T. Kobayashi, K. Yato, H. Iijima, Tokyo Denki University, Japan; A. Tomoki, T. Toda, Japan Aerospace Exploration Agency, Japan  

**09:20  512.4. A Deployable Conical Log-Spiral Antenna Design for CubeSat Applications**  
A. J. Ernest, Y. Tawk, C. G. Christodoulou, University of New Mexico, United States; J. Costantine, California State University Fullerton, United States  

**09:40  512.5. Volumetric Ring Array for Uniform Global Coverage in Satellite Applications**  
A. Reyna, University of Tamaulipas UAT, Mexico; M. A. Panduro, C. Del Rio, Public University of Navarra, Spain  

**10:00 Break**  

**10:20  512.6. Ground-Based Polarization-Forming Technique for Polarization-Tracking-Free Ku-Band Mobile Satellite Communication Systems**  
Y. Suzuki, T. Sugiyama, NTT Access Network Service Systems Laboratories, Japan
**Friday, July 13**  
**Session 513**  
**Parlor C**  
**10:40**  
**512.7**  
**Q-Band (37-41 GHz) Satellite Beacon Architecture for RF Propagation Experiments**  
R. N. Simon, E. G. Wintucky, NASA Glenn Research Center, United States

**11:00**  
**512.8**  
**A Broadband Soft Horn Antenna with Inhomogeneous Metasurface Coatings**  
Q. Wu, C. P. Scarborough, D. H. Werner, The Pennsylvania State University, United States; E. Lier, R. K. Shaw, Lockheed Martin, United States

**11:20**  
**512.9**  
**A Ring Probe Fed Metallic Cavity Antenna for Circular Polarization**  
K. Wei, Z. Zhang, Z. Feng, Tsinghua Univ., China

**11:40**  
**512.10**  
**A New Corrugated Dielectric Loaded Expo-Profiled Conical Feed Horn**  
S. M. Razavi zadeh, IRIB University, Iran

**Friday, July 13**  
**Session 514**  
**Mayfair**  
**10:20**  
**513.1**  
**EM Wave Scattering by Objects Moving on Boweditch-Lissajous Trajectories**  
D. Censor, Ben-Gurion University of the Neger, Israel

**10:40**  
**513.2**  
**Airy Beams in the Presence of Inhomogeneities**  
I. M. Besieris, Virginia Polytechnic, United States

**11:00**  
**513.3**  
**Rules for Parameter Selection in a Complex Point Beam Expansion**  
F. Martini, S. Maci, University of Siena, Italy

**11:20**  
**513.4**  
**Electromagnetic Transmission Through a Slot Surrounded with Grooves in a Conducting Plane**  
D. Y. Ng, J. H. Kim, Y. B. Park, Ajou University, South Korea; K.-Y. Jung, Hanyang University, South Korea

**9:40**  
**513.5**  
**A Novel Non-Local Polarizabilities Model for Accurate Homogenization of Metamaterials**  
D. L. Sonmez, C. Cabez, Ecole Polytechnique de Montréal, Canada

**10:00**  
**Service**

**10:20**  
**513.6**  
**Analytic Computation and Computer Simulations of Radiated Power and Surface Wave Power for a Hertzian Dipole over Planar Stratified Media**  
S. Weiss, Army Research Laboratory, United States

**10:40**  
**513.7**  
**Electromagnetic Modeling of Nonlinear, Spatially-Dispersive Materials**  
G. Hanson, University of Wisconsin, Milwaukee, United States

**11:00**  
**513.8**  
**Evolutionary Approach to Electromagnetics as an Alternative to the Time-Harmonic Field Method**  
O. A. Tretiakov, Gebze Institute of Technology, Turkey; P. Firden, University of Illinois at Urbana-Champaign, USA

**11:20**  
**513.9**  
**Nonlinear Wave Scattering by Semiconductor Periodic Structure with Defect**  
O. V. Kostyukova, Institute of Radiophysics and Electronics of NAS of Ukraine, Ukraine; O. V. Shramkova, Queen’s University Belfast, UK

**11:40**  
**513.10**  
**Electromagnetic Fields Generated by a Point Charge Moving with Uniform Velocity**  
S. R. Seshadri, 4502 Phyllis Court, Livermore, California 94550-7284, USA, United States

**Friday, July 13**  
**Session 515**  
**AP-S**  
**Interactive Forum**

**MIMO Communication Strategies**  
Session Chairs: Jon Wallace, Hai Deng

**IF51.1**  
**Optimization of Antenna Excitation Phases for Transmit Beam Nulling with MIMO Radar**  
L. Guo, T. Ma, H. Deng, Florida International University, United States

**IF51.3**  
**Adaptive Beamforming Using Sequential Beamspace Approach**  
Y. Huang, Montana State University, United States; C. Wang, The Cooper Union for the Advancement of Science and Art, United States

**IF51.4**  
**Increased Interference-Limited MIMO Capacity with Parasitic Reconfigurable Aperture Antennas**  
R. Mehmoond, J. W. Wallace, Jacobs University Bremen, Germany

**IF51.5**  
**A Hardware Demonstration of Wireless Power Transmission Based on Retro-Reflective Beaming**  
S. Sha, M. Lu, University of Texas at Arlington, United States

**IF51.6**  
**Effect of Metal Wire on Channel Capacity in Near-Field MIMO System**  
D. Zhang, T. Hori, M. Fujimoto, University of Fukui, Japan

**IF51.7**  
**DOF of Indoor MIMO Systems**  
J. Xu, Loyola Marymount University, United States

**IF51.8**  
**Multiple Polarization Communications**  
R. B. Dybdal, S. J. Curri, F. Lorentelli, D. J. Hinshlwood, The Aerospace Corporation, United States

**IF51.9**  
**A High-Rate MIMO Receiver in an FPGA**  
M. Vécastis, INESC-ID/ISEL/IPL, Portugal; P. Pinho, Instituto de Telecomunicações, Portugal

**IF51.10**  
**Compensation of Undesired Effects in MIMO Wireless Transceivers**  
M. Cabarkapa, M. Bozic, N. Neskovica, A. Neskovica, D. Bodimir, WESTMINSTER UNIVERSITY, UNITED KINGDOM; University of Belgrade, Serbia
### Volumetric Metamaterials

Session Chairs: Ashwin Iyer, Marco Antoniades

**IF52.1** Switchable near-Zero-Index Magnetic Metamaterial for Dynamic Beam-Scanning Lens
J. P. Turbin, D. H. Werner, Pennsylvania State University, United States

**IF52.2** A Fully Printed Multilayer Metamaterial with Broadband, Low-Loss Negative Index
H. L. Nguyen, A. K. Iyer, University of Alberta, Canada

**IF52.3** Dual Polarized Negative Refraction in a Volumetric Transmission-Line Metamaterial
M. Solvayangang, G. V. Eleftheriades, University of Toronto, Canada

**IF52.4** Suppression of Chromatic Aberrations Based on a Metamaterial with Anomalous Dispersion
J. T. Costa, M. G. Silveirinha, Instituto de Telecomunicacoes, Universidade de Coimbra, Portugal

**IF52.5** Network Modeling of Multi-Layer Magnet-Less Non-Reciprocal Gyrotropic Metamaterials
D. L. Sounas, T. Koderz, C. Caloz

**IF52.6** Hiding and Absorbing the Power Emitted by a Dipole at the Interface of an Infinite Medium
C. Gacula, S. Campione, S. H. Sedighy, F. Capolino, University of California, Irvine, USA

**IF52.7** Numerical Modeling of the Electromagnetic Response of Complex Shaped Spatially Dispersive Bodies
J. T. Costa, M. G. Silveirinha, Instituto de Telecomunicacoes, Universidade de Coimbra, Portugal

**IF52.8** Wideband Permeability Metamaterial with Non-Foster Compensation of Parasitic Capacitance
K. Miehle, T. P. Weldon, R. S. Adams, K. Daneshvart, Un. of N. Carolina at Charlotte, United States

**IF52.9** Bandwidth Enhancement of a Patch Antenna Using a Wire-Ferrite Substrate
A. Shahvarpour, S. Couture, C. Caloz, Ecole Polytechnique de Montreal, Canada

**IF52.10** On Bandwidth of Transmission-line-based and Inclusion-based Non-Foster ENZ Metamaterials
S. Hraban, I. Kress, A. Kricenko, I. Bonic, University of Zagreb, Croatia

**IF52.11** Resonance Mode Splitting in Split-Ring Resonator Arrays Used in the Microwave Invisibility Cloak
F. Chen, X. Wang, E. Semouchkina, Michigan Technological University, United States

**IF52.12** Live Electrophoretic Imaging for Visual Observations and Phase Velocity Evaluation of Internal Backward Waves in Two-Dimensional DNG Metamaterial
M. Tsuchiya, National Institute of Information and Communications Technology, Japan; T. Shiozawa, Kagawa National College of Technology, Japan

**IF52.13** Nonlinear Spiral Metamaterials
A. P. Slobozhanyuk, D. S. Filonenkov, M. Lapine, I. V. Shadrivov, P. A. Belov, Y. S. Kivshar

**IF52.14** Integrating Metamaterials Within a Structural Composite Using Additive Manufacturing Methods
P. Pa, K. Duncan, R. McCauley, S. Yarlagadda, M. Mirozinsk1

**IF52.15** Performance of Miniature GPS Arrays Loaded with SRRs
A. A. Gheethan, G. Muncu, University of South Florida, United States

**IF52.16** Neuro-Modelling of CSRR for Antenna Applications
D. Pal, A. Pamnani, S. N. Sinha, IIT Roorkee, India

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### Nano-electromagnetics

Session Chairs: Nader Behdad, Brian Lail

**IF53.1** A Biologically-Inspired Nanoantenna Array
Y. Yusuf, N. Behdad, The Pennsylvania State University, United States

**IF53.2** Studies of a Nanometer Antenna Combined with Open and Closed Cylindrical Active Coated Nano Particles
J. Geng, R. Jin, X. Liang, R. W. Ziolkowski

**IF53.3** Design and Optimization of Bow-Tie Optical Antennas
S. Koki, C. Korkmaz, Fatih University, Turkey

**IF53.4** Metamaterials with Angle Selective Emissivity in the Near-IR
L. A. Bossard, D. H. Werner, The Pennsylvania State University, United States

**IF53.5** Absorption Enhancement in Silicon Solar Cells Due to Surface Plasmons of Nanorodrdes
N. Burbdorf, M. El-Shenawee, University of Arkansas, United States

**IF53.6** On Understanding the Enhancement of Optical Absorption in Nanostructure Photovoltaic Solar Cells
T. J. Brockett, H. Rajagopalan, Y. Rahmat-Samii, University of California, Los Angeles, United States

**IF53.7** Integrated Infrared Nanodevices Based on Graphene Monolayers
P. Y. Chen, A. Ali, University of Texas at Austin, United States

**IF53.8** Superquadric Nanostructures for Enhanced Absorption in Solar Cells
H. Rajagopalan, T. J. Brockett, Y. Rahmat-Samii, University of California, Los Angeles, United States

**IF53.9** An X-Wave Pulse Train as a Tractor Beam
M. A. Salem, H. Bagci, King Abdullah University of Science and Technology, Saudi Arabia

**IF53.10** Field Enhancement Due to Surface Structuring During Aluminum Induced Crystallization of Amorphous Silicon
N. M. Burbdorf, M. El-Shenawee, University of Arkansas, United States; S. Shumate, D. Hutchings, H. Naseem, Silicon Solar Solutions LLC, United States

**IF53.11** Antenna-Coupled Microbolometers for Enhanced Absorption in Reduced-Pitch Infrared Detector Arrays
J. Larsen, B. A. Lai, Florida Institute of Technology, United States

**IF53.12** Novel Silicon-Based Hybrid Plasmonic Waveguide with Nano-Scale Gap at the Interface of Metal and Si
A. Amirhosseini, R. Safian, Isfahan University of Technology, Iran

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### Non-Antenna Applications of Metasurfaces

Session Chairs: Daniel Gregoire, Zhi Hao Jiang

**IF54.1** Enhancement of the Strips Electromagnetic Soft Surfaces Using Ledge Edges

**IF54.2** A Reconfigurable Near-infrared Circularly Polarizing Reflector Based on Phase Changing Anisotropic Metamaterials
P. E. Sieber, D. H. Werner, The Pennsylvania State University, United States

**IF54.3** Broadband Infrared (IR) Metamaterial Absorber
H. M. Faradat, Ummass Lowell, United States

**IF54.4** Surface-Wave Waveguides
D. J. Gregoire, A. V. Kabakian, HRL Laboratories, United States
### IF54.5 A Leaky Radial Waveguide for Generating Propagating Bessel Beams
M. Estorgg, IETR, University of Rennes 1. UMR CNRS 6164, France; S. M. Rudolph, Naval Research Laboratory, USA; A. Grbic, University of Michigan, USA

### IF54.6 Experimental Demonstration of an Optical Artificial Perfect Magnetic Mirror Using Dielectric Resonators

### IF54.7 A Low Profile AMC for Flexible and Conformal Applications
H. R. Khaleel, H. M. Al-Rizoo, D. G. Rucker, S. Abushamleh, University of Arkansas at Little Rock, United States

### IF54.8 3D Artificial Impedance Surfaces
D. J. Gregory, HRL Laboratories, United States

### IF54.9 Faraday Rotation by Artificial Electric Gyrotropy in a Transparent Slot-Ring Metamaterial Structure
T. Kodera, Yamaguchi University, Japan; D. L. Sounas, C. Caloz, Ecole Polytechnique de Montreal, Canada

### IF54.10 Synthesizing a Twist Polarizer
T. P. Niemi, A. O. Karlilam, S. A. Tret'yakov, Aalto University School of Electrical Engineering, Finland

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### Friday, July 13 10:00-5:00 River Exhibition Hall B

#### Session IF56 10:00-5:00 Interactive Forum

### Sensing the Environment

#### Session Chairs: William Davis, John Donohoe

#### IF56.1 A Novel Technique to Compute Impedance of an Arbitrarily Oriented Coil Antenna for Well Logging Applications
T. Zhang, G. Minero, J. Hunka, J. C. Gowsami, Schlumberger Technology Corporation, United States

#### IF56.2 Localization of Buried Object Using BackPropagation Nueral Network
A. Z. A. Ashoor, Z. Ren, O. M. Ramahi, University of Waterloo, Canada

#### IF56.3 Feasibility Study for Non-Metallic IED Detection Using Forward-Looking Ground Penetrating Radar Integrated with Target Feature Classification
J. S. K. Nakatsu, H.-S. Youm, M. F. Iskander, University of Hawaii at Manoa, United States

#### IF56.4 Coupling of Underground Objects to Antennas and Transmission Lines at Antiresonance
P. P. Donohoe, Mississippi State University, United States; I. R. Fairley, L. N. Lynch, US Army Engineer Research and Development Center, United States

#### IF56.5 Direction and Polarization Estimations of Signals Using Vector Circular Array
Y. Lu, Nanyang Technological University, Singapore; S. Yang, University of Electronics Science and Technology of China, China

#### IF56.6 A Circuit Parameter Identification of Personal Area Networks under the Magnetic Coupling
T. Ogasawara, A. I. Sasaki, K. Fuji1, Y. Fuji2, T. Fujita, M. Ya1, M. Shimizu1, H. Morimiura1, 1NTT Microsystem Integration Laboratories, Japan; 2NTT Innovation Laboratories, Japan

#### IF56.7 Experimental Design of the Micro-Strip Moisture Sensors
C. Guo, R. C. Liu, Chang'an University, China

#### IF56.8 Foliage Obscure Detection Exploiting Scattering and Depolarization of 2.4 GHz Waves Used for Communication Links
S. Nikolaou1, C. Eracleous1, M. Mills2, C. G. Panayi2, 1Frederick University Cyprus (FUC), Cyprus; 2University of Cyprus, Cyprus; 3SignalGenerix Ltd, Cyprus

#### IF56.9 Wireless Temperature Measurements Using an Acoustically Modulated Sensor
W. A. Davis, T. Yang, Virginia Tech, United States; J. Coggins, R. G. May, Prime Photonics, United States

#### IF56.10 Combined Measured Characteristics of Microwave Radiometer and Free-Space Optical Link
P. Dvork, J. Libich, S. Zvanovec, Czech Technical University in Prague, Czech Republic

#### IF56.11 Inkjet-Printed and Organic/Nanofluid-Based Conformal Wireless Sensors for Smart Temperature Monitoring
A. Trudel1, S. Bouzier2, P. Pons1, H. Aubert1, M. M. Tentzeris1, 1Georgia Institute of Technology, United States; 2CNRS, France

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### Friday, July 13 10:00-5:00 River Exhibition Hall B

#### Session IF57 10:00-5:00 Interactive Forum

### Small mobile antennas

#### Session Chairs: Thomas Wong, Koichi Ogawa

#### IF57.1 A Wideband Composite Right/Left Hand Rectenna for UHF Energy Harvesting Applications
B. L. Pham, J.-C. S. Chieh, A.-V. Pham, University of California Davis, United States

#### IF57.2 A THB Antenna with Parasitic Element for Bandwidth Enhancement
T. T. Y. Wong, A. Celebi, Illinois Institute of Technology, United States; M. Kenkel, Share, Inc., United States
IF57.3 An Arrow Shaped Printed Antenna for ZigBee Applications
M. Sharaf, National Telecommunication Institute, Egypt; R. El-Adl
S. Shams, A. Allam, German University in Cairo, Egypt

IF57.4 Multiband Planar Branched Monopole Antenna for GSM/GPS/WLAN/WIMAX Applications
B. Tili, Rochester Institute of Technology/Dubai Campus, United Arab Emirates; S. Youssef, Rochester Institute of Technology Dubai, UAE

IF57.5 A Dual-Polarization Single-Layered Antenna for GPS and ISM Bands
M. Matsunaga, Ehime University, Japan; T. Matsunaga, Fukuoka Institute of Technology, Japan

IF57.6 Stacked Package Loop Antenna for WLAN Based on IPD Manufacturing Technology
C.-H. Lee, T.-C. Tang, K.-H. Lin, National Sun Yat-sen University, Taiwan

IF57.7 Dynamic Efficiency Degradation of BAN Antennas Due to the Movement of the Arms
K. Osawa, K. Honda, Toyama University, Japan

IF57.8 Multisystem Microstrip Antenna for Mobile Communications
M. Gruszczynski, M. Wnuk, L. Nowosielski, Military University of Technology, Poland

IF57.9 Radiation Properties of Quadrifilar-Helix Antenna- an Analytical Approach
V. J. Krysztofiak, Wroclaw University of Technology, Poland

IF57.10 A Compact Curl Antenna with a Cavity-Backed Absorber
A. M. Mehrabian, L. Shalali, The University of Manitoba, Canada

IF57.11 Analysis and Design Process of a Stripline Archimedean Spiral Antenna
T.-K. Chen, G. H. Huffer, Texas A&M University, United States

IF57.12 UHF RFID Antenna Package Employing Shielded Parallel-Plate for Metallic Surface Installations
D. Liu, X. Zhu, University of Michigan-Shanghai Jiao Tong University Joint Institute, Shanghai Jiao Tong University, China; W. Hong, Samsung Electronics, South Korea

Friday, July 13 13:20-16:40 Chicago VI
Session 551 URSI

Fast Methods

Session Chairs: Dan Jiao, Joe Kotulski

13:20 551.1 Massively Parallel FFT and Interpolation Based Methods on GPU and CPU Systems
S. Li1, R. Chang1, A. Boag1, V. Lomakin1
1University of California, San Diego, United States; 2Tel Aviv University, Israel

13:40 551.2 On the MLMDA/Butterfly Compressibility of Inverse Integral Operators
H. Gao2, J. Hu2, E. Michielssen3
2University of Electronic Science and Technology of China, China; 3University of Michigan, United States

14:00 551.3 Further Considerations on the Use of Parallel Matrix Compression and Calderon Preconditioning in the Method of Moments Code EIGER
J. Kotulski, Sandia National Labs, United States

14:20 551.4 Parallel Truncated Multigrid Preconditioning of AIM for Bioelectromagnetics
F. Wei, A. E. Yilmaz, Electrical and Computer Engr., United States

14:40 551.5 A Scalable Parallel Implementation of the Plane Wave Domain Algorithm on Graphics Processing Unit-Augmented Clusters
Y. Liu1, A. C. Yuce1, V. Lomakin1, E. Michielssen1
1University of Michigan, United States; 2University of California, United States

15:00 Break

15:20 551.6 An Efficient FFT-Based Algorithm for 3-D Structures Residing in Multiple Layers of Layered Media
K. Yang, A. E. Yilmaz, The University of Texas at Austin, United States

15:40 551.7 Unified FFT Based Acceleration of Near and Far Interactions in Moment Method for Microstrip Circuits Embedded in Shielded Multilayered Media
B. J. Raoult1, V. Okhmatskovski, J. K. Lee, A. Cangelvis1
1Syracuse University, United States; 2University of Manitoba, Canada; 3University of Illinois at Urbana-Champaign, United States

16:00 551.8 Envelope Tracking Adaptive Integral Method for Volume Integral Equations
G. Karu, A. E. Yilmaz, University of Texas at Austin, United States

16:20 551.9 Multilevel Model Order Reduction for Finite Element Analysis of Microwave Structures
G. Fotyga, K. Nyka, L. Kalas, Gdansk University of Technology, Poland

Friday, July 13 13:20-17:20 Chicago VII
Session 552 URSI

EM Metrology and Materials

Session Chairs: William Davis, Reuven Shavit

13:20 552.1 Circuit Modeling Methodology with Application to RF via Transitions
R. Shavit, L. Arazi, Ben-Gurion University of the Negev, Israel

13:40 552.2 Estimating Effective Dose of Gas Wells Using Electromagnetic Techniques
M. K. Hassan, K. Panayappan, R. Mittra, Pennsylvania State University, United States

14:00 552.3 Embedded Actives for Heterogeneous Integration of Millimeter Wave Circuits
X. Yang, K. Y. Park, P. Chahal, Michigan State University, United States

14:20 552.4 A New Non-Spurious Discontinuous Galerkin Finite-Element Time Domain Method
Q. Ren, L. E. Tobón, Q. H. Liu, Duke University, United States

14:40 552.5 Electromagnetic Fields near Wireless Power Transfer Systems
Y. G. Kim, S. Nam, Seoul National University, South Korea

15:00 Break

15:20 552.6 Waveguide Probe to on-Wafer Waveguide Transition for Measurement of the Scattering Parameters at Millimeter- and Sub-Millimeter-Wave Frequencies
A. Jam, J. R. East, K. Sarabandi, University of Michigan, United States

15:40 552.7 Three Dimensional Printing of Graded Dielectrics Using an Ultrasonic Powder Deposition System
J. Smith, S. Yarlagadda, M. Mirotnik, University of Delaware, United States

16:00 552.8 Broadband Electromagnetic Modeling of Woven Fabric Composite Laminates
M. Mirotnik, S. Yarlagadda, P. Pa, R. McCauley, University of Delaware, United States; S. Simmons, Naval Surface Warfare Center, United States

16:20 552.9 The Evaluation of the Dielectric Breakdown Voltages of Pultruded Composites Comprised of Different Constituent Materials
E. Hutchcraft, R. K. Gordon, E. Lackey, J. G. Vaughan, University of Mississippi, United States

16:40 552.10 Two-Port Scalar Microwave Network Analyzer with an Analog Source and Software Error Correction
A. Kavaloe, D. Ertelko, University of Illinois at Chicago, United States

Friday, July 13 13:20-17:20 Chicago VIII
Session 553 AP/S/URSI Special Session

Advances in Commercial Electromagnetic Simulation Tools

Session Chairs: C.J. Reddy, Jay Krulovec, Aldo Petosa
Session Organizers: C.J. Reddy, Jay Krulovec, Aldo Petosa

13:20 553.1 Advances in TICRA EM Tools
H. H. Viskum, TICRA, Denmark

13:40 553.2 New Capabilities and Extensions to the Commercial EM Code FEKO
J. van Tonder1, M. Bingle1, W. Jakobs1, C. Ludick1, E. Lezar2, M. Schoeman1
1EM Software & Systems, South Africa; 2EM Software & Systems GmbH, Germany
14:00 553.3 Parameterized Compact Model Synthesis Based on Sonnet Electromagnetic Analysis Data
I. C. Rautio, Sonnet Software, inc., United States
14:20 553.4 Recent Developments in Antenna Magus
14:40 553.5 FDTD Simulations with 10^11 Unknowns Using AVX and SSD on a Consumer PC
W. Simon, A. Laser, A. Wien, IMST, Germany
15:00 Break
15:20 553.6 Computational Platform for Multidisciplinary Electromagnetic Simulations
X. L. Chen, E. Oflı, M. Fuetener, M. Minara, N. Chavannes, N. Kuster, SPEAG, Schmid and Partner Engineering AG, Switzerland
15:40 553.7 WASP-NET: Recent Advances in Fast EM CAD and Optimization of Waveguide Components, Feeds and Aperture Antennas
F. Arndt 1,2 University of Bremen, Germany; 1Microwave Innovation Group, Switzerland
16:00 553.8 Efficient Method of Moment Simulation Based on Higher Order Bases and CPU/GPU Parallelization
B. M. Kolumbozi, D. I. Ocan, Univ OF BELGRADE, Serbia; D. P. Zoric, WPIF-D.d.o.o., Serbia
16:20 553.9 Advanced Features to Enhance the FDTD Method in GEAMS Simulation Software Package
W. Xu 1, X. Yang, W. Li 2 1COMU, United States; 2Harbin Engineering University, China
16:40 553.10 Useful Techniques Included in NEWFASANT Tool for Electromagnetic Analysis and Design
P. Catedra, E. Garcia, C. Delgado, L. Lozano, I. Gonzalez, NEWFASANT SL, Spain; M. J. Algar, A. Semolinos, D. Moreno, Alcala University, Spain
17:00 553.11 Recent Technology Advances in the Computational Electromagnetics Code Efield® for Large Scale Sensor Integration Simulations
B. Strand, E. Abenius, B. Wastberg, Efield AB, ESI Group, Sweden

Friday, July 13 13:20-17:00 Chicago X
Session 554 AP-S

Slotted and Guided Wave Antennas II
Session Chairs: Miao Zhang, Ozlem Aydin Civi
13:20 554.1 Circularly Polarized Slot Antenna with a Simple Feed Design for Solar Cell Integration
M. Chandik, R. Bakar, Utah State University, United States
13:40 554.2 Analysis of an X-Shaped Cavity-Backed Slot 2+2 Element Sub-Array by Hybrid MoM/FEM with Numerical Eigenmode Basis Functions
T. Tomura, J. Hirokawa, T. Hirano, M. Ando, Tokyo Institute of Technology, Japan
14:00 554.3 Loss Reduction & Bandwidth Enhancement by Air-Region Insertion to LTCC Rectangular-Waveguide Slot Arrays in the Micrometer-Wave Band
Y. She, R. Fujino, J. Hirokawa, M. Ando, Tokyo Institute of Technology, Japan; D. Hanatani, M. Fujimoto, Hiraizumi Cooperation, Japan
14:20 554.4 A Slotted Waveguide EM-CAD Design Method
S. Maccio, L. Infante, SILEX Sistemi Integrati SpA, Italy
14:40 554.5 A Circularly Polarized Omni-Directional Low Loss Ka-Band Slot Antenna
C. B. Top, D. Dogan, Akselso Inc., Turkey
15:00 Break
15:20 554.6 Design and Performance Analysis of a Slot Antenna Integrated in a Photovoltaic Panel
A. Michel, R. Caso, L. Tavanti, L. Gazzarrini, R. Garropoto, P. Nepa, University of Pisa, Italy
15:40 554.7 A Study of Basic Slot Antenna Configurations Using Simulation-Driven Optimization
S. Kozije, S. Ogurtsov, Reykjavik University, Iceland
16:00 554.8 Miniaturized on-Chip Slot Antenna in 90nm CMOS
M. R. Khan, Z. C. Zhang, A. Dinh, L. Chen, University of Saskatchewan, Canada; M. Morley, H. Gorla, Southern Illinois University, USA
16:20 554.9 Design of Beamforming Slot Antenna Arrays Using Substrate Integrated Waveguide
F. D. L. Peters, S. O. Tatu, T. A. Denidni, University of Quebec - INRS, Canada
16:40 554.10 Eigenvalue Analysis of a Ridged Waveguide Using a Spectral Domain Green's Functions
T. Suzuki, Ibaraki University, Japan; I. C. Young, University of Kentucky, USA
17:00 554.11 Slots on Cylindrical Substrate Integrated Waveguide
O. Bayraktar, O. Aydin Civi, Middle East Technical University, Turkey

Friday, July 13 13:20-17:00 Chicago X
Session 555 AP-S

Antennas for mobile and wireless applications
Session Chairs: Sungtek Kang, Powen Hsu
15:40 555.1 Comparison Between CTIA Hand Phantom and Different Human Hands for OTA Power Measurements
O. A. Ojerinde, C. J. Panagawama, R. M. Edwards, W. G. Whittow, Loughborough University, United Kingdom
13:40 555.2 Compact MIMO Antenna of the Open-Loop and Meandered-Line I-Layer Radiators with Improved Isolation
S. Yoo, S. Kahng, S.-G. Mok, University of incheon, South Korea; G. Jiang, RF System Research Group, Korea
14:00 555.3 Effective Formulations of Objective Functions for Optimizing U-Shaped Folded Dipole Antenna by PSO
N. T. Hung, H. Morishita, National Defense Academy, Japan; K. Izu, S. Nishiwaki, Graduate School of Engineering, Kyoto University, Japan; Y. Koyanagi, Panasonic Mobile Communications Company Limited, Japan
14:20 555.4 Fundamental Study on Lowering Frequency of J-Shaped Folded Monopole Antenna
H. Kobayashi, N. T. Hung, H. Morishita, National Defense Academy, Japan
14:40 555.5 Three Designs of Dual-Polarized MIMO Antennas with Slender Columnar Structure
Y. Li, F. Liu, Z. Zhang, Z. Feng, Tsinghua University, China
15:00 Break
15:20 555.6 Penta-Band PIFA with Tunable Antenna Height for Wireless Multistandard Terminals
H. K. Tseng, Graduate Institute of Communication Engineering/National Taiwan University, Taiwan; P. Hsu, Department of Electrical Engineering/National Taiwan University, Taiwan
13:20 555.7 Evaluation of Diversity and MIMO Performance of a New High Port to Port Isolation Dual-Band System
B. Addachi, A. Dillow, P. Le Thuc, R. Stains, LEAT UNSA, France; H. Katsuyuki, P. Vainikainen, SMARAD Centre of Excellence, Finland
16:00 555.8 Multi-Band PIFA Loaded with Folded Slot Antenna
D. M. N. Elsheikh, E. A. Abdallah, Electronics Research Institute, Egypt
16:20 555.9 Band-Stop Filter Effect of Multiple Slots in Mobile Phone Antennas
C. R. Rowell 1, 2 E. Y. Lam 1, 2 1Hong Kong Applied Science and Technology Research Institute, China; 2University of Hong Kong, China
16:40 555.10 Tuning the Band-Stop Filter Effect in Mobile Phone Antennas
C. R. Rowell 1, 2 E. Y. Lam 1, 2 1Hong Kong Applied Science and Technology Research Institute, China; 2University of Hong Kong, China

Friday, July 13 13:20-17:20 Huron
Session 556 AP-S/URSI

Analysis and Application of Numerical Methods
Session Chairs: Ali Yilmaz, Vikram Jandhyala
13:20 556.1 Error Measures for Comparing Bioelectromagnetic Simulations
E. Wei, J. W. Musse, C. S. Geyik, H. E. Yilmaz, University of Texas at Austin, United States
### Modeling in Urban and Terrestrial Communication Systems

**Session Chairs:** Agostino Monorchio, Costas Sarris

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<th>Time</th>
<th>Title</th>
<th>Authors/Institutions</th>
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<td>13:40</td>
<td>556.2 Using Natural-Mode Basis Functions to Represent Broadband Responses of a Thin-Wire Scatterer</td>
<td>J. K. Lawrence, A. Q. Martin, Clemson University, United States</td>
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| 14:00 | 556.3 Statistical Characterization of Wave Propagation in Mine Environments                      | O. Bakirci, A. C. Yuce, H. Bagci, E. Michielssen
                                                      | University of Michigan, United States; *King Abdullah University of Science and Technology, KSA*       |
| 14:20 | 556.4 Stochastic Analysis for Interconnect Channels                                             | C. Guo, J. Shen, J. Chen, University of Houston, United States                                        |
| 14:40 | 556.5 A Multi-Resolution System of Domain Decomposition Spectral Functions for the Analysis of Large Smooth Bodies | M. A. Francavilla, M. Righero, F. Viganza, *Istituto Superiore Mario Boella (ISMB)*, Italy; G. Vecchi, Politecnico di Torino, Italy |

**Friday, July 13 13:20-17:00 Michigan A**

**Session 557 AP-S**

### Rough Surface Scattering Phenomenology

**Session Chairs:** Akira Ishimaru, Saba Mudalair

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<td>A. Ishimaru, M. Stoneback, Y. Kuga, University of Washington, United States</td>
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<td>558.2 HF Radar Ground Wave Propagation in a Maritime Complex Environment</td>
<td>C. Bourlier, IETR - Lunam université, France; G. Kubické, DGA Information Superiority, France</td>
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<td>558.3 A Study of the Third Field Series Term in the Small Slope Approximation for Rough Surface Scattering</td>
<td>I. T. Johnson, J. D. Ouellette, The Ohio State University, United States</td>
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<td>558.5 Multiple Scale Rough Sea Surface Scatter Cross Sections and Physical Optics and Diffuse Scattering by Capillary Waves</td>
<td>E. Babar, University of Nebraska-Lincoln, United States</td>
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**Friday, July 13 13:20-17:00 Superior A**

**Session 559 AP-S**

### Reconfigurable Arrays

**Session Chairs:** Pedram Mousavi, Chrisostos Christodoulou

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14:00 559.3 Synthesis of Reconfigurable Planar Arrays for Monopulse Radars
P. Rocca, A. De Matteis, A. Massa, ELEDA Research Center - University of Trento, Italy; A. F. Morabito, T. Isernia, LEMMA Research Group - University Mediterranea' of Reggio Calabria, Italy

14:20 559.4 Wireless Control of Reconfigurable Antenna Arrays
M. A. Iskander, D. Anagnostou, South Dakota School of Mines & Technology, United States

14:40 559.5 Instantaneous Expansion of a Collimated Beam to a Wider Pattern to Cope with System Energies
T. Takano, K. Saeuga, Nihon University, Japan

15:00 Break

15:20 559.6 Half-Phase-Gradient Partially Reflective Surface for a Reconfigurable Dual-Beam Scanning Cavity Antenna
H. Moshabak 1,2, M. Daneshzamand 1,2, P. Mousavi 1,2
1University of Alberta, Canada; 2TRlabs, Canada

15:40 559.7 Detection of Failures in Switch Reconfigurable Antenna Arrays Using Embedded Sensing Lines
M. Rivera 1, J. Costantine 2, Y. Tawk 1, C. Christodoulou 1
1University of New Mexico, United States; 2California State University Fullerton, United States

16:00 559.8 Orthogonally-Polarized Dual-Band MEMS-Tunable Double-Slotted Unit Cell for Reflectarray Applications
H. Moshabak 1,2, M. Daneshzamand 1,2, P. Mousavi 1,2, M. R. Chaharmir 1,2
1University of Alberta, Canada; 2TRlabs, Canada; 3Communication Research Center, Canada

16:20 559.9 Wideband Unit-Cell Based on Liquid Crystals for Reconfigurable Reflectarray Antennas in F-Band
G. Perez-Palomino, J.A. Encinar, M. Barba, Polytechnic University of Madrid, Spain; R. Dickie, P. Bain, R. Cahill, Queen’s University Belfast, United Kingdom; R. Florencio, R. R. Boix, University of Seville, Spain

16:40 559.10 Reconfigurable Sectoral Antenna Using an Cylindrical Frequency Selective Surface
L. Y. Wang, University of Electronic Science and Technology of China, China

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Friday, July 13 13:20-17:00 Superior B
Session 560 AP-S/URSI

Wideband Antennas and Arrays

Session Chairs: Dejan Filipovic, Wajih Elsallal

13:20 560.1 Top-Loaded UWB Monopole Antenna for Automotive Applications
D. N. Aloj, E. Ghiorti, Oakland University, United States

13:40 560.2 Comparison of Pulse Distortion Properties for UWB Antennas
N. Turker Tozak, F. Tokan, A. Neto, TU Delft, Netherlands

14:00 560.3 Wideband Printed Rectangular Monopole Antenna for Circularly Polarization
T. Fujimoto, K. Iono, Nagasaki University, Japan

14:20 560.4 Wideband Unidirectional Circularly Polarized Antenna for GPS/Galileo/GLOASS
X. Bao, M. Ammann, Dublin Institute of Technology, Ireland

14:40 560.5 Base-Station of Modified Collinear Antenna for Correspondence to Multimedia Broadcasting

15:00 Break

15:20 560.6 Performance of Two Linearly-Polarized Broadband Horns on a Small Circular Platform
M. J. Radway, D. S. Filipovic, University of Colorado at Boulder, United States

15:40 560.7 A TEM Horn Antenna with Non-Uniform Expansion for Oil Well Monitoring
D. Olum 1,2, M. I. Pettersson 1, D. Elliott 1, P. Mousavi 1,2
1University of Alberta, Canada; 2TRlabs, Canada; 3Blekinge Institute of Technology, Sweden

16:00 560.8 A Circularly Polarized Dual-Gridded Reflector Prototype with a Meander-Line Circular Polarizer
M. A. Jang 1, M. Rief 2, Y. Demer 2, J.-J. Larray 1
1École Polytechnique de Montréal, Canada; 2MDA Corporation, Canada

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Friday, July 13 13:20-17:00 Missouri
Session 562 AP-S/URSI

Radar Imaging and Non-Intrusive Monitoring

Session Chairs: Jeffrey Nanzer, Lorenzo Lo Monte

13:20 562.1 Three-Dimensional Imaging of Targets Behind Multilayered Walls
W. Zhang 1, A. Hoorfar 2, Q. H. Liu 1
1Duke University, USA; 2Villanova University, USA

13:40 562.2 Simulation of a Polarimetric Radar Imaging System Using Realistic Antenna Patterns
T. Dang, C. Le, US Army Research Laboratory, United States

14:00 562.3 Ground Surface Scattering and Clutter Suppression in Ground-Penetrating Radar Applications
D. H. Liu, U.S. Army Research Laboratory, United States

14:20 562.4 Compressed Sensing Through a Pipe
Session Chairs: Guido Lombardi, Weng Cho Chew

13:20 563.1 The Reactive Energy of Transient EM Fields

G. Kaiser, Center for Signals and Waves, United States

13:30 563.2 Antenna Reciprocity and the Theory of Electromagnetic Time Reversal

W. M. Dwyer, T. K. Sarkar, Syracuse University, United States; M. Salazar-Palma, Universidad Carlos III de Madrid, Spain

14:00 563.3 Derivation of the Fundamental Evolution Equations of Electromagnetic Radiation in the near-Field Zone

S. M. Mikik, Y. M. M. Antar, Royal Military College of Canada, Canada

14:20 563.4 Wave Operators and Green’s Functions on Random Graphs

C. Xing, V. Jandhyala, University of Washington, United States

14:40 563.5 Fluid-Dynamic Formulation of Maxwell’s Equations

C. A. Gonano, R. E. Zich, POLITECNICO DI MILANO, Italy

15:00 Break

15:20 563.6 The Casimir Force for Arbitrary Three-Dimensional Objects with Low Frequency Methods

P. R. Atkins1, Q. I. Dai1, W. E. I. Sha1, W. C. Chew1,2
1University of Illinois at Urbana-Champaign, United States; 2University of Hong Kong, Hong Kong

15:40 563.7 Evaluation of Certain Integrals Using Stochastic Formulation of the Lossy Wave Equation

R. Janaswamy, University of Massachusetts, United States

16:00 563.8 Theory of Near Field for Antennas Embedded in Complex Environments

S. M. Mikik, Y. M. M. Antar, Royal Military College of Canada, Canada

16:20 563.9 Relational Analysis of the Fundamental Operational Modes of General Electromagnetic Systems: The Antenna Current Greens Function Formalism as a Paradigm

S. M. Mikik, Y. M. M. Antar, Royal Military College of Canada, Canada

16:40 563.10 Pulse Transmission into a Lorentz Half-Space

N. Cartwright, SUNY New Paltz, United States

17:00 563.11 More Unusual Properties of the Microwave Vortex

S. D. Stearns, Northrop Grumman Corporation, United States
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