2022 16th European Conference on Antennas and Propagation (EuCAP 2022)

Madrid, Spain
27 March – 1 April 2022

Pages 1-788

IEEE Catalog Number: CFP2277B-POD
ISBN: 978-1-6654-1604-7

Copyright © 2022, European Association on Antennas and Propagation (EurAAP)
All Rights Reserved

****** This is a print representation of what appears in the IEEE Digital Library. Some format issues inherent in the e-media version may also appear in this print version.***

IEEE Catalog Number: CFP2277B-POD
ISBN (Print-On-Demand): 978-1-6654-1604-7
ISBN (Online): 978-88-31299-04-6

Additional Copies of This Publication Are Available From:

Curran Associates, Inc
57 Morehouse Lane
Red Hook, NY 12571 USA
Phone: (845) 758-0400
Fax: (845) 758-2633
E-mail: curran@proceedings.com
Web: www.proceedings.com

TABLE OF CONTENTS

A 28 GHz Beam Steerable Elliptic Microstrip Array Antenna for 5G Applications 1
Amir Mohsen Ahmadi Najafabadi, Firas Abdul Ghani, Ibrahim Tekin

From Sub-6 GHz to mm-Wave: Simultaneous Multi-band Characterization of Propagation from Measurements in Industry Scenarios 5
Diego Dupleich, Niu Han, Alexander Ebert, Robert Muller, Stephan Ludwig, Alexander Artemenko, Josef Eichinger, Tobias Geiss, Giovanni Del Galdo, Reiner Thoma

Effective Permittivity Measurement of 3D-Printed Dielectric Crystals 10
Simon P. Hehenberger, Aparna P. T. Adithyababu, Stefano Caizzone

Manufacturing and Testing of a 94GHz Linear Slot Array Designed by the MoM-FMP Technique 15
I. Montesinos-Ortego, M. Garcia-Pena, B. Galocha-Iraguen, M. Sierra-Castaner

Meta-surface Boosted Antenna to achieve higher than 50 dB TRX Isolation at 26 GHz for Joint Communication and Radar Sensing (JC&S) 19
Mehrab Ramzan, Andre N. Barreto, Padmanava Sen

X-Band Low-Profile Wideband Circular Polarized Microstrip Array for CubeSat Communications 24
Gong Chen, Chaoran Hu, Mingchuan Wei, Jiyao Zhang, Fujiang Lin

Array Antenna with HIS Metasurface for mmWave Imaging Applications 28
A. Florez Berdasco, M. E. De Cos Gomez, H. Fernandez Alvarez, F. Las-Heras Andres

Simulation-based Machine Learning Training for Brain Anomalies Localization at Microwaves 33
Valeria Mariano, Mario R. Casu, Francesca Vipiana

UWB-MIMO antenna for wireless communication systems with isolation enhancement using metamaterial 36
Omkar Ashish Shelar, Tanweer Ali, Praveen Kumar

High-Performance Processing with Equivalent Currents: Results on a Very Large Measured Antenna 41
L. Scialacqua, F. Mioc, F. Scattone, L. J. Foged, G. Giordanengo, M. Righero, G. Vecchi

A unified Nyström/Galerkin method for for multiscale problems 46
Felipe Vico, Miguel Ferrando-Bataller, Eva Antonino-Daviu, Marta Cabedo-Fabres

Selecting Characteristic Modes in Multi-Mode Direction Finding Antenna Design by Using Reconstructed Incident Fields 51
Lukas Grundmann, Dirk Manteuffel

Dispersion HIE-SF-FDTD Method for Simulating Graphene-Based Absorber 56
Mohammad Moradi, Mohammad S. Sharawi, Ke Wu

Target Selection in Multistatic Microwave Breast Imaging Setup Using Dielectric Lens 61
Daniela M. Godinlio, Joao M. Felicio, Carlos A. Fernandes, Raquel C. Conceicao

Low-Frequency Data Learning for Solving Highly Nonlinear Inverse Scattering Problems 66
Zhichao Lin, Rui Guo, Maokun Li, Aria Abubakar, Tao Zhao, Fan Yang, Shenheng Xu

An Efficient Strategy for Distributing the Mesh of Parallel Electromagnetic Solvers Based on the AIM 69
Damian Marek, Shashwat Sharma, Piero Triverio

A Repeater Antenna System Utilizing Genetically Modified Bacteria for Multiscale Communications 74
Ozan Furkan Sezgen, Oguz Kaan Erden, Nedim Haciosmanoglu, Macit Emre Lacin, Arda Deniz Yalcinkaya, Zeliha Cansu Canbek Ozdil, Urartu Ozgur Safak Seker, Sema Dumanli

Miniaturized Circularly Polarized Implantable Antenna for Leadless Pacemaker Devices 78
Abdenasser Lamkaddem, Ahmed El Yousfi, Vicente Gonzalez Posadas, Daniel Segovia-Vargas

A 868 MHz compact antenna with no impact of the material support 82
Shandipsing Robee, Francois Gallee, Jean-Philippe Coupez, Darius Jakonis, Valerio Beni, Stephane Rioual

The 2019-2022 ESA-EurAAP Facility Comparison Campaign with the DTU-ESA mm-VAST Antenna — Mid-Term Status 87
O. Breinbjerg, J. M. Bjorstorp, T. M. Gemmer, A. C. Granich, F. Las-Heras, M. Rodriguez-Pino, M. Sierra Castaner, X. Sun, P. Ratajczak, L. Le Coq, R. Vallauri, A. Vicentini, H. Garcia Lopez Del Amo, D. Allenic, L. Rolo, I. Barbary, M. Saporetti, R. Tena Sanchez, C. Hunscher, J. Herrero Del Real

Antenna Element Study for a Future SMOS Mission 92
Q. Garcia-Garcia, D. Espinosa, A. Zurita, J. Closa, E. Gandini, M. Suess, M. Martin-Neira

Using the Convolutional Neuron Network for Target Localization and Wall Characterization in the Through the Wall Imaging Problem 97
Behzad Ashrafi Nia, Sajjad Sadeghi, Franco De Flaviis

A Single Metasurface Plate Excited by a Patch Antenna for Large Tilt Angle Formation 100
T. Abe, J. Yamauchi, H. Nakano

Chamber Design for Automotive EMC and ADAS Testing 104
Garth D'Abreu, Zhong Chen

Architecture of the Overlapped Subarray Fed Reflector Antenna SAR System 109
Quiterio Garcia-Garcia, Javier Del Castillo, Tamara Coello, Giovanni Toso, Ernesto Imbembo

A reconfigurable MuPAR antenna system employing a hybrid beam-forming technique 114
Dimitrios K. Rongas, Leonidas Marantis, Athanasios G. Kanatas

What Positioning Accuracy is Sufficient for Reliable mmWave A2G Channel Measurements? 119
Vasilii Semkin, Aki Karttunen, Seongjoon Kang, Jukka Talvitie, Marco Mezzavilla, Sundeep Rangan, Mikko Valkama

Wave Scatterer Localization in Outdoor-to-Indoor Channels at 4 and 14 GHz 124
Pasi Koivumaki, Aki Karttunen, Katsuyuki Haneda

Dual-band Multi-Polarization Metallic Cavity Antenna Design for Satellite Communications 129
Jorge Calatayud Maeso, Alfonso Tomas Muriel Barrado, Adrian Tamayo Dominguez, Pablo Sanchez Olivares, Jose Manuel Fernandez Gonzalez

A High-Gain Fabry-Perot Antenna Based on Partially Reflecting Surfaces and Polarization Conversion Surfaces 134
Yang Cai, Peng Mei, Xian Qi Lin, Shuai Zhang

High Isolation Wideband SICL Excited Compact MIMO Antenna Array for 5G Endfire Applications in Customer Premises Equipment 138
Naman Baghel, Soumava Mukherjee

A Gap Waveguide-Based 2x2 Circularly-polarized Monopulse Antenna Array 142
Carlos Vazquez-Sogorb, Miguel Ferrando-Rocher, Stephan Marini, Jose I. Herranz-Herruzo

Analytical Form of the Scan Blindness Condition in an Infinite Phased Array of Printed Dipoles with a Superstrate 145
Andrey Kobyakov

Detection of Water Through Steel-Lined Grout Using a Stepped-Frequency Continuous Wave Radar 150
Thomas Maetz, Manfred Hagelen, Rainer Jetten, Jochen Moll

Circularly Polarized Shared Aperture Reflectarray and Patch Antenna Array for S- and Ka-Band 154
Daniel E. Serup, Shuai Zhang, Gert Frolund Pedersen

A feasibility study of a radio-frequency theranostic device for tumor localization and treatment 158
Sabrina Rotundo, Danilo Brizi, Agostino Monorchio

Study of Feasibility for 2D and 3D Innovative Jet Printed RF Devices 162
Camille Delfaut, Tan-Phu Vuong, Alejandro Niembro-Martin, Thierry Lacrevaz, Quoe-Bao Duong, Damien Paulet, Denis Curtil, Jean-Emmanuel Broquin, Cecile Venet, Nadege Reverdy-Bruas

Mosaic Frequency Selective Surface with Wideband Response for the Optically Transparent and Absorber Applications 166
Nur Biha Mohamed Nafis, Mohamed Himdi, Mohamad Kamal A Rahim, Faissal Merzaki

Phase Reconfiguration via SIW Structures Filled with Liquid Metal 171
Shaker Alkaraki, Alejandro L. Borja, James Kelly, Syeda Fizzah Jilani, Raj Mittra, Yue Gao

Synthesis and Characterization of a Focused-Beam Transmitarray Antenna at 300 GHz 176
Francesco Foglia Manzillo, Orestis Koutsos, Benjamin Fuchs, Ronan Sauleau, Antonio Clemente

Optimal MIMO Sparse Array Design Based on Simulated Annealing Particle Swarm Optimization 180
Xiaoyuan He, Cristian Alistarh, Symon K. Podilchak

Backscattered field of a random set of dipoles as a model for highly coupled RFID tags 185
Aiman Mughal, Jithin Mudakkarappilli Sudersanan, Shermila Mostarshedi, Benoit Poussot, Jean-Marc Laheurte

A Metal-Only Reflectarray Made of 3D Phoenix Cells 189
Zhihang An, Tony Makdissy, Maria Garcia Vigueras, Sebastien Vaudreuil, Raphaël Gillard

Crossover level improvement between beams in a geodesic lens antenna based on a generalized Luneburg lens 194
Astrid Algaba-Brazalez, Philip Arnberg, Oskar Zetterstrom, Freysteinn Vidar Vidarsson, Lars Manholm, Martin Johansson, Oscar Quevedo-Teruel

Validating FR2 MIMO OTA Channel Models in 3D MPAC 199
Usman Tahir Virk, Lassi Hentila, Pekka Kyosti, Jukka Kyrolainen

A Deep Learning Architecture for Augmented Shape Reconstruction via Microwave Imaging 204
Alvaro Yago Ruiz, Marija Nikolic Stevanovic, Marta Cavagnaro, Lorenzo Crocco

Butler-Matrices-Based Omnidirectional Beamforming of Circular/Cylindrical Arrays 208
Rui Ma, Wenning Gao

Propagation Experiment Using a G-band Terrestrial Link: Design and Preliminary Results 212
L. Luini, C. Riva, C. Franchini, A. Colosimo, A. Marziani, L. Resteghini, C. Mazzucco, A. Milani, R. Lombardi

Understanding phase pattern discrepancies in UAV-based measurements of a SKA-low prototype 217
L. Ciorba, G. Virone, F. Paonessa, P. Bolli, O. A. Peverini, G. Addamo, M. Lumia

Dual-Linearly Polarized Wideband Printed Planar Monopole Antenna 221
Pedro Falcao, Custodio Peixciro

Multibeam Leaky-Wave Antenna with Independent Beam Control at Millimeter Waves 226
Despoina Kampouridou, Alexandros Feresidis

Influence of Stirrer Vibration During Stepwise Operation of a Reverberation Chamber 230
Christoph Cammin, Thomas Doebbert, Gerd Scholl

Maximization of Millimeter-Wave LoS OAM Link Using Beam Steering and Partial Receiving 235
Yanlei Xiu, Yang Wang, Panpan Shi, Kuo Zhao, Tao Hu, Xi Liao

Modeling and Measurements for Multi-path Mitigation with Reconfigurable Intelligent Surfaces 240
Ruya Zhou, Xiangyu Chen, Wankai Tang, Xiao Li, Shi Jin, Ertugrul Basar, Qiang Cheng, Tie Jun Cui

Design and Test of a Circularly Polarized Microstrip Antenna Array for a Sentinel-1 SAR Active Reflector with co- and cross- Polarization Capability 245
F. Mira Perez, G. Luzi, P. Espin-Lopez

A Learning-Based NLOS Mitigation Method for Single-Anchor SLAM 249
Tianyu Wang, Yuxiao Li, Junchen Liu, Yuan Shen

An Encoder-Only Transformer to Generate Power Patterns from Far-Field Performance Criteria 254
Chen Niu, Max Kelly, Puyan Mojabi

An Integrated Microwave-Ultrasound Breast Imaging System: Initial Phantom Results 258
Hannah C. Fogel, Max Hughson, Mohammad Asefi, Ian Jeffrey, Joe Lovetri

A New Method for Gain Prediction of Superdirective End-Fire Arrays 263
Alessio Tornese, Antonio Clemente, Christophe Delaveaud

Antenna De-Embedding in FDTD Using Spherical Wave Functions by Exploiting Orthogonality 267
Leonardo Morlein, Lukas Berkelmann, Dirk Manteuffel

Localizing Targets via Properly-Synthesized Orbital Angular Momentum Vortices 272
Giada Maria Battaglia, Andrea Francesco Morabito, Roberta Palmeri, Tommaso Isernia

The Way One Defines Specification Matters: On the Performance Criteria for Efficient Antenna Optimization in Aggregated Bi-Objective Setups 276
Adrian Bekasiewicz, Michal Czyz

Performance Analysis of Classification Algorithms for Millimeter-wave Imaging 281
Rahul Sharma, Raphael Hussung, Andreas Keil, Fabian Friederich, Thomas Fromenteze, Mohsen Khalily, Bhabesh Deka, Vincent Fusco, Okan Yurduseven

Design of High Gain and High Steering Angle Matrix Antenna for Electronic Warfare Application 286
Paul Karmann, Edson Martinod, Joël Andrieu, Mohamad Majed, Mohamad Rammal

Monte-Carlo Method for EMF Exposure Distribution Assessment in 5G Base Station 290
Tingyong Jiang, Anja K. Skrivervik

Enhancing the beamwidth of low profile single-fed microstrip antennas using parasitic elements 295
Ismael Vico Trivino, Anja K. Skrivervik

Drop-by-Drop Radar Cross Section Calculations for Sand C-band Weather Radar Frequencies 300
Franz Teschl, Merhala Thurai, Sophie Steger, Michael Schonhuber

A Statistical Assessment of Anthropomorphic Characteristics Impacts on WBAN Communications..... 305
Badre Youssef, Christophe Roblin

A Microwave Imaging Technique Based on Artificial Neural Networks for Neck Tumors Detection..... 310
Chiara Dachena, Alessandro Fedeli, Alessandro Fanti, Matteo B. Lodi, Giorgio Fumera, Matteo Pastorino, Andrea Randazzo

3D-Printed Wide Beamwidth Lens Antennas for Beamforming Coverage Improvement 315
Vitor Coelho, Tiago Varum, Joao N. Matos

Dual-Band, Dual-Linearly Polarized Transmitarrays for SATCOM Applications at Ka-Band 320
Reda Madi, Antonio Clemente, Ronan Sauleau

Thermographic Investigation of Frequency-Reconfigurable Wearable Antennas..... 324
Quoc Hung Dang, Shengjian Jammy Chen, Christophe Fumeaux

Enhanced Data Throughput Using 26 GHz Band Beam-Steered Antenna for 5G Systems 328
M. Rabbani, J. Churm, S. Payami, M. Khalily, P. Xiao, R. Rahim Tafazolli, T. H. Loh, James R Kelly, A. Feresidis

Millimeter-Wave Quasi-Optical Feeds for Linear Array Antennas in Gap Waveguide Technology..... 331
Artem R. Vilenskiy, Yingqi Zhang, Esme Galesloot, Adrianus Bart Smolders, Marianna V. Ivashina

Multifunctional Metasurface for Broadband Reflect-Transmit-Array Antenna at 5G Millimeter-Wave Band 336
Weixu Yang, Ke Chen, Yijun Feng

A Reference Model for Channel Sounder Performance Evaluation, Validation and Comparison 341
Sven Wittig, Michael Peter, Wilhelm Keusgen

Coplanar Waveguide Fed U-Band Horn Antenna Manufactured Using 3D Printing and Electroplating 346
Anne Vaske, Altan Akar, Bjorn Neubauer

Numerical Aspects of the Application of Ray-Tracing to Geodesic Lenses 350
S. Clendinning, S. Yang, Q. Liao, P. Castillo-Tapia, F. Mesa, N. J. G. Fonseca, O. Quevedo-Teruel

Metal-only Multi-beam Fabry-Perot Antenna 355
Jorge Ruiz-Garcia, Christos Bilitos, Enrica Martini, Giovanni Toso, Stefano Maci, David Gonzalez-Ovejero

Towards real-time monitoring of pulsed microwave ablation using thermoacoustic signals: A study of signal characteristics as a function of salinity 359
Audrey L. Evans, Chu Ma, Susan C. Hagness

Array Antenna Power Pattern Analysis Through Quantum Computing..... 363
Luca Tosi, Nicola Anselmi, Alessandro Polo, Paolo Rocca

Latency Validation Method for 3D 5G Networks' URLLC Applications 366
Marjo Heikkila, Virve Malkamo, Pentti Etelaaho, Tero Kippola, Marjut Koskela

Improved Iterative DGFM Convergence, Towards Large-Scale Antenna Array Analysis 371
Andre S. Conradie, Matthys M. Botha

Recent Developments of Wideband and Multi-Band Dual-Circularly-Polarized Reflect-Arrays 375
Zhi Hao Jiang, Xuanfeng Tong, Yuan Li, Fan Wu, Wei Hong

SbD-based Propagation Contouring through 1-bit Dual-Polarization Reconfigurable Intelligent Surfaces 379
Giacomo Oliveri, Andrea Massa

On Breast Imaging from Joint Microwave and Acoustic Data Within a Bayesian Framework 383
Yingying Qin, Thomas Rodet, Dominique Lesselier

Millimeter-Wave Antenna Arrays for 5G Mobile Handset 388
Chao Yu, Xiaoyue Xia, Yunli Li, Xuanfeng Tong, Fan Wu, Zhi Hao Jiang, Yu Yao, Wei Hong

Multi-beam Tracking for Phased Array Antenna Measurement by multiple UAVs 392
Saki Omi, Hyo-Sang Shin, Antonios Tsourdos, Joakim Espeland, Andrian Buchi

Numerical quantitative evaluation of the skin impact in breast cancer imaging at mm-waves 397
S. Di Meo, A. Fava, M. Pasian

Triple-Band Quad-Element Polarization/Pattern Diversity Directional MIMO Antenna for Sub-6 GHz Application..... 402
Jogesh Chandra Dash, G. Shrikanth Reddy, Kalva Nagalakshmaiah, Jayanta Mukherjee

A Study on Radio Propagation Channel Modelling for Tunnels 407
Suying Jiang, Jiting Song, Wei Wang, Rashdan Ibrahim

A Design Methodology for Response-controlled Passive Magnetic Metasurfaces 411
Martina Falchi, Sabrina Rotundo, Danilo Brizi, Agostino Monorchio

Application of Glide Symmetry to Ridged Waveguides 414
Angel Palomares-Caballero, Carlos Megias, Carlos Molero, Antonio Alex-Amor, Pablo Padilla

Liquid Metal Enabled SIW Vias and RF Blocking Walls for Reconfigurable Antennas 418
Shaker Alkaraki, Zhishu Qu, James Kelly, Alejandro L. Borja, Raj Mittra, Yi Wang

Optimization of Uniform Amplitude Periodic Linear Phased Arrays for Grating Lobe Reduction 423
Yanki Aslan, Nehir Berk Onat

A Conformal and Transparent Frequency Reconfigurable Water Antenna 428
Abu Sadat Md. Sayem, Roy B. V. B. Simorangkir, Karu P. Esselle, John L. Buckley

Reflection and Penetration Loss Wideband Measurements of Building Materials at 28 GHz and 39 GHz 432
Saied El Faitori, Sana Salous

Single layer Multimodal OAM Reflectarray 436
M. Beccaria, P. Pirinoli

A Study on Low Profile Orthogonal Polarization Antenna Using Halo Antenna 440
Tomokazu Mizutani, Naobumi Michishita, Hisashi Morishita, Hiroshi Sato, Yoshio Koyanagi

Evaluation of Chipless RFID Indoor Landmarks at 80 GHz and 240 GHz Using FMCW Radars 444
Jesus Sanchez-Pastor, Lukas Piotrowsky, Alejandro Jimenez-Saez, Martin Schussler, Nils Pohl, Rolf Jakoby

On the Scattering of Nondiffractive Beams by PEC and Dielectric Cylindrical Objects 448
Santi C. Pavone, Loreto Di Donato, Gino Sorbello

Indoor Material Transmission Measurements between 2 GHz and 170 GHz for 6G Wireless Communication Systems 452
Mohamed Abdelbasset Aliouane, Jean-Marc Conrat, Jean-Cristophe Cousin, Xavier Begaud

Fast Array Diagnosis Based on Measured Complex Array Signals with Short Measurement Distance 457
Mengting Li, Fengchun Zhang, Wei Fan

Flexible RFID tag for bottle labelling 462
David Rodrigues, Pedro Pinho, Carlos Mendes

Phaseless, non-redundant planar wide-mesh scanning for antenna characterization: numerical validation 466
F. Bevilacqua, A. Capozzoli, C. Curcio, F. D'Agostino, F. Ferrara, C. Gennarelli, R. Guerriero, A. Liseno, M. Migliozzi, Y. Vardaxoglou

Measured Radiation Behaviour of a UAV-attached LTE Antenna 471
Philipp Reingruber, Robert Langwieser, Taulant Berisha, Christoph F. Mecklenbrauker

Penrose Tiling Subarrays for Large-Scanning and Energy-Saving Phased Array 476
Francesco Alessio Dicandia, Simone Genovesi

Comparison of Capacitive and Inductive Partially Reflective Surface Antenna Using Ray-tracing 480
Qiuyan Liang, Buon Kiong Lau

A Localization System for Autonomous Vehicles Based on TriLateration Tags 485
Emidio Digiampaolo, Francesco Martinelli, Fabrizio Romanelli

Design and Optimization of a Compact Planar Radiator for UWB Applications and Beyond 490
Michal Czyz, Jan Olencki, Adrian Bekasiewicz

On the Design of Unit Cells with Diagonal Symmetry for Wideband Polarization Converters 493
Salvador Moreno, J. Luis Medran-Del-Rio, Angel Palomares-Caballero, Antonio Alex-Amor, Armando Fernandez-Prieto, Carlos Molero

Omnidirectional Millimeter-Wave Propagation Characteristics of Corridor Environments based on Measurements at 28, 38, 71 and 82 GHz 498
Juyul Lee, Kyung-Won Kim, Jae-Joon Park, Myung-Don Kim, Heon Kook Kwon

Indoor Radio Channel Modeling at D-Band Frequencies 503
Brecht De Beelde, Emmeric Tanghe, David Plets, Wout Joseph

Thermally Actuated Vanadium Dioxide Millimeter Wave Reflectarray 507
Jordan Ramsey, Kendrick Henderson, Nima Ghalichechian

Multibeam Leaky-Wave Antenna for Mm-wave Wide-Angular-Range AoA Estimation 510
Julien Sarrazin, Guido Valerio

Understanding Single-Element Beamforming using Characteristic Modes and a Change of Basis 515
Leonardo Morlein, Dirk Manteuffel

An investigation into the effects of spatial correlation error on 5G MIMO OTA testing using single-probe anechoic chamber method 518
Qiwei Zhang, Tian Hong Loh, Zhibei Huang, Fei Qin

3D-Printed Half-Maxwell Fish-Eye dielectric lens antenna with integrated DRA feed 523
Jose Manuel Poyanco, Francisco Pizarro, Eva Rajo-Iglesias

Radar Cross Section Enhancement using Metasurfaces for Road Safety Applications 528
Mohammed Kalaagi, Divitha Seetharamdoo

Dispersion control in metallic 3D cells to synthesize polarization conversion 533
C. Molero, H. Legay, M. Garcia-Vigueras

Sensorized Facemask with Temperature RFID Sensor for Cough Analysis 538
Nicoletta Panunzio, Francesca Ciafrei, Cristina Magnante, Giulio Maria Bianco, Gaetano Marrocco

Preconditioned Inverse Source Solutions 543
Thomas F. Eibert

Low Profile Three Element Half Cylindrical Dielectric Resonator Antenna for MIMO Application 548
Monika Chauhan, Anil Rajput, Biswajeet Mukherjee

Developing a MIMO Test Methodology using Dynamic Channel Models and Link Adaptation 553
Michael D. Foegelle, Thorsten Hertel, Pekka Kyosti, Jukka Kyrolainen, Doug Reed

Substrate Integrated Waveguide Cavity Backed Slot Antennas for Millimeter- Wave Applications 558
Sanaâ Finich, Henrique. M. Salgado, Pedro Pinho

Channel Characteristics Analysis of Ultra-high Mobility MIMO Wireless System in Tunnel Scenario 563
Sirou Wang, Hengkai Zhao, Guoxin Zheng

Investigation of Different Levels of Probe Compensation in Spherical Near Field Measurements Performed with Wideband and Dual-Polarized Probes 568
F. Saccardi, A. Giacomini, T. Blin, L. J. Foged

Miniaturized 5G Module of Wideband Dual-Polarized Mm-Wave Antennas-in-Package as Non-Mm-Wave Antennas (AiPaA) for Handsets 573
Huan-Chu Huang, Zhixing Qi, Dasong Gao, Junyong Liu, Yanchao Zhou, Jingwei Li, Hong Lin

Computation of Fundamental Bounds for Antennas 578
Jakub Liska, Lukas Jelinek, Miloslav Capek

Towards Holographic Antenna Systems for MIMO Radar and Communication Applications..... 582
Thomas Frey, Maximilian Doring, Christian Waldschmidt, Tobias Chaloun

Level Measurement of Low-Permittivity Material using an M-Sequence UWB Radar..... 587
Tim Erich Wegner, Stefan Gebhardt, Giovanni Del Galdo

Generation of Sum and Difference Radiation Beams with a 2-bit Polarization-Dependent Metasurface 592
Peng Mei, Gert Frolund Pedersen, Shuai Zhang

Experimental Study of Loss and Variation of Human Blockage for Terahertz Wireless Communications..... 597
Keiji Yoshikawa, Takahiro Hayashi

Design Optimization of Pyramidal Horn Antennas for 3D Printing in the mm-Wave Range..... 602
K. Lomakin, J. Schur, G. Gold

Human Brain Imaging by Electromagnetic Tomography: a mobile brain scanner for clinical settings..... 606
Tommy Henriksson, Sahar Sahebdivan, Ramon Planas, Cornelia Brunner, Lukas Kellermair, Michael Guger, Walter Struhal, Peter Fuchs, Jakob Reichl, Andreas Stelzer, Serguei Semenov, Stephen Pearce, Milan R. Vosko

Conformal Structural Integration of Airborne Satellite Communication Antennas 611
Jaco Verpoorte, Harmen Schippers

Triple-band dual-antenna decoupling system for mobile handset 616
Jesus De Mingo Sanz, Pedro Luis Carro Ceballos, Paloma Garcia Ducar, Antonio Valdovinos Bardaji, Juan Ernesto Garcia Cerezo

Enhancement of 5G Millimeter-Wave Coverage in Indoor Scenarios by Passive Shaped-Beam Reflectarray Panels..... 621
Eduardo Martinez-De-Rioja, Alvaro F. Vaquero, Manuel Arrebola, Eduardo Carrasco, Jose A. Encinar, Safa Salman, Maha Achour

Deep Learning-Based Path Loss Prediction Using Side-View Images in an UMa Environment..... 626
Nobuaki Kuno, Minoru Inomata, Motoharu Sasaki, Wataru Yamada

Beam-Steerable Helical Antenna Using Plasma Reflectors 631
Fatemeh Sadeghikia, Mahsa Valipour, Ali Karami Horestani, Mohamed Himdi, Theodore Anderson

Huygens' Metasurfaces for Antenna Beamforming and Beamsteering 635
Vasileios G. Ataloglou, Minseok Kim, George V. Eleftheriades

Investigation on user shadow suppression for mobile handset antenna at 28GHz 640
Peiye Liu, Igor Syrytsin, Shuai Zhang

60 GHz Propagation Channel Measurements with a Real mmWave Communication Equipment in an Office Environment 645
Randy Verdecia-Pena, Maria A. Serrano, Jorge Alvarez-Casado, Adolfo Del-Solar, Jose I. Alonso

RF Coverage Mapping of Bistatic Radio Links Using the Terrain Integrated Rough Earth Model (TIREM) 650
Michael A. Varner, Thomas A. Rodriguez, Gregory D. Durgin

Theoretical Efficiency and Dosimetry of Buffered On-body Transmitter Antennas for Wireless Powering of In-body Devices 655
Icaro V. Soares, Anja K. Skrivervik, Denys Nikolayev

Wireless LAN sensing with smart antennas 660
Marco Santoboni, Riccardo Bersan, Stefano Savazzi, Alberto Zecchin, Vittorio Rampa, Daniele Piazza

Sustainable Multi-User Communication with Reconfigurable Intelligent Surfaces in 5G Wireless Networks and Beyond 665
Hamidreza Taghvaee, Sergio Terranova, Neekar M Mohammed, Gabriele Gradoni

Modelling 3D Dynamic Cloud Fields to Investigate the Performance of FSO SatCom Systems 670
Alef Comisso, Lorenzo Luini

Experimental Testing of an Effective Near to Far-Field Transformation for Flat Antennas using Non-redundant Spiral Data 675
F. Bevilacqua, F. D'Agostino, F. Ferrara, C. Gennarelli, R. Guerriero, M. Migliozzi, G. Riccio

UHF Wideband Antenna Design for AUV Applications 680
S. J. Verwer, K. Alekseev, R. Engel, U. Johannsen

Propagation Models Trials for TV White Spaces in Colombian Rain Forest 685
Andres Navarro, Leonardo Vargas, Dinael Guevara, Diego Parada, Christian Amu, Cassio G. Rego

Advances on CS-Processing Applied to Phased Arrays Synthesis, Processing, and Characterization 690
Lorenzo Poli, Giacomo Oliveri, Nicola Anselmi, Marco Salucci, Mohammad Abdul Hannan, Francesco Zardi, Marco Donald Migliore, Paolo Rocca

Theoretical Calculation of the Phase Limit for Transmitarray Unit Cell 693
Zhishu Qu, James R. Kelly

Effect of Space Diversity for Fading Mitigation at 40 and 60 GHz Indoor Channels 697
Miguel Riobo Prieto, Rob Hofman, Manuel Garcia Sanchez, Inigo Cuinas, Isabel Exposito Perez, Jo Verhaevert

A New Approach for Solving Inverse Scattering Problems Based on Physics-informed Supervised Residual Learning 702
Tao Shan, Zhichao Lin, Xiaoqian Song, Maokun Li, Fan Yang, Shenheng Xu

Fourier-based Radar Processing for Multistatic Millimetre-wave Imaging with Sparse Apertures 706
Vasiliki Skouroliakou, Amir Masoud Molaei, Vincent Fusco, Okan Yurduseven

Flexible and Adaptive Dipole-Based Triple-Fed Antenna for Single-Chip Transceiver 711
Serafin B. Fischer, Shuo Wang, Jan Hesselbarth, Joachim N. Burghartz

A Single Layer Dual-Polarization Array Antenna Based on Parallel Plate Gap Waveguide 716
Ali Farahbakhsh, Davoud Zarifi, Ashraf Uz Zaman

Reduction of Radiation Pattern Distortion of Beam Scanning Antennas Inside Radome 720
Juan Andres Vasquez-Peralvo, Jose Iglesias-Gonzalo, Pablo Sanchez-Olivares, Manuel Sierra-Castaner

A Novel Millimeter-Wave Series-Fed Microstrip Line Antenna Array 725
Sumin David Joseph, Edward Ball

Electromagnetic Triggering for Microfluidic Mixing 729
Mohammed Saad Shaikh, Robert Donnan, Rostyslav Dubrovka

Dynamic Metasurface for Holographic Imaging 733
Rui Feng, Badreddine Ratni, Jianjia Yi, Hailin Zhang, Gerard-Pascal Piau, Alexandre Piche, Andre De Lustrac, Shah Nawaz Burokur

Absorptivity Modulation with Salisbury-Inspired Structures for X-Band 737
Xhoandri Lleshi, Thi Quynh Van Hoang, Paolo Martins, Brigitte Loiseaux, Didier Lippens

An Iterative Algorithm Enhancing the Resolution of Microwave Resonant Sensors for Biomedical Applications 742
Giovanni Buonanno, Adriana Brancaccio, Sandra Costanzo, Raffaele Solimene

Fast and Accurate Modeling and Optimization of Large Metasurface Considering Near Couplings 746
Zixuan Ma, Yuchenxi Zhang, Mengmeng Li

Study on the Series Arrangement of One-Dimensional Leaky-Wave Antennas 750
Miguel Poveda-Garcia, Eloy Adreu-Garcia, Alejandro Gil-Martinez, David Canete-Rebenaque, Jose Luis Gomez-Tornero

Convex Optimization of Reactively Loaded Antenna Arrays with Backlobe and Sidelobe Constraints 755
Michel A. Nyffenegger, Costas D. Sarris, Hans-Dieter Lang

MammoWave Breast Imaging Device: Path to Clinical Validation, Results and Implications in Future Population-based Breast Screening Programs 760
Gianluigi Tiberi, Navid Ghavami, Daniel Alvarez Sanchez-Bayuela, Lorenzo Sani, Alessandro Vispa, Alessandra Bigotti, Mario Badia, Lorenzo Papini, Giovanni Raspa, Cristina Romero Castellano, Lina Marcela Cruz Hernandez, Daniela Bernardi, Alberto Tagliafico, Massimo Calabrese, Mohammad Ghavami

Assessment of Automotive SAR from Direct Measurements and Post Processing 764
L. Scialacqua, F. Mioc, E. Toniolo, L. J. Foged

High-Directivity Ultra-Sparse Antenna Arrays Using Multielement Metagratings 768
Yaniv Kerzhner, Ariel Epstein

Two Co-Linear Transitions for Q-Band Horn Waveguide Dense Cluster 773
Marco Simone, Matteo Bruno Lodi, Giacomo Muntoni, Nicola Curreli, Alessandro Fanti, Tonino Pisanu, Giuseppe Valente, Giorgio Montisci, Giuseppe Mazzarella

New reconfigurable HMSIW associated to horn antenna 777
David Rene-Loxq, Olivier Lafond, Mohamed Himdi, Langis Roy, Farhan Ghaffar

A 4x4 Double Slot Antenna Array Unit Based on Gap Waveguide Technology for mm-Wave Frequencies 781
Panagiotis Petroutsos, Stavros Koulouridis

Outdoor Line-of-Sight Path Loss Modeling at 140 GHz 785
Brecht De Beelde, Emmeric Tanghe, David Plets, Wout Joseph

The Hybrid Chamber for OTA measurements: Plane Wave Spectrum Quality Vs. Dynamic Range Trade-off 789
O. A. Iupikov, P. S. Krasov, R. Maaskant, A. Alayon Glazunov, J. Friden, M. V. Ivashina

The Measurement-based Intelligent Reflecting Surfaces Path Loss Model 793
Qibo Qin, Zhimeng Zhong, Xinyu Gao, Jianyao Zhao, Chao Li, Li Fan, Zhiyuan Jiang

Dielectric Characterization and Chemical Concentration Sensing using T-Shaped Antenna 798
Muhammad Usman Ejaz, Tayyaba Irum, Akram Alomainy

Parasitic-Based Frequency-Agile Electrically Small Antenna Design 803
Marwan Jadid, Serge Bories, Christophe Delaveaud, Anthony Bellion

Smart EM Environments: Current Trends and Future Perspectives 807
Arianna Benoni, Giacomo Oliveri, Paolo Rocca, Marco Salucci, Francesco Zardi, Andrea Massa

3D Printed Millimetre-Wave and Sub-Terahertz Devices: Prospects, Challenges, and Solutions 811
Yang Yang, Mengze Li, Karu Esselle, Dushmantha Thalakotuna

A Deep Space Ka-band Antenna for CubeSat: Design and Multiphysics Analysis 815
Marco Simone, Matteo Bruno Lodi, Nicola Curreli, Santi Concetto Pavone, Claudia Maccio, Elena Marongiu, Lorena Mariani, Giacomo Muntoni, Giuseppe Mazzarella, Alessandro Fanti

Design of an Amplitude-Tapered Corporate-Feed Slot Array Antenna with Reduced Side-Lobe Level for Silicon Micromachining 820
Armin Karimi, Joachim Oberhammer

Propagation Graphs for UWB MIMO Channels: Modeling and Experimental Validation 825
Richard Pruller, Stefan Pratschner, Robert Langwieser, Markus Rupp

Bandwidth Improvement of Planar RFID Tag Antennas using Characteristic Mode Theory 830
Pallavi Sharma, Jennifer T. Bernhard

Horizontally Polarized Antenna Array for an Airborne Ka - PolInSAR System 834
Alicja Schreiber, Markus Limbach, Bernd Gabler, Andreas Reigber

Design of a Non-periodic Mushroom Antenna Using Bayesian Optimization 839
Yunjia Zeng, Xianming Qing, Michael Yan-Wah Chia, Min Hlaing

Large Scale Channel Parameters Estimation by Utilization of Reflected Rays Information for an Urban Environment 843
Inocent Calist, Zhiqiang Li, Minseok Kim

Measurement-based Analysis of Atmospheric Attenuation by Considering Different Weather Types for Visible Light Communications 847
Baobao Liu, Pan Tang, Yue Yin, Jianhua Zhang, Liang Xia

Highly Efficient and Wideband Millimeter-Wave Slotted-Array Antenna Technology for 5G Communications 852
Mst Nishat Yasmin Koli, Karu P. Esselle, Dush. N. Thalakotuna, Muhammad U. Afzal, Md Zahidul Islam

Radio-Frequency Guidance System for Path-Following Industrial Autonomous Guided Vehicles 856
Mahmoud Elgeziry, Filippo Costa, Simone Genovesi

Enhancing mmWave Devices with Custom Lenses 861
Konstantin Koslowski, Felix Baum, Luca Buhler, Michael Peter, Wilhelm Keusgen

Experiment of a Phase-Gradient Metasurface Reflector for Millimeter Wave and 5G Applications 866
Sarawuth Chaimool, Chawalit Rakluea, Pubet Sangmahamad, Yan Zhao, Apisak Worapishet, Prayoot Akkaraekthalin

Inset Feed Impedance Matching Technique for Rectennas 869
Erik Farias Da Silva, Alfredo Gomes Neto, Custodio Peixeiro

A Summary of Actual Maximum Approach Studies on EMF Compliance of 5G Radio Base Stations 872
Bo Xu, Davide Colombi, Paramananda Joshi, Fatemeh Ghasemifard, David Anguiano Sanjurjo, Carla Di Paola, Christer Tornevik

Periodic Integral Equation Formulation for the Numerical Analysis of Glide Structures 877
J. A. Tobon Vasquez, J. Rivero, G. Valerio, F. Vipiana

Design of a UWB/Tri-Band Reconfigurable Flexible Antenna for IoT Applications 880
Syed Muhammad Rizvi Jarchavi, Muhammad Shabbir, Mohammad Alibakhshikenari, Francisco Falcone, Ernesto Limiti

Investigation on Simplified Test Environment of OTA In-Band Blocking for 5G Millimeter-Wave Radio Base Stations 884
Hans Andersson, Stefan Nilsson, Jonas Friden, Sam Agneessens, Joakim Lysell, Anders Fransson, Arya Khan-Amidy, Jacob Mannerstråle, Noor Choudhury, Bo Xu, Queenie Zhang

Recent Advances in Artificial neural networks for EM parameterized modeling and optimization 887
Li Ma, Jianan Zhang, Shuxia Yan, Qijun Zhang

Plantenna: Using Plant Leaves to Increase Antenna Performance 890
Lieke A. M. Geubbels, G. Federico, V. Vidojkovic, Jaume Anguera, Laurens A. Bronckers

Measurements and Modeling of Radiohelmet-UAV LoRa Links in a Mountain Canyon 895
Giulio Maria Bianco, Abraham Mejia-Aguilar, Gaetano Marrocco

A Novel Polyimide Flexible Antenna Design for S- Band Applications 899
Alassane Sidibe, Alexandru Takacs, Daniela Dragomirescu, Samuel Charlot, Jan Mennekens

A Single-Layer Center-Feed Slotted Antenna Array with Reflection Canceling Stairs in 38-GHz Waveband 904
Wenbo Liu, Yasuhiro Tsunemitsu

Smart Apertures for In-Flight Electronically Steerable Antennas in LEO/MEO/GEO Satellite Constellations 909
Manuel J Gonzalez, Alberto Pellon, Ana Ruiz

Study of MACKEY Type H Antenna Miniaturized Using Slits 913
Kota Hakamata, Keisuke Miyashita, Keito Yokoe, Shigeru Makino, Kenji Itoh

Automatic Classification of Low-Loss and Lossless Materials in Wideband Radar Images for Millimeter-Wave Personnel Screening Systems 917
Mahshid Asri, Mohammad Tajdini, Elizabeth Wig, Carey Rappaport

Radio Channel Emulation for Virtual Drive Testing with Site-Specific Channels 921
Allan Wainaina Mbugua, Yun Chen, Wei Fan

Alternate Methods for Computation of Higher-Order Modal Scattering of Anechoic Absorbers at mm-Wave Frequencies 926
Anoop Adhyapak, David Rolando

EMF Exposure of Human Head by Handset mmWave Phased Antenna Array 931
Stanislav Stefanov Zhekov, Ming Yao, Ondrej Franek, Kun Zhao, Shuai Zhang

Exploiting Metasurfaces in Wire Antennas Beyond Cloaking Applications 936
S. Vellucci, A. Monti, M. Barbuto, A. Toscano, F. Bilotti

Cavity-Backed Broadband Microstrip Antenna Array for Photonic Beam Steering at W Band 940
Jerôme Taillieu, Ronan Sauleau, Mehdi Alouini, David Gonzalez-Ovejero

Coherence Factor Based Methods for Improving the Image Quality of the Advanced Imaging System 945
Guanying Sun, Mohammad H. Nemati, Carey M. Rappaport

EME-Net: A U-net-based Indoor EMF Exposure Map Reconstruction Method 949
Mohammed Mallik, Sofiane Kharbech, Taghrid Mazloum, Shanshan Wang, Joe Wiart, Davy P. Gaillot, Laurent Clavier

Simulation and Measurement for Sidelink Communication Between Cars and Bicycles 954
Simon Husges, Michael Meuleners, Niloufar Bateni, Christoph Degen

Multidisciplinary Data Fusion for THz Ray- Tracing 959
Andreas Prokscha, Fawad Sheikh, Dien Lessy, Najah Abu Ali, Thomas Kaiser

An Embedded Dual-Band Base Station Antenna Array Employing Choked Bowl-Shaped Antenna for Cross-Band Scattering Mitigation 964
Yi He, Can Ding, Gengming Wei, Y. Jay Guo

BepiColombo Mission to Mercury: Designing RadioMetOP Weather-Forecast Based Operations to Improve Satellite Data Throughput at Ka-Band 969
M. Biscarini, F. S. Marzano, P. Antonelli, S. Di Fabio, L. Bernardini, P. Scaccia, M. Montagna

Terahertz Enabled Use Cases for Smart Mobility towards B5G and 6G Communications 974
Kun Yang, Haofan Yi, Ke Guan, Yang Shen, Danping He, Bo Ai, Zhangdui Zhong

A Broadband CP Elliptical-Slot Antenna for Ambient RF Energy Harvesting 979
Khatereh Nadali, Patrick McEvoy, Max J. Ammann

Optimal Planning of Passive Reflective Skins for Next-Generation Smart EM Urban Environments 984
Arianna Benoni, Baozhu Li, Marco Salucci, Andrea Massa

A Hybrid Machine Learning-Based Model for Indoor Propagation 988
Aristeidis Seretis, Costas D. Sarris

A Practical Solution to Enhance Electromagnetic Transmission to an Implantable/Wearable Antenna 993
Ludovica Tognolatti, Cristina Ponti, Giuseppe Schettini

Robustness Testing of a Compact Distributed Automotive GNSS Array in Virtual Environment 996
Syed N. Hasnain, Uwe Stehr, Ralf Stephan, Marius Brachvogel, Michael Meurer, Matthias A. Hein

Accuracy assessment of water vapor and cloud attenuation estimated from ERA5 single level parameters at two sites with large difference of altitude 1001
Gustavo A. Siles, Juan Pablo Arcienega, Yasmin Balderrama

A Microwave Imaging Device for Detecting Contaminants in Water-based Food Products 1006
M. Ricci, L. Crocco, F. Vipiana

Handmade Microstrip Leaky-Wave Antenna in UHF band for Educational Purposes 1009
Maria Campo-Valera, Miguel Poveda-Garcia, Joaquin Garcia-Fernandez, David Canete-Rebenaque, Jose Luis Gomez-Tornero

Flat- Top Gaussian Arrays with Dynamic Range Ratio Control 1014
Goran Molnar, Dorian Ljubenko, Mile Sakic

Reconfigurable FSS with a Switchable Passband for Space Applications in X and Ka Bands 1019
Mousa Abdollahvand, Eduardo Martinez-De-Rioja, Jose A. Encinar, Kanishka Katoch, Amir Ebrahimi, Saptarshi Ghosh

Estimation of Characteristics for the Reflective Rectangular Slot Element Using MoM with One Basis Function 1023
Svyatoslav V. Ballandovich, Liubov M. Liubina, Mikhail I. Sugak

A 2-bit Tunable Unit Cell for 6G Reconfigurable Intelligent Surface Application 1028
Luis G. Da Silva, Pei Xiao, Arismar Cerqueira S.

Analysis of Normally Incident EM Waves Reflected from a Conformal Meta-surface 1033
Dinesh Rano, Mohammad Hashmi, Andrey Yelizarov, M. Chaudhary

AI-Assisted Global Optimization for Solving Inverse Scattering Problems 1038
Marco Salucci, Lorenzo Poli, Paolo Rocca

Dielectric Spectroscopy of High Permittivity Thin Solids Using Open-Ended Coaxial Probes 1042
Arya Fallahi, Sina Hashemizadeh, Niels Kuster

Measurements of IP3 and P1dB for Spectrum Monitoring with Software Defined Radios 1046
Mike McNulty, Dazhen Gu, Daniel G. Kuester, Payam Nayeri

Smart Electromagnetic Environments enabled by Metasurfaces 3.0 1051
M. Barbuto, Z. Hamzavi-Zarghani, M. Longhi, A. Monti, D. Ramaccia, S. Vellucci, A. Toscano, F. Bilotti

A Dually-Polarized Leaky-Wave Antenna Based on Polarization-Selective Coupling Mechanisiam with Fixed Beams Capability 1053
Mohammad Reza Rahimi, Mohammad S. Sharawi, Ke Wu

Potentially Fast Spherical Near-Field Measurements for General Antennas based on Signal Derivatives 1056
Kyriakos Kaslis, Olav Breinbjerg

Estimation of FSO Path Length at Mid-IR Wavelength 1061
Elizabeth Verdugo, Luiz Da Silva Mello, Carlo Riva, Lorenzo Luini, Roberto Nebuloni

Characterization of a 5G Wireless Train Backbone via Ray-Tracing 1065
Jorge Elizalde, Aitor Arriola, Manuel Alfageme, Jerôme Harri, Igor Lopez

Wearable Harmonic Transponder for IoT Applications 1069
Milan Polivka, Vaclav Hubata-Vacek, Milan Svanda

Spatially-Discrete Traveling-Wave Modulation: A Higher-Order Space-Time Symmetry 1074
Cody Scarborough, Anthony Grbic

Amplifier-Antenna Array Optimization for EIRP by Phase Tuning 1078
Veli-Pekka Kutinlahti, Anu Lehtovuori, Ville Viikari

Linear Polarization from Scalar Modulated Metasurfaces 1083
A. Arroyo, R. Contreres, A. Piche, H. Roussel, M. Casaletti

A Dual-Polarized Wideband Planar Multiport Mobile Antenna 1087
Riku Kormilainen, Rasmus Luomaniemi, Anu Lehtovuori, Alexander Khripkov, Janne Ilvonen, Ville Viikari

Design of a MIMO 5G Indoor Base Station Antenna using Unit Cells..... 1092
Jaime Molins-Benlliure, Eva Antonino-Daviu, Marta Cabedo-Fabres, Miguel Ferrando-Bataller

Comparative Study of Struts' Geometry and Material in Reflector Antennas..... 1096
Stefanos Lampiris, Vasileios Vlachodimitropoulos, Aris Tsolis, Antonis A. Alexandridis

A Study on Physical Layer Security Through Ray Tracing Simulations..... 1101
Simone Del Prete, Franco Fuschini, Marina Barbiroli, Marco Zoli, Andre Noll Barreto

All-Optical Fiber Link Antenna Measurement System using an Industrial Robot System 1106
Satoru Kurokawa, Michitaka Ameya, Sayama Matsukawa, Masahiro Sato, Masatoshi Onizawa, Hiroshi Murata, Masanobu Hirose

Investigation of Eavesdropping Opportunities in a Meeting Room Scenario for THz Communications..... 1110
Christoph Herold, Tobias Doeker, Johannes M. Eckhardt, Thomas Kurner

A Fast Pattern Synthesis Method for Arbitrary Planar Arrays 1115
Rui Ma, Wenning Gao

Co-Design of Dual-Purpose Heatsink Antenna for Multi-Source Ambient Energy Harvesting 1119
Azamat Bakytbekov, Atif Shamim

Comparison of Sub 6 GHz and mmWave Wireless Channel Measurements at High Speeds 1122
Faruk Pasic, Daniel Schutzenhofer, Edgar Jirousek, Robert Langwieser, Herbert Groll, Stefan Pratschner, Sebastian Caban, Stefan Schwarz, Markus Rupp

UltraWideband Microstrip to Waveguide Transition for 5G MillimeterWave Applications 1127
Ivan Zhou, Jordi Romeu

FPC-Based Integration of 5G Mm-Wave Antennas and 5G Non-Mm-Wave Antennas for Mobile Phones 1131
Huan-Chu Huang, Zhixing Qi, Dasong Gao, Hong Lin

Design of a D-Band Tilted Beam Antenna..... 1135
Chao Gu, Vincent Fusco

A Novel Full-wave Methodology for Channel Estimation in Digital mMIMO Applications 1139
H. R. D. Filgueiras, M. A. S. Ferrero, I. F. Da Costa, J. V. Da Silva, S. Arismar Cerqueira

A New Weighting Method for Antenna Clusters 1144
Yunfeng Dong, Shen Wang

PTD Symmetric Wideband Absorbers 1149
Kristy A. Hecht, Mario Junior Mencagli

Ultra Low Power Wireless Epidermal Sensor for Battery-less pH monitoring in the sub-6 GHz 5G band 1151
Alessio Mostaccio, Cecilia Occhiuzzi, Rocco Giofre, Paolo Colantonio, Gaetano Marrocco

3:1 Bandwidth Sinuous Antenna for Direction Finding Applications 1156
Mohamed Elmansouri, Ljubodrag Boskovic, Dejan Filipovic

Highly Miniaturized Folded-Slot Based MIMO Antenna Design for CubeSat Applications 1161
Rifaqat Hussain, Abida Shaheen Rao, Abdul Aziz, Muhammad Umar Khan, Mohammad S. Sharawi

Environmental Reflections Diagnostics Through Radius Flights Using UASs 1164
Cosme Culotta-Lopez, Snorre Skeidsvoll, Andrian Buchi, Joakim Espeland

A Novel RCS based CRFID Tag Design 1168
Nadeem Rather, John Buckley, Brendan O'Flynn, Melusine Pigeon

Approximate and Full-Wave Analysis for Efficient Antenna Design 1173
Hubregt J. Visser

A Comparison Between Different Approaches to Wireless Power Transfer 1178
Rafael G. Ayestaran, Marcos R. Pino, Borja Imaz, Paolo Nepa

Metantennas: Opportunities and Challenges in Future Microwave Metasurface Antenna Research and Applications 1183
Zhi Ning Chen, Qun Lou, Wei Liu

A Fabry-Perot Multilayer High Gain Frequency Scanning Antenna at 60GHz 1188
Solomon Mingle, Muhammad Saqib Rabbani, Alexandros Feresidis

Initial Results on D Band Channel Measurements in LOS and NLOS Office Corridor Environment 1192
Joonas Kokkoniemi, Veikko Hovinen, Klaus Nevala, Markku Juntti

Wearable Sensor for Breath Rate Monitoring 1197
Mahmoud Elgeziry, Filippo Costa, Alessandro Tognetti, Simone Genovesi

Modified CSRRs in SIW technology for passband improvement 1202
Javier Martinez, Angela Coves, Angel A. San-Blas, Enrique Bronchalo, Maurizio Bozzi

Study of Channel Model Validation in Millimeter Wave MIMO OTA Test 1206
Shangbing Qiao, Xiang Zhang, Ying Zhu, Hao Sun, Feilong Wang

Flight test campaign of Embedded Electronically Steerable SATCOM Aero Antenna for Clean Sky 2 project 1211
Gonzalo Exposito-Dominguez, Francisco Javier Jimenez, Avi Gal, Alex Volodarsky, Borislav Marinov

Efficient Microwave Wireless Power Transmission using Optimization Algorithm 1214
Ho Yeol Kim, Sangwook Nam

SAW Based Sensing System Coupled to a Thin Flexible Antenna for Biomedical Applications..... 1218
Tony Makdissy, Cecile Floer, Omar Elmazria, Sami Hage-Ali

Parity-Time Glide-Symmetry and Third Order Exceptional Degeneracy in a Three-Way Microstrip Waveguide..... 1223
Alireza Nikzamir, Robert Marosi, Tarek Mealy, Farshad Yazdi, Filippo Capolino

The Application of Machine Learning for Computational Electromagnetic Solver Selection 1227
Willem F. De La Bat, Danie J. Ludick, Trienko L. Grobler

Millimeter-Wave Lightweight 3D-Printed 4×1 Aluminum Array Antenna 1232
Leticia Alonso-Gonzalez, Jose Rico-Fernandez, Alvaro F. Vaquero, Manuel Arrebola

A Finger-worn Epidermal Antenna for Pressure Sensing..... 1237
Martina Frattaioli, Giulio Maria Bianco, Simone Nappi, Gaetano Marrocco

Textile Star-Shaped Supershaped Patch Antenna for 5G Applications..... 1241
Guilherme Martins, Pedro Pinho, Caroline Loss

Improved Axial Ratio Bandwidth for Dual-Band Dual-Circular Polarization FSS in Transmission Mode for Satellite Communications by Stub Tuned Resonator 1245
Roberto Garrote Moreno, Miguel A. Salas-Natera, Ramon Martinez Rodriguez-Osorio

A Frequency Domain Approach for Estimating the Angular Dependent Delay of an UWB Antenna..... 1250
Ali Rashidifar, Sebastian Semper, Christoph W. Wagner

A Wideband and Miniaturized Metal Rim Antenna with A New Material for Smartphone Applications..... 1255
Xiantao Yang, Yi Huang, Lyuwei Chen

Characterization and Calibration of the Hybrid OTA Chamber Using a Field Scanner..... 1257
P. S. Krasov, O. A. Iupikov, J. Friden, R. Maaskant, A. Alayon Glazunov, M. V. Ivashina

Design of FSS-Backed Reflectarray Cells for Coverage-Enhancing Panels with Suppressed Out-Of-Band Reflections in Millimeter-Wave 5G..... 1261
Roman Soroka, Eduardo Martinez-De-Rioja, Ana Arboleya, Jose A. Encinar

New uniplanar and broadside-coupled CSRR substrate integrated waveguides for mmWave components..... 1266
Maria-Thaleia Passia, Traianos V. Yioultsis

Analysis of Resonant Bessel-Beam Launchers based on Isotropic Metasurfaces 1271
Edoardo Negri, Walter Fuscaldo, Mauro Ettorre, Paolo Burghignoli, Alessandro Galli

Overlapped subarrays of leaky-wave antennas for a reflector-based SAR instrument..... 1275
N. Memeletzoglou, E. Rajo-Iglesias, J. L. Vazquez-Roy, Q. Garcia, L. Orgaz, J. Del Castillo, G. Toso, E. Imbembo

Path-loss Modelling and Scalloping Aspects in Intelligent Reflecting Surface Assisted Communication: A Method-of-Moment Analysis..... 1280
Debdeep Sarkar, Yahia Antar

5G Communication QoS Measurements for Smart City UAV Services 1285
Seppo Horsmanheimo, Lotta Tuomimaki, Vasilii Semkin, Stephan Mehnert, Tao Chen, Marko Ojennus, Lasse Nykanen

Design of double-reflector objective for corneal sensing in the 220 – 330 GHz band 1290
Mariangela Baggio, Aleksi Tamminen, Juha Ala-Laurinaho, Zachary Taylor

Ensemble Learning for 5G Flying Base Station Path Loss Modelling 1293
Sotirios P. Sotiroudis, Georgia Athanasiadou, George V. Tsoulos, Christos Christodoulou, Sotirios K. Goudos

Multipath-Enhanced Device-Free Localization using Low-Cost Ultra-Wideband Devices 1297
Martin Schmidhammer, Christian Gentner

Micro versus Macro Antenna Corridor for Trains Equipped with FSS Windowpanes 1302
Nima Jamaly, Adrian Schumacher, Daniel Wenger

Performance of Doubly Periodic Absorpbing Structures Formed by Spherical Black Holes on a PEC Screen 1307
Yana I. Chizhevskaya

Effect of Integrated Lens Antenna Diameter on Scan Loss 1312
Sabin Kumar Karki, Juha Ala-Laurinaho, Ville Viikari

Design of an Ultra- Wideband Antenna for Ambient Radio Frequency Energy Harvesting in 10.88-33.66 GHz 1317
Samar Ahmed Elbendera, Ahmed Allam, Ahmed Magdy Mohamed, Ramesh Pokharel, Adel B. Abdel-Rahman

Characteristic Mode Analysis of SCMR and CSCMR Systems 1322
Ferdaous Abderrazak, Eva Antonino-Daviu, Larbi Talbi, Miguel Ferrando-Bataller

Muscle Analyzer System: Exploring Correlation Between Novel Microwave Resonator and Ultrasound-based Tissue Information in the Thigh 1327
Viktor Mattsson, Mauricio D. Perez, Leanne L. G. C. Ackermans, Maud A. M Vesseur, Julia L. M. Bels, Marcel C. G. Van De Poll, Bappaditya Mandal, Patricia Sanchez-Gonzalez, Alexander P. Seiffert, Enrique J. Gomez, Paul Meaney, Jan A. Ten Bosch, Taco J. Blokhuis, Robin Augustine

Applying machine learning techniques to compute vertical refractivity profiles in maritime environments 1332
Jacques Claverie, Jean Motsch

Metal-Only Reflectarray Unit Cell for Dual-Polarization Control 1336
Angel Palomares-Caballero, Carlos Molero, Pablo Padilla, Maria Garcia-Vigueras, Raphaël Gillard

On the Phase-Compensated Long-Range VNA-based Channel Sounder for sub-6 GHz, mmWave and sub-THz frequency bands 1340
Yejian Lyu, Allan Wainaina Mbugua, Kim Olesen, Pekka Kyosti, Wei Fan

Experimental Evaluation of Thin Bone Fracture Detection Using Microwave Imaging 1345
Kesia C. Santos, Carlos. A. Fernandes, Jorge R. Costa

Synthesis of Sparse Large Arrays via Sequential Convex Optimizations 1348
Christos Monochristou, Shang Xiang, Mark Holm, Ronan Sauleau, Mauro Ettorre

Information Processing at the Deep Physical Layer level 1351
Marco Donald Migliore

Polarization Dependent Multi-Functional Engineered Surface 1355
F. Samadi, A. B Kouki

An Integral Equation Approach Towards the Design of Compact Metasurface Pairs..... 1357
Mario Phaneuf, Puyan Mojabi

Limits of WPT through the human body using Radio Frequency 1361
Rodrigo Duarte, Carolina Gouveia, Pedro Pinho, Daniel Albuquerque

Design of Tunable Millimetre-wave Pass-Band FSS Unit-Cell Loaded with GaAs Air-Bridged Schottky Diodes 1366
Ioannis Gerafentis, Alexandros Feresidis

Analysis of Dielectric Post-Wall Waveguide-based Passive Circuits using Recurrent Neural Network..... 1371
Saba Kobakhidze, Elguja Archemashvili, Vakhtang Jandieri, Kiyotoshi Yasumoto, Hiroshi Maeda, Wonbin Hong, Douglas H. Werner, Daniel Erni

A Novel Tightly Coupled Dipole Array Unit Cell 1375
Kaan Arda, Gulbin Dural

Comparison of Statistical and Deep Learning Path Loss Model for Motherboard Desktop Environment..... 1380
Jinbang Fu, Prateek Juyal, Erik J. Jorgensen, Alenka Zajic

Multistatic Electromagnetic Imaging of Dielectric Targets with LSTM Cells..... 1385
Alessandro Fedeli, Valentina Schenone, Matteo Pastorino, Andrea Randazzo

SDR-Based Communication Sniffing for Determining the Proliferation of ITS-G5..... 1390
Golsa Ghiaasi, Thomas Blazek, Fjolla Ademaj, Julian Karoliny, Stefan Marksteiner, Markus Wolf, Peter Priller, Hans-Peter Bernhard

Preliminary development of anatomically realistic breast tumor models for microwave imaging..... 1395
Ana Catarina Pelicano, Nuno A. M. Araujo, Raquel C. Conceicao

Numerical Dosimetry at 5G-Bands Using Time-Domain Methods and the Impact of Discretization and Uncertainty in Tissues Constitutive Parameters 1399
Abdelrahman Ijjeh, Soukaina Mifdal, Marylene Cueille, Jean-Lou Dubard, Michel Ney

Design of an E-Band 1-Bit Reconfigurable Reflectarray Antenna Using PIN Diodes..... 1404
Changhao Liu, Yongli Ren, Fan Yang, Shenheng Xu, Maokun Li

Design of Circularly Polarized and Highly Depointing Reflectarrays with high polarization purity 1407
Andrea Guarriello, Daniele Bresciani, Herve Legay, George Goussetis, Renaud Loison

High Gain Broadband Stacked Filtering Antenna with Stable Radiation Pattern 1412
Rinkee Chopra, Rahul Lakhmani

A Portable Microwave Scanner for Brain Stroke Monitoring: Design, Implementation and Experimental Validation..... 1416
D. O. Rodriguez-Duarte, J. A. Tobon Vasquez, S. De Luque Arias, R. Scapaticci, L. Crocco, F. Vipiana

Development of Robust CMA Tool for Efficient Modeling of Large PEC Structures 1421
Jihong Gu, Chao-Fu Wang

Design of Dual Circularly Polarized Inclined Slot Pair Based on Stepped-Height Ridge Gap Waveguide with Series Excitation 1425
Zhaorui Zang, Ashraf Uz Zaman, Jian Yang

A Simple Approach to Modifying the Contrast Basis in Contrast Source Inversion 1430
Lucas Banting, Kevin Brown, Mohammad Asefi, Ian Jeffrey, Colin Gilmore, Joe Lovetri

Validation of Propagation Delay on The Development of Wi-Fi CSI Based Channel Sounder for Passive Motion Sensing 1434
Nopphon Keerativoranan, Kentaro Saito, Jun-Ichi Takada

Wireless Capsule Video Endoscopy For Population-Based Colon Cancer Screening Using 5G network 1439
Ali Khaleghi, Hemin Qadir, Per-Hjalmar Lehne, Ilangko Balasingham

Examination of Impedance Response of Capsule- Integrated Antennas Through Gastrointestinal Tract 1444
Erdem Cil, Sema Dumanli, Denys Nikolayev

Power Reception and Verification Procedure for Small-Scale SPS Satellite Demonstration 1449
Yoshiyuki Fujino

A Synthesis Process for Microwave Absorber Design Based on Pyramidal Absorbers 1453
Arya Fallahi, Amin Enayati

Passive and Modular Surface Design for Tailoring EM Propagation in Urban Scenarios 1457
Pietro Da Ru, Nicola Anselmi, Paolo Rocca, Andrea Massa

Design and Performance Comparison of Compact Resonant Cavity Antennas Using Customized 3D Printing Techniques 1461
Touseef Hayat, Muhammad U. Afzal, Foez Ahmed, Karu P. Esselle

Comparison of Echo Reduction Techniques for Omni-Directional Antenna Calibration in an Extrapolation Range 1466
Zhong Chen, Yibo Wang

A Simple Imaging Strategy for In-Line food Inspection via Microwave Imaging 1471
G. Bellizzi, L. Crocco, M. Cavagnaro, M. Ricci, J. A. Tobon Vasquez, F. Vipiana

Experimental Demonstration of a Supergain Three-Dipole-End-Fire-Array 1475
Alexandre Debard, Antonio Clemente, Lotfi Batel, Christophe Delaveaud

A Broadband Inhomogeneous Frequency Selective Surface on Quartz Glass Substrate 1479
Andreas Roehrner, Georg Strauss, Thomas Eibert

An SU-8/Glass Meshed Patch Antenna for Integration with Solar Cells 1483
Shirin Ramezanzadehyazdi, Cyrus Shafai, Dustin Isleifson, Philip Ferguson, Lot Shafai

Multi-permittivity 3D-printed Ceramic Dual-Band Circularly Polarized Dielectric Resonator Antenna for Space Applications - Measurement 1488
Quentin Lamotte, Gautier Mazingue, Jacek Bhatker, Maxime Romier, Nicolas Capet, Nicolas Delhote, Cyrille Menudier, Olivier Tantot, Marc Thevenot, Kevin Elis

Broadband Circularly Polarized Reconfigurable Single Layer Metasurface Antenna 1492
Ahmed El Yousfi, Abdenasser Lamkaddem, Kerlos Atia Abdalmalak, Daniel Segovia-Vargas

Directional analysis of jamming attack for connected vehicular platoons 1496
R. Valiente, L. Montero, C. Ballesteros, L. Jofre

Definition of Far Field Measurement Distance for 5G mmW Antenna Arrays: Application on N × M Patch Arrays..... 1501
Walid El Hajj, Tsitoha Andriamiharivolamena, Juan Antonio Del Real, Nawfal Asrih

Wideband Top-Loaded Monopole Antenna 1505
Bingyue Qu, Yongqiang Pang, Luyi Wang, Anxue Zhang, Zhuo Xu

SICL Excited Dual Band Uniform Crossed Dipole Array for Endfire Applications at 5G Millimeter Wave Frequencies 1509
Naman Baghel, Soumava Mukherjee

Microstrip-to-Waveguide Transition for 3D-Printed mm-Wave Sectoral Horn Array..... 1513
James R. Henderson, Marcus C. Walden

Implementation of an Open Ended PTD-Symmetric Edge Waveguide 1516
Iram Nadeem, Enrica Martini, Alberto Toccafondi, Stefano Maci

An E-band Reconfigurable Phase Shifter Based on Gap Waveguide..... 1520
Enlin Wang, Jian Yang, Ashraf Uz Zaman

A Compressive Sensing Approach for Directions-of-Arrival Estimation in Planar Sub-Arrayed Arrays..... 1523
Mohammad Abdul Hannan, Paolo Rocca

Phase Change Material Based Reconfigurable Transmitarray: A Feasibility Study 1526
Samara Gharbieh, Antonio Clemente, Jorick Milbrandt, Bruno Reig

Impact of a Transmitting-RIS on the Geometrical Structure of Indoor mmWave Channels..... 1530
Alfred Mudonhi, Marina Lotti, Antonio Clemente, Raffaele D'Errico, Claude Oestges

Efficient Surface-wave Excitation by Parallel-Plate Waveguide for Substrate Integrated Image Guides..... 1535
Victoria Gomez-Guillamon Buendia, Adrian Ayastuy Rodriguez, Khalid Alrushud, Symon K. Podilchak

Capacity Analysis and Improvement for OAM-MIMO in Typical Multipath Scenarios 1540
Kuo Zhao, Tao Hu, Yang Wang, Xi Liao

Bandwidth Enhancement of Microstrip Antennas using Crossing Avoidance of Characteristic Modes..... 1544
Bashar Bahaa Qas Elias, Azremi Abdullah Al-Radi, Ping Jack Soh

Computation of Scattering from Rough Surfaces using Successive Symmetric Over Relaxation and Eigenvalue Deflation..... 1549
Conor Brennan, Imtiaz Islam, Jason Basquill, Kirk M. Soodhalter

Radar-Based Refractivity Estimation: A New Calibration Approach Relying on Reanalysis Data 1554
Brais Sanchez-Rama, Ruben Nocelo Lopez, Veronica Santalla Del Rio

Development of MMIC for the Three Dimensional Phased Array Antenna as Student Project..... 1559
Takuya Nakata, Ryo Takamatsu, Keisuke Yoshimi, Nobuyuki Kaya

Hyperbolic Positioning and Tracking of Moving UHF-RFID Tags by Exploiting Neural Networks 1562
Spyros Megalou, Aristidis Raptopoulos Chatzistefanou, Anastasios Tzitzis, Andreana Malama, Traianos Yioultsis, Antonis G. Dimitriou

A maximum directivity beamformer for an SKA-Low prototype station..... 1567
David B Davidson, Daniel C X Ung

Polarization Conversion from a Two-Port Impedance Loaded Tag 1572
Luis Felipe Fonseca Dias, Camille Jouvaud, Christophe Delaveaud, Herve Aubert

Results on Shadowing Determination with Linear Cost Scaling for Physical Optics Analysis..... 1577
Dao P. Xiang, Matthys M. Botha

Metasurface antenna system for pedestrian to vehicle communications based on IEEE 802.11p: design and evaluation 1581
Narimane Awada Mislmani, Divitha Seetharamdoo

Simulating the Radar Cross Section of a Bare Tree: From Megahertz to Terahertz 1586
Oliver Csernyava, Katsuyuki Haneda

3-D Modeling of Human Hands for Characterizing Antenna Radiation from a 5G Mobile Phone..... 1591
Lauri Vaha-Savo, Pasi Koivumaki, Katsuyuki Haneda, Clemens Icheln, Jingjing Chen

Geographical Clustering of Path Loss Modeling for Wireless Emulation in Various Environments..... 1596
Tatsuya Nagao, Takahiro Hayashi

Site-Level Deterministic Channel Emulator: Grid-based Architecture and Continuous Channel Emulation Technique..... 1601
Nopphon Keerativoranan, Jun-Ichi Takada

Impact of the Number of Transmitting-Receiving Channels on the Quality of the Images Obtained by a Millimeter- Wave Freehand Imager..... 1606
Guillermo Alvarez-Narciandi, Jaime Laviada, Fernando Las-Heras

Systematic Analysis of Microwave Breast Imaging Detection of Different-Sized Malignant and Benign Tumors 1610
Raquel A. Martins, Joao M. Felicio, Jorge R. Costa, Carlos A. Fernandes

Bayesian Optimisation of a Frequency Selective Surface Using a Regularised Objective Function 1614
Kilian Bihannic, Jeremy Omer, Renaud Loison, Guillaume Reille

Design of High-Frequency Selective Rasorber with Wide-Angle Broadband 1618
Ying Sun, Shuai Zhang

A Sensor Using a Matryoshka Geometry Defected Ground Structure 1622
Deisy Formiga Mamedes, Alfredo Gomes Neto, Jens Bornemann, Jefferson Costa E Silva, Francisco Aldir Teixeira Abreu

3D Printed Slotted Waveguide Antenna Array for Millimeter-wave Communication Systems 1626
Zia Ullah Khan, Shaker Alkaraki, Qammer H. Abbasi, Muhammad Ali Imran, Tian Hong Loh, Akram Alomainy

Simultaneous X/Wide-Band-Ka Feed System for SATCOM Reflector Antenna Applications 1630
Christophe Granet, John S. Kot

Multibeam Binomial MSA Array for Sub-6 GHz Application 1635
Anamika Verma, Mahima Arrawatia, Girish Kumar

Effect of Varying Prior Information in Axillary 2D Microwave Tomography 1638
Matteo Savazzi, Olympia Karadima, Joao M. Felicio, Carlos A. Fernandes, Panagiotis Kosmas, Raquel C. Conceicao

Long Term Scintillation Measurements at Ka and Q-Bands 1643
Armando Rocha, Susana Mota, Ana Gomes

Transmitter Considerations for 5G Wireless Powered Sensor Networks 1647
Adnan Nadeem, David Chatzichristodoulou, Hamza Kiani, Abdul Quddious, Loukia Vassiliou, Nosherwan Shoaib, Photos Vryonides, Symeon Nikolaou

Deep Learning-Based Joint Communication and Sensing for 6G Cellular-Connected UAVs 1652
Jose Rodriguez-Pineiro, Wenjing Liu, Yu Wang, Xuefeng Yin, Juyul Lee, Myung-Don Kim

A Harmonic-Free Wilkinson Power Divider Using Lowpass Resonators 1654
Gholamhosein Moloudian, Ali Lalbakhsh, Sirous Bahrami

Platform for Multi-User Channel-Based Encryption of Speech Communication with AES on 2.45 GHz 1658
Victor Van Der Elst, Ruben Wilssens, Jelle Jocque, Joryan Sennesael, Jo Verhaevert, Patrick Van Torre, Hendrik Rogier

Radial Line Patch Array Antenna with Enhanced Circularly Polarized Beam-Steering Performance for K-Band Fixed Radio Links 1663
A. T. Muriel-Barrado, O. A. Pla-Terrada, P. Sanchez-Olivares, J. M. Fernandez-Gonzalez, M. Sierra-Perez

Accuracy of De-Embedding Models for the Open-Ended Coaxial Probe Considering Different Calibration Standards 1668
Klementina Vidjak, Laura Farina, Martina O'Halloran, Marta Cavagnaro

Long-Term Measurements of Tropospheric Scintillation at Very Low Elevation Angles - Initial Analysis 1673
Martin Rytir

Comparison of Coefficient Calculation Techniques for NLPLS PCE Models of Antennas 1678
Dieter Klink, Petrie Meyer, Werner Steyn

Exploring half-mode groove gap waveguide performance and advantages 1683
Miguel Ferrando-Rocher, Alejandro Valero-Nogueira, Jose I. Herranz-Herruzo

A Simple Antenna Element for Millimeter Wave Tightly Coupled Arrays 1687
Gaeron R. Friedrichs, Mohamed A. Elmansouri, Dejan S. Filipovic

Planar Glide-Symmetric Dielectric Half-Luneburg Lens at K/K_a-Band 1690
Oskar Zetterstrom, Pilar Castillo-Tapia, Jose-Manuel Poyanco, Nelson J. G. Fonseca, Francisco Pizarro, Oscar Quevedo-Teruel

Compact and Broadband CPW Fed Ring Pair Slot Antenna 1694
Surbhi Arora, Girish Kumar

Sub-Millimeter-Wave Validation Standard Antenna Requirements and Design 1697
D. Valcazar, A. Martinez, B. Thomas, K. Lichius, H. Gibson, B. Braun, F. Rodriguez, X. Sun

New Method for Calculation of Average Electric Properties of Reference Head Phantom in Microwave Imaging 1702
Tushar Singh, Branislav Ninkovic, Miodrag Tasic, Marija Nikolic Stevanovic, Branko Kolundzija

Evolution of the NISAR Feed Antenna Design due to Environmental Requirements 1707
Paolo Focardi, Joseph D. Vacchione

Simultaneous Localization and Antenna Calibration 1711
Robert Pohlmann, Siwei Zhang, Emanuel Staudinger, Armin Dammann, Peter A. Hoeher

Measurement of Low Frequency Antennas in Indoor Reflective Environments with the Synthetic Probe Array Technique 1716
R. Tena Sanchez, F. Saccardi, A. Giacomini, M. A. Saporetti, P. Moseley, L. J. Foged

Polarization of BS Array in FR2 Deployments 1721
Doug Reed, Alfonso Rodriguez-Herrera, Jukka-Pekka Nuutinen

Shape Regularization and Acceleration of Topology Optimization via Point Group Symmetries 1726
Miloslav Capek, Vojtech Neuman, Jonas Tucek, Lukas Jelinek

Geometry-Based Stochastic Channel Model for Train-to-Train Communication in Open Field Environment 1730
Paul Unterhuber, Michael Walter, Thomas Kurner

A Hybrid Lebesgue-Space Inverse-Scattering Technique for Microwave Imaging of Objects Hidden Behind a Wall 1735
Andrea Randazzo, Cristina Ponti, Alessandro Fedeli, Matteo Pastorino, Giuseppe Schettini

On the use of Leaky-Wave Antennas for Amplitude Monopulse Comparison 1740
Alejandro Gil-Martinez, Miguel Poveda-Garcia, David Canete-Rebenaque, Jose Luis Gomez-Tornero

Microfluidically Frequency & Polarization Reconfigurable Patch Antennas 1745
Hamza Kiani, David Chatzichristodoulou, Adnan Nadeem, Abdul Quddious, Nosherwan Shoaib, Photos Vryonides, Dimitris E. Anagnostou, Symeon Nikolaou

Stacked Geodesic Lenses for Radar Applications in the W-Band 1750
German Leon, Omar Orgeira, Nelson J. G. Fonseca, Oscar Quevedo-Teruel

An Anisotropic 3D Printed Circular Polarization Converter for a Patch Antenna Array Operating in the Ka Band 1755
Max J. Rigby, Tom Whitaker, Will Whittow

Antenna Design for Overlapped Array Fed Reflector OLAF SAR Instrument 1760
Quiterio Garcia-Garcia, Tamara Coello, Javier Del Castillo, Giovanni Toso, Ernesto Imbembo

Characterisation of Frequency Selective Reflections off Indoor Surfaces for 92–110 GHz 1765
Demos Serghiou, Mohsen Khalily, Ali Ali, Tim Brown, Rahim Tafazolli

Short-term Forecast of Radiocommunication Geostationary Satellite Links coupling Weather Prediction and Radiopropagation Models 1770
M. Biscarini, L. Luini, C. Riva, P. Antonelli, S. Di Fabio, L. Bernardini, P. Scaccia, T. Cherubini, R. Nebuloni, L. Dossi, D. Cimini, T. Rossi, M. De Sanctis, A. Martellucci, F. S. Marzano

Designing a Microwave Moisture Content Sensor for Carasau Bread: A Feasibility Study 1775
Giacomo Muntoni, Alessandro Fedeli, Matteo Bruno Lodi, Marco Simone, Andrea Randazzo, Giuseppe Mazzarella, Alessandro Fanti

FMM IE-GSTC Simulation of Metasurfaces with Complete Dyadic Surface Susceptibilities 1780
Jordan Dugan, Tom. J. Smy, Shulabh Gupta

Device-Free Localization Using Millimeter-Wave Double-Directional Channel Sounding Measurements..... 1783
Minseok Kim, Yuto Miyake, Togo Ikegami, Hibiki Tsukada, Keiichiro Kumakura

Low-Noise Amplifier-Antenna Co-Design Overview..... 1787
Kirill Alekseev, Marcus Hasselblad, Klas Eriksson, Martin Johansson, Bart Smolders, Ulf Johannsen

Two-channel Epidermal RFID Sensor for the Analysis of Nasal Respiratory Flow 1792
Elisa Fontana, Nicoletta Panunzio, Francesco Montecchia, Gaetano Marrocco

Simple Matching Technique using Finite Metasurface to Control Surface Waves 1797
Maksim Kuznetcov, Victoria Gomez-Guillamon Buendia, Khalid Alrushud, Symon K. Podilchak

A low cost Dual-branch Q-band 39.4 GHz I/Q Satellite Beacon Receiver for Atmospheric Propagation Studies..... 1802
Patrick C. F. Eggers, Igor Syrytsin, Johannus Kristmundsson

Numerical Analysis of the Azimuthally Magnetized Ferrite-Dielectric Circular Waveguide..... 1807
Mariana Nikolova Georgieva-Grosse, Georgi Nikolov Georgiev

3D-Printed Dielectric Leaky-Wave Bull-eye Antenna..... 1812
Tomas Lira, Francisco Pizarro, Eva Rajo-Iglesias

Dual-Band Metal Frame Blockage Reduction for 5G mm-Wave Arrays in Mobile Phones..... 1817
Rocio Rodriguez-Cano, Kun Zhao, Shuai Zhang, Gert F. Pedersen

Design of Fully Planar Cost-Effective Metamaterial-Enhanced SIW Antennas for 5G Applications..... 1821
Michalis Nitas, Vasileios Salonikios, Savvas Raptis, Traianos V. Yioultsis

Development of X-band antenna for CUBESAT platform..... 1825
Dubravko Tomic, Ivan Kuljak, Josipa Vincetic, Petar Bersic, Josip Loncar, Juraj Bartolic, Zvonimir Sipus

Automotive Performance Tests Based on Machine Learning Algorithms 1830
M. Geissler, J. Kunisch, C. Oikonomopoulos-Zachos, A. Friedrich

Analytical Models of Link Budget in the Presence of Reflection-shaping Metasurface Panels..... 1835
S. Kosulnikov, A. Diaz-Rubio, S. Tretyakov

Production Measurement of 5G Millimeter Wave Plane Wave Generators 1838
F. Scattone, D. Sekuljica, A. Giacomini, F. Saccardi, R. Tena Sanchez, A. Scannavini, K. Rutkowski, E. Kaverine, S. Anwar, N. Gross, P. O. Iversen, L. J. Foged

Extremely Small Size Mechanical Antenna, Propagating Electromagnetic Wave..... 1841
Masoud Alipour Shirazi, Bijan Zakeri Gatabi

Towards Improved IoT LoRa-WAN Connectivity using Broadband Omnidirectional Antennas..... 1846
Mahmoud Wagih, Peter Birley

Dual-Band Polarizer Reflectarray Operating in Dual-CP for High-Gain Antenna in CubeSats..... 1851
Eduardo Martinez-De-Rioja, Ignacio Linares, Daniel Martinez-De-Rioja

Target Localization by Mobile Handheld UHF RFID Reader..... 1855
Aristidis Raptopoulos Chatzistefanou, Spyros Megalou, Stavroula Siachalou, Vasiliki Drakaki, George D. Sergiadis, Antonis G. Dimitriou

Angle of Arrival Estimation System for LoRa Technology based on Phase Detectors..... 1860
Noori Bnilam, Samer Nasser, Maarten Weyn

A Wideband Automotive 4x4-MIMO 5G Antenna System with Single-Stage Decoupling Circuit for a Double Shark Fin Cover..... 1865
Mirco Hardman, Stefan Lindenmeier

Dual Frequency MIMO Rectenna with Two-Branch Rectifier and Common Power Storage Unit..... 1870
David Chatzichristodoulou, Giacomo Paolini, Abdul Quddious, Diego Masotti, Alessandra Costanzo, Photos Vryonides, Symeon Nikolaou

W-Band waveguide slotted array antenna based on stacked glide-symmetric metal sheets fed by a groove gap waveguide..... 1875
Hosnia Azkiou El Boulifi, A. Tamayo-Dominguez, J. M. Fernandez-Gonzalez

3D printed metaparticles based on platonic solids for isotropic, multimode microwave scattering..... 1880
Alexander W Powell, James R Capers, Simon A. R. Horsley, J Roy Sambles, Alastair P Hibbins

Evaluation of Near Singular Integrals for Computational Electromagnetics by Dimensionality Reduction 1884
D. R. Wilton, M. A. Khayat, W. A. Johnson, J. Rivero, F. Vipiana

Application of Field Intensity Shaping Paradigm in a Biological Scenario for MRI Shimming..... 1886
Sabrina Zumbo, Martina T. Bevacqua, Giada M. Battaglia, Tommaso Isernia

Programmable Metasurface Intelligent Beamforming 1889
Shangyang Li, Zhuoyang Liu, Yan Wang, Feng Xu

Fine-Tuning Impedance Matching Circuit for a Triple-Band Meandered PIFA in Brain-Implantable Bio-telemetric Systems..... 1892
Nikta Pournoori, Lauri Sydanheimo, Yahya Rahmat-Samii, Leena Ukkonen, Toni Bjominen

Design of a Rotman Lens Operating in the Full K/K_a Band Using Ridge Waveguide Technology..... 1897
Fabio Cardoso, Sergio Matos, Jorge Costa, Carlos Fernandes, Joao Felicio, Nelson J. G. Fonseca

Modified Equivalent Circuit Model for Modal Admittance of a Dipole with Dielectric Loads..... 1902
Zitong Wang, Qi Wu

Higher-Symmetries for Broadband Reflecting Luneburg Lenses at Ka-band..... 1907
C. Bilitos, J. Ruiz-Garcia, R. Sauleau, E. Martini, S. Maci, D. Gonzalez-Ovejero

Analysis of Microwave Absorber Scattering Using Ray-tracing and Advanced Measurement Techniques..... 1910
Willi Hofmann, Andreas Schwind, Christian Bornkessel, Matthias A. Hein

Active Unit Cell with Continuous Transmission Phase for a Radome-Periodic Structure in S-band..... 1915
Pablo Camacho, Mohammad S. Sharawi

Analysis of Arrays Composed of Quarter-Cylinder Dielectric Resonator Antennas 1919
Gabriel P. Paulena, Juner M. Vieira, Marcos V. T. Heckler

Wideband, Electronically Reconfigurable Reflectarrays With 1- and 2-Bit Phase Quantization 1924
Mohammad Mahdi Honari, John H. Booske, Nader Behdad

Receiver Structures for Phase Modulated FMCW Radars 1928
Utku Kumbul, Nikita Petrov, Cicero S. Vaucher, Alexander Yarovoy

Optically Controlled Circularly Polarized-Reconfigurable Millimeter-Wave Rectangular Dielectric Resonator Antenna using Photoconductive Switches 1933
Akrem Soltan, Abdulmajid A. Abdulmajid, Salam K. Khamas

Multimodal Transfer Matrix Approach for the Analysis and Fundamental Understanding of Periodic Structures with Higher Symmetries 1938
P. Castillo-Tapia, F. Mesa, O. Quevedo-Teruel

Millimeter Wave Antenna on Eco-friendly Substrate for Radar Applications 1943
M. E. De Cos Gomez, H. Fernandez Alvarez, F. Las-Heras Andres

Line-of-Sight Probability for Urban Microcell Network Deployments 1948
Dave Townend, Stuart D. Walker, Adrian Sharples, Andy Sutton

Small Conformal Cavity-Backed Magnetoelectric Antenna for GNSS Bands 1953
Alexandre Causse, Loic Bernard, Sylvain Collardey, Ala Sharaiha

Dual Linear Polarization Waveguide Feed Alternatives for Fabry-Perot Cavity Antennas 1958
Inigo Ederra, Naiara Platero, Juan Carlos Iriarte

An Introduction to Dimensionality Reduction for Propagation Measurements 1961
Alejandro Ramirez-Arroyo, Luz Garcia, Antonio Alex-Amor, Juan F. Valenzuela-Valdes

Near-field synthesis of spatially-fed arrays for uniform field distribution in complex areas 1966
Alvaro F. Vaquero, Marcos R. Pin, Manuel Arrebola

Multi-Band Outdoor-to-Indoor Propagation Measurements Using a Drone 1971
F. Fuschini, M. Barbiroli, E. M. Vitucci, V. Degli-Esposti

Studying the Noise Performance of CORPS Beam Forming Networks 1975
Carlos Biurrun-Quel, Carlos Del-Rio Bocio

On the Maximum Power Density of Implanted Antennas within Simplified Body Phantoms 1980
Mingxiang Gao, Zvonimir Sipus, Anja K. Skrivervik

SAR-Based Sensing of Harmonic Transponders 1985
Aman Batra, Maher Khaliel, Ahmed El-Awamry, Abdelfattah Fawky, Jahangir Alam, Michael Wiemeler, Diana Gohringer, Thomas Kaiser

Highly Transparent Fully Metallic 1-Bit Coding Metasurfaces for Near-Field Transformation 1990
Foez Ahmed, Muhammad U. Afzal, Khushboo Singh, Touseef Hayat, Karu P. Esselle

Solving Electromagnetic Scattering in Dielectric Bodies by Monte Carlo Sampling 1994
Hector Lopez-Menchon, Juan M. Rius, Eduard Ubeda, Alexander Heldring

Synthesis of L_1 Pencil Beams with Constrained Sidelobe Level and Dynamic Range Ratio 1999
Katarina Vodvarka, Maja Jurisic Bellotti, Mladen Vucic

Microwave Antenna Array Calibration via Simulated and Measured S-parameters Matching 2004
C. Origlia, D. O. Rodriguez-Duarte, J. A. Tobon Vasquez, F. Vipiana

Dual-Band Millimetre-wave Phase Shifting Metasurface Element Enabled by Air-Bridged Schottky Diodes 2008
Evangelos Vassos, Alexandros Feresidis

Dual-band and Dual Linear to Dual Circular polarization transformer FSS in reflection for satellite communications 2012
Miguel A. Salas-Natera, Roberto Garrote Moreno, Ramon Martinez Rodriguez-Osorio

Analysis of MIMO Performance in Complex Indoor Scenarios at 3.7 GHz Band for Future 5G Deployments 2017
Luis Lenin Trigueros, Peio Lopez-Iturri, Leyre Azpilicueta, Carlos Del-Rio, Francisco Falcone

Bidirectional Periodic Leaky-Wave Antennas Using Side-Fire and Slot-Pair Configurations 2021
Mohamed K. Emara, Shulabh Gupta

Continuous Leakage from Slow-Wave Structure for Integrated All-Dielectric Uniform Leaky Wave Antenna 2024
Daniel Headland, Withawat Withayachumnankul

Narrow Band Rejection in Ultra Wideband Pixel Antennas 2029
Mohamad Majed, Mohamad Rammal, Hussein Abou Taam, Mayank Mayank, Joël Andrieu, Bernard Jecko

Inverse Design of Rectangular Microstrip Patch Antenna using Neural Network Combining with Time-Domain Representation of S-parameters 2033
Yue Su, Zhiguo Su, Hongtai Chen, Hongxin Zhao, Xiaoxing Yin

Statistical modelling of short-range interference paths 2037
Richard Rudd

183GHz Cavity-Backed Spiral Radiometer Antenna with Dual Circular Polarization for Earth Observation Applications 2041
Juan M. Herrera-Martin, Vicente Gonzalez-Posadas, Daniel Segovia-Vargas

Multipath-Based Localization and Tracking Considering Off-Body Channel Effects 2046
Thomas Wilding, Erik Leitinger, Klaus Witrisal

Dual-Polarized/Dual-Band Antenna with Compact Size for GNSS and 5G NR Applications 2051
Nasimuddin, Michael Chia

Circularly Polarized Wideband Planar Antenna Array Using Any-Layer PCB Technology for mm-Wave Applications 2056
M. Roodaki-Lavasani-Fard, G. A. E. Vandenbosch, K. Mohammadpour-Aghdam, R. Faraji-Dana

A new design of RF medium power calorimeter based on water calorimetric method 2061
Jinwen Liu, Wenze Yuan, Yang Zhao, Wei Zhao, Xiaohai Cui

The Resonant Electrical Length of Helical Antennas Placed between Metallic Parallel Plates 2065
Walid M. G. Dyab, Mourad S. Ibrahim, Ahmed A. Sakr, Ke Wu

Gain Improvement of Wideband Patch Antenna at Millimeter-wave Band Using Novel Metamaterial Superstrate 2068
Abubakar Hamza, Abdelhalim Chaabane, Hussein Attia

Linear-to-Circular Polarization Converter Based on Four-Arms Star FSS at 5.2 GHz for 5G Applications 2072
Deisy Formiga Mamedes, Jens Bornemann, Alfredo Gomes Neto

Feasibility Study for the Design of a Simultaneous X/Ka/Ka-Radar Feed System 2076
Christophe Granet, John S. Kot

Embedding Antenna Booster in Smart-metering Platforms 2081
Alejandro Fernandez, Jussi Rahola, Jaakko Juntunen, Aurora Andujar, Joan L. Pijoan, Jaume Anguera

Multi-band antenna system for IoT from Space applications 2085
Fabien Ferrero, Le-Huy Trinh

Equivalent Circuit Model of Unbalanced Fed Tightly Coupled Dipole Array For Analyzing Even and Odd Modes 2088
Seongjung Kim, Sangwook Nam

Additively Manufactured Helix Antenna for X-Band Applications 2092
D. Panusch, F. Hubert, F. Bachbauer, K. Lomakin, G. Gold

Examination of Antenna Calibration Methodologies in an Extrapolation Range 2096
Zhong Chen, Yibo Wang, Dennis Lewis

MIMO mmWave Over-the-air Testbed Calibration using Symmetries and Experimental Verification 2100
Koen Buisman, Thomas Eriksson

First Order Design of a Quadruple-Ridged Flared Horn for the ngVLA Band 1 2105
Robert Lehmensiek, Dirk I. L. De Villiers

Automotive Antenna Measurements in the Installed State Under Variable Boundary Conditions 2109
Muhammad Ehtisham Asghar, Christian Bornkessel, Ralf Stephan, Matthias A. Hein

Equiangular Spiral Antenna Design Embedded in a Launcher Fuselage for S-Band Communications 2113
Sergio Garcia Martinez, Pablo Sanchez Olivares, Jose Manuel Fernandez Gonzalez, Adrian Tamayo Dominguez

Propagation Measurements Comparing Indoor and Outdoor Hotspot Coverage at 28, 58, and 143 GHz 2118
Christina Larsson, Bengt-Erik Olsson, Sinh L. H. Nguyen, Martin Johansson

Design of a 3D Printed Antenna for Grid of Beams Applications at mm-wave frequencies 2123
Philippe Ratajczak

A Quantitative Analysis of the Plastic Shell Effects in 3D- Printed Breast Phantoms for Microwave Imaging 2127
Tyson Reimer, Spencer Christie, Stephen Pistorius

Radial Line Helical Phased Array with Antenna Elements Rotated by Motors for Microwave Power Transmissions 2132
Narihiro Nakamoto, Jun Goto, Yusuke Suzuki, Toru Fukasawa, Toru Takahashi, Yoshio Inasawa, Hiroaki Miyashita

Accelerating Electromagnetic Inverse-Design using Deep Learning 2137
Ronald P. Jenkins, Sawyer D. Campbell, Pingjuan L. Werner, Douglas H. Werner

Low Cost Over The Air Testing Method to Create a 3D Spatially Dynamic Environment to Evaluate the Performance of 5G Millimeter Wave Devices 2139
David Reyes Paredes, Mark Beach, Moray Rumney

Active Topological Metamaterials with Robust Oscillation Modes 2144
Dimitrios L. Sounas

Low Radar Cross Section Dipole Antenna Integrated with Absorptive Frequency Selective Reflection Structure 2147
Mehran Manzoor Zargar, Archana Rajput, Kushmanda Saurav, Shiban K. Koul

The Effect of Contact Pressure on Ex-vivo Measurements of the Conductivity of Liver 2151
Niko Istuk, Hamza Benchakroun, Muhammad Adnan Elahi, Martin O'Halloran

Hardware Acceleration of Biomedical Microwave Techniques using High Level Synthesis 2154
Mohammad Amir Mansoori, Mario R. Casu

Comparison of Indoor Channel Characteristics for Sub-THz Bands from 125 GHz to 300 GHz 2159
Marina Lotti, Mathieu Caillet, Raffaele D'Errico

Fast Eigenmode Mapping in Printed Periodic Structures 2164
Denis Tihon, Modeste Bodehou, Shambhu Nath Jha, Christophe Craeye

Linearly Polarized Transmit-array Operating in mmWave Bands, Design, Optimization and Demonstration 2169
Alessandro De Oliveira Cabral Junior, Jeanne Pages-Mounic, Andre Barka, Hamza Kaouach

Rainfall measurements in Bolivia: Conversion of statistics from 15-min to 1-min by EXCELL RSC model and accuracy test of ITU-R P.837 2174
Gustavo A. Siles, Martin Alvarez

Multi-material additive manufacturing of microwave devices 2179
Benjamin Vial, Henry Giddens, Yang Hao

Adjoint Optimization of 3D Printed RF GRIN Lenses 2184
Eric B. Whiting, Sawyer D. Campbell, Galestan Mackertich-Sengerdy, Saber Soltani, Douglas H. Werner, Pingjuan L. Werner

Dog IoT: Path Loss and Link Budget Analysis for Canine Wireless Body Area Network 2187
J. Goethals, A.-M. Leys, G. Vermeeren, M. Deruyck, L. Martens, W. Joseph

Advances in the ICV EMC Test Standardization in China-SAE 2191
Juan Li, Jianmei Lei, Rui Chen, Yuanliang Peng, Song Mao, Bonian Zhang

Integrated Wideband Dual-Polarized ME-Dipole Planar Antenna Array with Tight Coupled Elements 2196
Bruno Ferreira Gomes, J. R. Mejia-Salazar

Reconfigurable Wideband Linear-Polarized and Dual Left/Right-Hand Circularly-Polarized Waveguide Antennas for Beamforming Antenna array 2200
Yifang Wei, Christian Arnold, Jiasheng Hong, Jiayu Rao

A Miniaturized Wideband Circularly Polarized Antenna using Metasurface 2205
Nasimuddin, Xianming Qing

A Compact Loaded DETSA Antenna With Enhanced Directivity Using Characteristic Modes Optimization 2210
Hussein Jaafar, Jean-Francois Pintos, Christophe Delaveaud

Effects of Human Body on Characteristics of a Reverberation Chamber for Microwave Frequencies 2214
Masaru Numano, Takahiro Aoyagi

Dynamic Metasurface Antenna for Computational Polarimetric Imaging 2218
The Viet Hoang, Vincent Fusco, Thomas Fromenteze, Okan Yurduseven

Directional Modulation from a Wrist-Wearable Compact Antenna 2223
Abel Zandamela, Nicola Marchetti, Adam Narbudowicz

Circumplexer: A Novel Dual-Band Dual-Circular Polarization Antenna Feeding Network for Satellite Communications 2228
Fernando Teberio, Ibai Caleroau, Jorge Teniente, Itziar Maestrojuan

Huygens' Metasurfaces for Extending the Scan-range of Phased arrays 2232
Jaemin Kim, Gleb A. Egorov, George V. Eleftheriades

SAFEDRONE project: development of a UAV -based high-resolution GPR system for IED detection 2236
Maria Garcia-Fernandez, Guillermo Alvarez-Narciandi, Yuri Alvarez Lopez, Fernando Las-Heras Andres

A Planar Leaky-Wave Antenna with Dual Circular Polarization in Continuous Backward and Forward Scanning 2241
Xiaowen Li, Lei Wang, Junhong Wang, George Goussetis

Measurement Uncertainty Evaluation for Validating RF/EMC Chambers from 30 MHz to 1000 MHz 2245
Wei Du, Donglin Meng, Yulu Huang, Rui Wang

Parallel-plate waveguide with a Bed of Nails for Radial-Line Slot Array Antennas 2250
Jose I. Herranz-Herruzo, Alejandro Valero-Nogueira, Miguel Ferrando-Rocher

Compact Wideband Antenna-in-Package Based on PCB Technology for 39 GHz 5G mmWave Applications 2254
Thi Huyen Le, Ivan Ndip, Oliver Schwanitz, Stefan Kosmider, Kavin Senthil Murugesan, Uwe Maass, Martin Schneider-Ramelow

Deep Learning Strategies for Quantitative Biomedical Microwave Imaging 2258
Maria Maddalena Autorino, Stefano Franceschini, Michele Ambrosanio, Fabio Baselice, Vito Pascazio

Experimental 39-GHz Band Propagation Measurements for Coverage Extension from the Sky 2262
Yuki Hokazono, Yoshihisa Kishiyama, Takahiro Asai, Tetsumi Takamori, Jun Suzuki, Hiromu Kitanozono

A Simple Geometrical Frequency Reconfigurable Antenna with Miniaturized Dimensions for 24.8/28GHz 5G Applications 2267
Musa Hussain, Akash Hussain, Mohammad Alibakhshikenari, Francisco Falcone, Ernesto Limiti

Multi-probe Linear Matrix Inversion Method in Sub-array Internal Element Calibration 2270
Yusheng Zhang, Zhengpeng Wang, Jungang Miao

On the design of HAPs High Throughput and flexible 5G Communication Payloads 2275
Miguel A. Salas-Natera, Gonzalo Lazaro Macein, Ramon Martinez Rodriguez-Osorio

Spatial-temporal Correlations of U2V Channel Considering Fuselage Posture and Antenna Pattern 2280
Tongtong Zhou, Boyu Hua, Qiuming Zhu, Haoran Ni, Kai Mao, Xiao-Min Chen

Wideband Flexible Textile Antenna with Parasitic Shorted Strips for Body-Centric Communications 2285
Shengjian Jammy Chen, Zhihan Xu, Christophe Fumeaux

Concept for Virtual Drive Testing on the Basis of Challenging V2X and LTE Link Scenarios 2289
Philipp Berlt, Berk Altinel, Christian Bornkessel, Matthias A. Hein

Greedy Channel allocation in Meshed Wideband HF Radio Networks with Channel Aggregation 2294
Jens Zander

Using 3D Soil Surface Profile to Predict and Remove the Surface Response in Stripmap SAR 2299
Brian Burns, Nader Namazi

Glide-Symmetric Periodic Structures with Enhanced Isotropic Properties 2303
Marko Bosiljevac, Zvonimir Sipus, Eva Rajo-Iglesias

Spatial Distribution of Equivalent Echo Sources in Antenna Measurements with a Moving Antenna Under Test 2307
Josef Knapp, Thomas F. Eibert

Recent Advances in Complex Reflectarray Synthesis within the System-by-Design Framework 2312
Andrea Massa, Giacomo Oliveri, Marco Salucci

Measurement Trials of Radiowave Propagation Through Pinus Pinaster Fuel Bed Under Fire 2316
Stefânia Faria, Mario Vala, Nuno Leonor, Joao M. Felicio, Carlos Fernandes, Carlos Salema, Rafael Caldeirinha

Exceptional Points of Degeneracy in Electromagnetic Periodic Waveguides and the Role of Symmetries 2320
Tarek Mealy, Mohamed Y. Nada, Ahmed F. Abdelshafy, Ehsan Hafezi, Filippo Capolino

Inverse Design of a Dual-Band Reflective Polarizing Surface Using Generative Machine Learning 2324
Parinaz Naseri, George Goussetis, Nelson J. G. Fonseca, Sean V. Hum

Numerical Analysis of Dispersion Compensation for Guided Electromagnetic Waves in Rectangular Microwave Waveguides 2329
Manuel E. Rao, Thomas Maetz, Jochen Moll

Low-Profile Automotive Antenna Systems for MIMO 5G and L1/L5 GNSS Communications 2334
Ahmad Yacoub, Daniel N. Aloi

Electromagnetic Characterization of Lunar Dust Simulants 2338
Jose Cidras Estevez, David Ramos Somolinos, Borja Plaza Gallardo, Narek Stepanyan Stepanyan, Aidan Cowley, David Poyatos Martinez

A GNSS Conformal Antenna Achieving Hemispherical Coverage in L1/L5 Band 2343
Federico Boulos, Wahid Elmarissi, Stefano Caizzone

Efficient Optimization of the Blended Rolled Edge of a Rectangular Single Offset-Fed Compact Antenna Test Range Reflector Using Genetic Evolution 2347
S. F. Gregson, M. Dirix, R. Dubrovka

Ka-band Mechanically Steered Phase Shifter for Satellite User Terminals 2352
Cilei Zhang

Space-fed antenna based on dielectric-only transmitarray 2355
A. Massaccesi, P. Pirinoli

Predicted and Measured Antenna Patterns of the European Large Deployable Reflector 2359
C. Cappellin, M. Lori, A. Geise, C. Hunscher, L. Datashvili

Miniature Super-Directive and Super-Gain Parasitic Antenna Array Based on Far-Field Pattern Synthesis 2364
Marwan Jadid, Serge Bories, Christophe Delaveaud, Anthony Bellion

Branch Line Coupler Inspired Circularly Polarized Leaky-Wave Antenna with Broadside Scanning 2368
Ayaz Ahmad, Vishakha Pandey, Busineni Mahesh Kumar, Jayanta Mukherjee

Path Loss Measurements and Modelling in a Citrus Plantation in the 1800 MHz, 3.5 GHz and 28 GHz in LoS 2372
Leandro Juan-Llacer, Jose Maria Molina-Garcia-Pardo, Alain Sibille, Saul A. Torrico, Luis Martinez Rubiola, Maria Teresa Martinez-Ingles, Jose-Victor Rodriguez, Juan Pascual-Garcia

Multibeam Directional Secure Transmission with Multiport Compact Antenna 2377
Edith A. Cabrera-Hernandez, Josep Parron, Alan Tennant

Internal probing of an asteroid analogue by electromagnetic method 2382
Astrid Dufaure, Yusuf Oluwatoki Yusuf, Jean-Michel Geffrin, Liisa-Ida Sorsa, Sampsa Pursiainen, Christelle Eyraud

Frequency dependence of fire-induced signal level variability 2385
Manuel Garcia Sanchez, Inigo Cuinas, Luis A. Lopez-Valcarcel, Miguel Riobo Prieto, Isabel Exposito

High Gain and Fixed Broadside radiation at 140GHz Band by a Leaky Wave Slotted Waveguide 2389
Seyed Ali Razavi, Ashraf Uz Zaman

Analysis of Residential Sub-THz Deployments from Accurate Radio Simulations and Planning Techniques 2392
Laurent Maviel, Yoann Corre, Gregory Gougeon, Djamel Amar

Dual RFID Tag System for AC Current Sensing 2397
Irfan Ullah, Benito Sanz-Izquierdo, John C. Batchelor

Correlation Levels for Measured Indoor 21.5 GHz Channels With a User-Held Handset 2402
Jesper Odum Nielsen, Gert Frolund Pedersen

Radiative Wireless Power Transfer System using Circularly Polarised Transmitter-Receiver Antenna Module to Improve Power-Transfer-Efficiency 2407
Alok Chandra Joshi, Jogesh Chandra Dash, Debdeep Sarkar

Verification of THz Channel Sounder and Delay Estimation with Over-The-Air Multipath Artifact 2412
Diego Dupleich, Sebastian Semper, Mohanad Dawood Al-Dabbagh, Alexander Ebert, Thomas Kleine-Ostmann, Reiner Thoma

Non-homogeneous Fabry-Perot Antenna Design Process to Improve Aperture Efficiency 2417
Pablo Mateos-Ruiz, Elena Abdo-Sanchez, Carlos Camacho-Penalosa

On Spatial Visualization of Mutual Coupling With Applications to Small Embedded Antennas 2420
B. L. G. Jonsson, Johan Lundgren, Johan Malmstrom

Circularly-Polarized GNSS Metasurface Antenna with Two Feed Points in a Sub-wavelength Metallic Cavity 2424
L. Garcia-Gamez, L. Bernard, R. Sauleau, S. Collardey, K. Mahdjoubi, P. Pouliguen, P. Potier

Array Antenna Fault Diagnosis Via Near Field Amplitude-Only Data 2428
Roberta Palmeri, Giada M. Battaglia, Andrea F. Morabito, Tommaso Isernia

Widely Linear Beamforming for Full-Duplex Joint Communications and Sensing: An Investigation on Virtual Displacement of Array Elements during Local Optimization 2432
Hadi Alidoustaghdam, Yang Miao, Andre Kokkeler

Challenges for 5G and Beyond 2437
Jelena Senic, Anmol Bhardwaj, Camillo Gentile, Derek Caudill, Chiehping Lai, Damir Senic, Sung Yun Jun, Jack Chuang, Jian Wang, Anuraag Bodi, Raied Caromi, Nada Golmie

Investigation of a Flat, High-Gain Omni-Directional Antenna 2442
E. Levine, H. Matzner

Design of a Linearly Dual-Polarized and Dual-Wideband Multi-Ring Microstrip Antenna Fed by Two L-Probes for a Small Ground Plane 2445
Yuki Kimura, Sakuyoshi Saito, Yuichi Kimura

Full-metal X-band Reflectarray for Small Satellite Constellations 2448
Gautier Mazingue, Louis Mangenot, Maxime Romier, Nicolas Capet

Measurement Based Identification of MPCs in an Urban Drone-to-Drone Propagation Scenario 2451
Dennis Becker, Uwe-Carsten Fiebig

Microwave Absorber Made of Hanoi-Tower Shaped Dielectric Resonators and a Magnetic Support 2456
Pablo H. Zapata-Cano, Erika Vandelle, Thi Quynh Van Hoang, Brigitte Loiseaux

Fast Spline-Based Antenna Measurements for Robotic Test Ranges via Pointwise Probe Correction 2461
R. Moch, D. Heberling

V-Band Vivaldi Antenna for Beyond-5G Integrated Photonic-Wireless Millimetre Wave Transmitter 2466
Dimitrios Konstantinou, Jasper De Graaf, Simon Rommel, Ulf Johannsen, Yuqing Jiao, Idelfonso Tafur Monroy

Single-Cut Phaseless Near-Field to Far-Field Transformation 2471
Fernando Rodriguez Varela, Belen Galocha Iraguen, Manuel Sierra Castaner

Fully Coherent UAV-Based Near-Field Measurement and Transformation of the S67-15 m Ground Station Antenna at the German Space Operations Center in Weilheim 2476
Stefan Punzet, Fabian T. Faul, Thomas Mittereder, Christian Oettl, Matthias Ganser, Martin Hausler, Thomas F. Eibert

A 5.5GHz-Band 2x2 Array Antennas Module Based on Compact 2-D Beamforming Network in Broadside Coupled Stripline..... 2481
Jean Temga, Mizuki Motoyoshi, Takashi Shiba, Noriharu Suematsu

On-Body Path-Gain Investigation for Body-Centric Wireless Communications for Hearing Instruments 2485
Jonas Ornskov Nielsen, Kristina Josefine Wurden Kammann, Soren Helstrup Kvist, Kaj Bjarne Jakobsen

Comparisons of Scalar and Tensor Circularly-Polarized Holographic Artificial Impedance Surfaces 2490
Ming Yao, Peng Mei, Gert Frolund Pedersen, Shuai Zhang

Transparent Spherical Spiral Antenna for Capsule Endoscopy Systems..... 2495
Amir Arayeshnia, Amirhossein Hajbagheri, Majid Rafiee, Roy B. V. B. Simorangkir, Ali Lalbakhsh

How to transform an Aortic Valve Prostheses into an UHF antenna for the RFID-based Wireless Monitoring of the Cardiac Health..... 2498
Miriam Gagliardi, Cecilia Occhiuzzi, Roberto Verzicco, Gaetano Marrocco

A Bio-degradable Textile-Based Graphene Antenna for the 5G Smart Wearables..... 2503
Owain Thompson, Shaker Alkaraki, Qammer H. Abbasi, Syeda Fizzah Jilani, David Andrew Evans

Investigation of Material and Scattering Losses in Antennas in Transmitting and Receiving Mode 2507
Mohamed K. Emara, Shulabh Gupta

Connectivity Model for Mobile Ad-Hoc Networks..... 2512
Rasmus Liborius Bruun, Konstantinos Voulgaris, Troels Pedersen

Can a mmWave 5G Handset have Quasi-Omnidirectional Coverage? 2517
Cheng Wang, Christopher Larmour, Vincent F. Fusco, M. Ali Babar Abbasi

Reproducible Virtual Test Drive for Car2Car/Car2X and its Application on a new Parallel Sniffing Diversity Circuit..... 2522
Anton Dobler, Olha Voitsun, Stefan Lindenmeier

Tropospheric Scintillation Fading Analysis of Alphasat Satellite Measurements in Ka and Q Bands..... 2527
Arsim Kelmendi, Andrej Hrovat, Ales Svigelj, Mihael Mohorcic

Surface Current Optimization of Dipole Antenna Close to Ground Plane for 5G Mobile Applications..... 2532
Jin Zhang, Resti Montoya Moreno, Ville Viikari

Hybrid Active Antennas for Telecom Applications 2537
C. Tienda, S. Amos, G. Thomas, S. Laws, D. Dupuy

Multi-Resolution Strategies for Microwave Inverse Scattering - Challenges, Solutions, and Future Trends..... 2541
Francesco Zardi, Marco Salucci, Lorenzo Poli, Andrea Massa

Waves in Linear Time-Varying Dielectric Media 2544
A. Sotoodehfar, M. S. Mirmoosa, S. A. Tretyakov

Fast Microwave Screening of Breast Tumors with a System-by-Design Inversion Strategy 2549
Francesco Zardi, Lorenzo Poli, Marco Salucci

Design and Measurement of a Bandwidth Enhanced Quad-Ridged OMT 2553
Kobus Kotze, Petrie Meyer, Werner Steyn

Ultra-Small Bent Meta-Waveguide Filters 2557
Maliheh Khatibi Moghaddam, Romain Fleury

Design of A Dual-Circularly Polarized Antenna Using Gap Waveguide Based on Contactless Sliding Mechanism 2562
Abdullah J. Alazemi, Ali Farahbakhsh, Davoud Zarifi

Calibration of a 94-GHz Monopulse Feed based on Hybrid Comparison of its Experimental Patterns 2566
Marta Ferreras, Mariano Barba, Jesus Grajal

A New Approach for the Evaluation of Time Averaged SAR of Multiple Emitting Antennas 2571
Mounir Teniou, Mathieu Chamaillard, Thomas Julien, Stephane Pannetrat, Lyazid Aberbour

Dielectric Image Line Rod Antenna Array With Integrated Power Divider at W-Band 2575
Henning Tesmer, Daniel Stumpf, Ersin Polat, Dongwei Wang, Rolf Jakoby

Angular Localization of Wideband Sources using a single port metamaterial receive Antenna 2580
A. Ourir, A. Mokh, R. Khayatzadeh, M. Kamoun, A. Tourin, A. Fink, J. De Rosny

Evaluation of the active impedances in large Interleaved Parasitic Arrays Antennas (IPAAs) 2584
Remy Lamey, Marc Thevenot, Cyrille Menudier, Olivier Maas, Faycel Fezai

Experimental Demonstration of Anomalous Refraction with a 3D-Printed Binary Grating 2589
Erika Vandelle, Matthieu Bertrand, Thi Quynh Van Hoang, Brigitte Loiseaux

A Broadband Potential-Based Boundary Element Method for Modeling Electromagnetic Scattering from Dielectrics and Conductors 2593
Shashwat Sharma, Piero Triverio, Edward S. Rogers

Characterization of Rain Attenuation in 80–200 GHz Radio Links Considering Non-Spherical Raindrops 2598
Domingo Pimienta-Del-Valle, Jose Manuel Riera, Santiago Perez-Pena, Pedro Garcia-Del-Pino, Ana Benarroch

Nonlinear Effects of Electromagnetic Pulse on a Plasma-Based Electrically Small VHF Antenna 2603
Adrien Laffont, Jean-Pierre Adam, Thierry Callegari, Laurent Liard, Olivier Pascal, Romain Pascaud

Impact of Drug Treatment on the Electromagnetic Properties of Basal Cell Carcinoma Cancer in the Terahertz Band 2607
Shohreh Nourinovin, Muhammad M Rahman, Robert Christopher Jones, Michael P Philpott, Akram Alomainy

RMS Delay Spread Model for 60 GHz Band for Offices and Conference Rooms 2611
Monika Drozdowska, Amar Al-Jzari, Sana Salous, Narcis Cardona

Angle of Arrival Retrieval from Power Angular Spectrum Using Antenna Pattern Deconvolution at K-Band 2616
Glaucio L. Ramos, Mario Vala, Rafael F. S. Caldeirinha, Nuno Leonor, Luiz Da Silva Mello

Spatially Dispersive Electromagnetic Metasurfaces: Multipolar Modeling vs Extended GSTCs 2620
Jordan Dugan, Joao G. Nizer Rahmeier, Tom. J. Smy, Shulabh Gupta

Characteristic Modes Analysis for the Design of a Wideband Circularly Polarized X-band Antenna 2625
Simone Genovesi, Francesco Alessio Dicandia

Optimal Design Method of RF-DC Conversion Circuits for Various Input and Load Conditions Required for Rectenna Site Design 2629
Kazuhiro Fujimori, Kensuke Kobayashi

Experimental validation of camouflaging a high-index dielectric scatterer with metasurfaces 2633
Riccardo Cacocciola, Badreddine Ratni, Nicolas Mielec, Emmanuel Mimoun, Shah Nawaz Burokur

Frequency Reconfigurable and Circularly Polarized Patch Antenna Over Dual Ultra-wideband Channels 2637
Amina Benouakta, Fabien Ferrero, Leonardo Lizzi, Robert Staraj

A Dual-Polarized Dual-Band Flat-Top Pattern 5G mm-Wave Array Antenna 2642
Johan Wettergren, Xinxin Yang, Per Landin

Design Aspects of 3D Printing for Gradient Index Lenses 2647
I. Grigoriev, I. Munina, D. Zelenchuk

Electromagnetic Analysis of Lasing Eigenmodes of Twin Semiconductor Nanorods with Graphene Covers 2651
Dariia O. Herasymova

Encoding Strategy to Increase the Data Capacity in Near-Field Chipless-RFID Systems 2655
Cristian Herrojo, Ferran Paredes, Ferran Martin

Salient Features of Eulerian and Quaternion Formalisms in Antenna Applications 2660
Yahya Rahmat-Samii, Tianjian Huang

Phased Array Antenna Design with Improved Radiation Characteristics for Mobile Handset Applications 2665
Atta Ullah, Naser Ojaroudi Parchin, Ahmed S. I. Amar, Raed A. Abd-Alhameed

Fast Gain Switching on TwinRX USRPs 2669
Maximilian Engelhardt, Julia Beuster, Carsten Andrich, Alexander Ihlow, Giovanni Del Galdo

Application of Supervised Descent Method to MRI Electrical Properties Tomography 2674
Sabrina Zumbo, Stefano Mandija, Flavio Meliado, Cornelis A. T. Van Den Berg, Tommaso Isernia, Martina T. Bevacqua

Enhancement Indoor mmWave Coverage Using Passive Reflector for NLOS Scenario 2679
Marwan El Hajj, Mbissane Dieng, Gheorghe Zaharia, Ghais El Zein

Closed Metal Chamber Configuration for Estimating RF Attenuation in Vehicles with Advanced Thermal Properties Windows 2684
R. Chueca, R. Alcain, C. Heras, I. Salinas

DeepRay: Deep Learning Meets Ray-Tracing 2688
Stefanos Bakirtzis, Kehai Qiu, Jie Zhang, Ian Wassell

Channel Characterization for 5G-R Indoor Communication at 2.1 GHz 2693
Ting Liu, Danping He, Ke Guan, Dongliang Liu, Fusheng Zhu

Unit Cell Polarizability and Sheet Impedance Extraction in Aperiodic Environments 2698
Jordan Budhu, Anthony Grbic

Efficient Design of H-Plane SIW Horn Antenna Array at mmWaves 2703
Cleofas Segura-Gomez, Angel Palomares-Caballero, Pablo Padilla

Preliminary phantom-based dynamic calibration techniques assessment for microwave colonoscopy systems 2707
Alejandra Garrido-Atienza, Walid Dghoughi, Jordi Romeu Robert, Marta Guardiola Garcia

Low-Cost Feature-Based Tolerance Optimization of Multi-Band Antennas 2711
Anna Pietrenko-Dabrowska, Slawomir Koziel

Parallel-Plate Lens Beamformer in Multilayer PCB Technology for Wide-Angle Scanning 2716
Thomas Strober, Segolene Tubau, Herve Legay, Etienne Girard, George Goussetis, Mauro Ettorre

Extending the Range of 5G Energy Transfer: Towards the Wireless Power Grid 2720
Aline Eid, Jimmy Hester, Manos M. Tentzeris

Using a Conical Horn as Compact Antenna Test Range Feed in Millimetre Bands 2724
Sergiy Pivnenko, Ashraf Uz Zaman, Marianna Ivashina

3D Microwave Breast Imaging using Double Stage Delay Multiply and Sum Beamforming 2729
Michelangelo Maria Malatesta, Luca De Marchi, Jochen Moll

OTHR Phase-Only Beamformer Drone-Based Measurements 2733
Simon Henault

Temperature Dependent RF Characterization of Thin-Film Polyimide for 5G mmWave Antenna-in-Package Modules 2738
Abhijeet Kanitkar, Mykola Chernobryvko, Ivan Ndip, Michael P. Kaiser, Mathias Brottcher, Philipp Scheibe, Martin Schneider-Ramelow, Marcel Wieland, Christian Goetze, Jean Trewhella

Miniaturized CORPS-BFN to feed OLAF SAR Instrument 2743
Carlos Biurrun-Quel, Juancarlos Iriarte, Inigo Ederra, Carlos Del-Rio

High-Gain Slotted Waveguide Array Fed by a Sectoral Horn 2748
E. Levine, H. Matzner

Low Cost Active Phased Array with Switchable Circular Polarization in Ka Band for SATCOM Application 2751
Xiaoliang Sun, Jorge Calatayud-Maeso, Alfonso-Tomas Muriel-Barrado, Pablo Sanchez-Olivares, Jose Manuel Fernandez Gonzalez

A Huygens' Principle Based Ray Tracing Method for Diffraction Calculation 2756
Han Na, Thomas F. Eibert

Feasibility Study of Plaque Detection using Electrical Impedance Techniques 2760
Shauna Burke, Katarzyna Polak-Krasna, Hamza Benchakroun, Patricia Vazquez, Martin O'Halloran, Atif Shahzad, William Wijns, Marcin J. Krasny

Antennas for a Space Solar Power System and Technical Challenges 2764
Tadashi Takano

Transfer Function Analysis and Vehicle Models for Investigation of Coupling Between a Multi-Antenna System and Wires 2769
Emanuel Panholzer, Martin Aidam, Stefan Lindenmeier

Package-PCB Near-Field Antenna Co-Design for K-Band Radar-based Breast Cancer Detection 2774
Martin Maier, Duy Hai Nguyen, Jochen Moll, Viktor Krozer, Vadim Issakov

Potential of edge-soldering in millimeter-wave antenna design 2779
Katerina Galitskaya, Mikko Leino, Jari Van Wonterghem

Preliminary Results of a Multibeam Reflectarray Antenna in Ka-band for LEO Satellites Constellations 2784
Daniel Conde-Parraga, Daniel Martinez-De-Rioja, Jose A. Encinar

Substrate Integrated Waveguide Pedestal Filtenna for Sub-6 GHz 5G Radio Frequency Front-Ends 2789
Elmine Meyer, Cornelis Vertegaal, Leanne Johnson, Petrie Meyer, U. Johannsen

Printed Non-Metallic Textile-Based Carbon Antenna for Low-Cost Green Wearable Applications 2794
Mahmoud Wagih, Sheng Yong, Kai Yang, Alex S. Weddell, Steve Beeby

Comparative Study of Beamforming Techniques for VHTS Array Fed Reflector Antennas 2798
Alejandro Baldominos, Andrea Segneri, Alberto Mengali, Nelson J. G. Fonseca, George Goussetis

Piezoelectric Tuning for Ultra-Law-Loss Tuneable mm-Wave and THz Components 2803
James Churm, Alexandros Feresidis

4×4 Butler-Matrix based Beam Steering Antenna Systems using Substrate Integrated Waveguide 2808
Lu Chongqing, Nasimuddin, A Alphones

Synthesis of a Metasurface-based Bessel Beam Launcher at Microwaves and Millimeter Waves 2813
Santi C. Pavone, Walter Fuscaldo

Influence of Wave Diffraction on the Coastal Airfield Surface on the Glide Path Behavior 2816
Iungaitis E. M., Voytovich N. L, Ershov A. V.

Evolved Multiobjective Low Side-lobe Taper for Beam Steerable Arrays 2821
Sudipta Das, Ritu Rimjhim, Durbadal Mandal, Rajib Kar

A Compact Size CPW-Fed Ultra-Wideband (UWB) Antenna for Wireless Networks 2825
Sarosh Ahmad, Daniel Segovia Vargas, Adnan Ghaffar, Shakir Ullah

Comparison of Measurements and Simulations of Tapered Anechoic Chambers 2830
Vince Rodriguez, Elis Rios

A New Approach for Matching Small Parasitic Superdirective Antennas Using Network Characteristic Modes 2835
Abdellah Touhami, Ala Sharaiha, Sylvain Collardey

On the Sampling Effects of Disdrometer-Derived Data Measured by the 1D-Video-Disdrometer 2839
Joel Flavio, Guenter Lammer, Michael Schoenhuber

Performance Analysis of Indoor Distributed Massive MIMO Based on Channel Measurements at 3.5 GHz 2843
Abla Bedoui, Mohamed Et-Tolba, Oscar Fernandez, Jesus R. Perez, Luis Vallet, Rafael P. Torres

Cell-Free Massive MIMO Deployments: Fronthaul Topology Options and Techno-Economic Aspects 2848
Lucas Furtado, Andre Fernandes, Aline Ohashi, Fabricio Farias, Andre Cavalcante, Joao Costa

Opportunistic Navigation Using Sub-6 GHz 5G Downlink Signals: A Case Study on A Ground Vehicle 2853
Ali A. Abdallah, Zaher M. Kassas

A dual-beam analog beamformer for LOFAR 2.0 enabling simultaneous space weather and radio astronomy observations 2858
M. Ruiter, P. Kruger, S. R. Harison, S. Bosse, S. Barth, B. Da Silva, C. Taffourreau

Microwave and Contactless Sensor for Millimeter Inclusions Detection in Biomedical Applications 2861
Angelica Masi, Sabrina Rotundo, Eliana Canicattì, Francesco Molesti, Danilo Brizi, Agostino Monorchio

Measurement-Based Propagation Channel Modeling for Communication between a UAV and a USV 2864
Yuning Yu, Jose Rodriguez-Pineiro, Xie Shunqin, Yixiao Tong, Jing Zhang, Xuefeng Yin

Microstrip Radiating Element with High Polarization Purity for Weather Observations 2869
Francesco Zardi, Paolo Rocca

Efficient Combination of Scalar-Potential Representations of Solenoidal Functions and Quasi-Helmholtz Projectors 2872
Bernd Hofmann, Thomas F. Eibert, Francesco P. Andriulli, Simon B. Adrian

End-to-End Transmission of Physiological Data from Implanted Devices to a Cloud-Enabled Aggregator Using Fat Intra-Body Communication in a Live Porcine Model 2875
Johan Engstrand, Mauricio D. Perez, Bappaditya Mandal, Johan Liden, Christian Rohner, Thiemo Voigt, Robin Augustine

High-Gain Multi-Linear Polarization Reconfigurable Antenna in the Millimeter-Wave Band 2880
Shu-Lin Chen, Yanhui Liu, Dingzhao Chen, Y. Jay Guo

Height of the 0°C Isotherm and the Melting Layer in Madrid: Comparison of Estimations from Different Sensors 2884
Ana Benarroch, Gustavo A. Siles, Jose Manuel Riera

Decoupling Between Multiple Planar Inverted-F Antennas Without Adjusting Antenna Configuration 2889
Quang Quan Phung, Naobumi Michishita, Hiroshi Sato, Yoshio Koyanagi, Hisashi Morishita

A Compact, Tri-band and Circularly Polarized Patch Antenna Using a Ferrite Material 2894
S. Jemmeli, T. Monediere, E. Arnaud, L. Huitema

Experimental validation of automotive OTA measurements at close distance 2899
A. Scannavini, F. Mioc, K. Rutkowski, M. Mercier, F. Saccardi, L. J. Foged

Ultrathin Metamaterial-Inspired Huygens Dipole Antenna and Rectenna Arrays for Wireless Power Transfer Enabled IoT Applications 2903
Wei Lin, Richard W. Ziolkowski

Electrically Small Antenna with Embedded Operational Amplifier Circuit Surpasses the Passive Upper Bound of the Gain-Bandwidth Product 2907
Yaqing Yu, Ming-Chun Tang, Da Yi, Dingmou Hong, Ting Shi, Richard W. Ziolkowski

Performance Assessment of a UHF-RFID Robotic Inventory System for Industry 4.0 2912
Andrea Motroni, Fabio Bernardini, Sacha Vaiani, Alice Buffi, Paolo Nepa

Spatial Domain Indirect Holography for Phaseless Microwave Imaging 2917
Sandra Costanzo, Giuseppe Lopez, Giuseppe Di Massa

Feeder System Design for OLAF SAR Instrument 2921
Carlos Biurrun-Quel, Quiterio Garcia-Garcia, Carlos Del-Rio

Outage Performance of Cooperative Satellite Diversity System Using Two Aerial Regenerative Relays 2926
Konstantinos. P. Psychogios, Athanasios. D. Panagopoulos

A 60 GHz-Band 4×4 Butler Matrix Based on Ridge Gap Waveguide 2931
Davood Zarifi, Ali Farahbakhsh, Ashraf Uz Zaman

Design of a Low Frequency and Wide Band Reflector Antenna Feed for Future Earth Observation Radiometers 2934
Ruben Caballero Nagore, Josep Closa Soteras, Tamara Coello Garrido, Kerlos Atia Abdalmalak, Luis Enrique Garcia Munoz, Aitor Martinez Agoues

Intelligent Design of Metamaterials via Machine Learning Techniques 2939
Che Liu, Tie Jun Cui

Substrate Integrated Waveguide Based Compact Multiband and Broadband Antennas at X / Ku-Bands 2943
Soumik Dey, Sukomal Dey

A NLOS Detection Method Based on Kernel Principal Component Analysis 2948
Tiantian Chang, Wei Wang

Exponential correlation model for electric field intensity in reverberation chambers 2952
Carlo Carobbi, Ramiro Serra

3D Printed Discrete Dielectric Lens With Improved Matching Layers 2957
Juan Andres Vasquez-Peralvo, Jose Manuel Fernandez-Gonzalez, Thomas Wong

A Novel PIFA Antennas Design With Capacitive Load for Glacier Monitoring Applications 2962
Martina Lodigiani, Nicolò Delmonte, Marco Pasian

Analysis of Antenna Radiation Patterns by Means of Spherical Wavelets 2965
Alice Quennelle, Alexandre Chabory, Philippe Pouliguen, Romain Contreres, Gwenn Le Fur

A Series-Fed Loop Array Antenna with Wideband Circular Polarization and Enhanced Gain 2970
Kazuhide Hirose, Ryuga Matsumoto, Yusuke Kanda, Hisamatsu Nakano

A Pattern Reconfigurable Compact Antenna Structure Based on Shorted Microstrip Patches 2974
Feza Turgay Celik, Lale Alatan, Ozlem Aydin Civi

Eigenanalysis-based Port Synthesis of Multifeed Antenna for Power Combining 2978
Sirous Bahrami, Wonbin Hong, Ho-Jin Song

Metasurface-Enhanced Antenna for Microwave Breast Imaging 2983
E. Razzicchia, A. Janjic, N. Ghavami, I. Akduman, M. Cayoren, P. Kosmas

One-way Doppler and Interferometry: Space Domain Awareness 2988
Jean-Francois Guimond, Simon Henault, Kathia Levis

Off-grid Compressive Sensing Based Channel Estimation with Non-uniform Grid in Millimeter Wave MIMO System 2993
You You, Li Zhang

Characterization of EMF Exposure in Massive MIMO Antenna Networks with Max-Min Fairness Power Control 2998
Maarouf Al Hajj, Shanshan Wang, Joe Wiart

Mobile Network Testing of 5G NR FR1 and FR2 Networks: Challenges and Solutions 3003
Christoph Hausl, Julian Emmert, Manuel Mielke, Benjamin Mehlhorn, Corbett Rowell

A Compact Wideband Circular Polarized Antenna for Automotive GNSS Applications 3008
Zafer Toprak, Stefan Lindenmeier

Cross polarization in swept beam THz imaging systems using off-axis parabolic mirrors 3013
Pouyan Rezapoor, Aleksi Tamminen, Irina Nefedova, Juha Ala-Laurinaho, Nuria Llombart, Helena Rodilla, Jan Stake, Zachary Taylor

A fully-screen printed, multi-layer process for bendable mm-wave antennas 3017
Zubair Akhter, Weiwei Li, Yiyang Yu, Atif Shamim

RF Performance of USRP TwinRX Daughterboard Under Influence of Strong Interferers 3022
Maximilian Engelhardt, Carsten Andrich, Alexander Ihlow, Giovanni Del Galdo

Large DUT Testing in FR2 MIMO OTA 3027
Jukka-Pekka Nuutinen, Doug Reed, Alfonso Rodriguez-Herrera

Preliminary Design of a Double Ridge Waveguide Device for Monitoring the Complex Permittivity of Carasau Bread Doughs 3032
C. Macciò, M. B. Lodi, N. Curreli, L. Mariani, A. Melis, M. Simone, G. Muntoni, G. Mazzarella, M. Bozzi, A. Fanti

Wideband Co-Polarized Antenna System for in-Band Full-Duplex Applications 3037
Di Wu, Ruina Lian, Bing Xiao, Bo Wang, Min Li, Yujiang Wu, Kwan Lawrence Yeung

3D printed DRA for S-band IoT from Space applications 3041
Fabien Ferrero, Thao Nguyen, Trinh Le Huy, Julien Sourice, Romain Faye, Guillaume De Calan

Verification of RTK Positioning of UAVs with High-Precision Laser Tracker 3044
Patrick Henkel, Markus Lamm, Ulrich Mittmann, Torsten Fritzel, Rudiger Strauss, Hans-Jurgen Steinert, Matthias John

Stub-Loaded Sub-Terahertz Wideband Antenna Design and Measurement 3049
Dongjin Jung, Chan Ju Park, Jung Woo Seo, Taek Sun Kwon, Jun Gi Jeong, Sang-Hyuk Wi, Ilju Na, Sunghyun Choi

Reduction of Sidelobe Level for Dual Frequency and Dual Polarization Reflectarray 3053
Hiroshi Hashiguchi, Naobumi Michishita, Hisashi Morishita, Hiromi Matsuno, Takuya Ohto, Masayuki Nakano

Wideband Circularly Polarized Antenna with Enhanced Gain and Wide Beamwidth for Energy Harvesting Applications 3058
Yassmeen M. Afify, Ahmed Allam, Asano Tanemasa, Adel B. Abdel-Rahman

Characterization of 5G K-band Array Antennas 3063
Thomas Harz, David Ulm, Thomas Kleine-Ostmann

Space-Time-Coding Digital Metasurfaces for New-Architecture Wireless Communications 3066
Lei Zhang, Xiao Qing Chen, Qiang Cheng, Tie Jun Cui

Multi-standards Slot-based Antenna Design for NB-IoT and LTE-M Applications 3070
Rifaqat Hussain, Mohamed Abou-Khousa, Muhammad Umar Khan, Mohammad S. Sharawi

High aperture efficiency 3D-printed radial GRIN lens 3073
Anastasios Paraskevopoulos, Ilir Gashi, Matteo Albani, Stefano Maci

Low-cost Setup for Electromagnetic SAR Evaluation in a Human Phantom 3078
S. I. Rodriguez, A. Gallego, E. Pineda, J. C. Vargas, M. R. Perez, F. Roman, J. L. Araque

Development of Ultra-Wideband Textile-Based Metamaterial Absorber for mm-wave Band Applications 3083
Gokberk Akarsu, Hany Taher, E. Buse Zengin, Mohammed Farouk Nakmouche, Diaa E. Fawzy, A. M. M. A Allam, Frances Cleary

A Wideband Magneto-Electric Dipole Transmitarray for Linear to Circular Polarzation Conversion 3088
Jun Hu, Hang Wong

ClothFace: Battery-Free On-body Interface Platform for Future Human-Machine Interaction 3091
Xiaochen Chen, Han He, Adnan Mehmood, Pasi Raumonen, Mirka Leino, Sari Merilampi, Johanna Virkki

Analysis of Instantaneous and Maximal RF Exposure in 4G/5G Networks With Dynamic Spectrum Sharing 3096
Lisa-Marie Schilling, Christian Bornkessel, Matthias A. Hein

Angular Characteristics Prediction of Radio Propagation Channel from Point Cloud Data by Aperture Field Integration Method 3101
Kentaro Saito, Chechia Kang, Jun-Ichi Takada

RNN Based Prediction of Path Loss Fading Distribution by Interval Estimation 3106
Motoharu Sasaki, Nobuaki Kuno, Toshiro Nakahira, Minoru Inomata, Wataru Yamada, Takatsune Moriyama

Preliminary Study of Bone Tumors Hyperthermia at Microwaves Using Magnetic Implants 3111
M. B. Lodi, N. Curreli, C. Macciò, E. Marongiu, L. Mariani, A. Fanti, M. Bozzi, G. Mazzarella

Preliminary Study of a Lens Antenna for a Solar Power Satellite 3116
Ricardo A. M. Pereira, Nuno Borges Carvalho

Anatomical and Dielectric Tissue Mimicking Phantoms for Microwave Breast Imaging 3121
Eliana Canicattì, Giulia Monacelli, Daniel Alvarez Sanchez-Bayuela, Alessandro Vispa, Lorenzo Sani, Agostino Monorchio, Gianluigi Tiberi

Compact, Multiband, Flexible Decagon Ring Monopole Antenna for GSM/LTE/5G/WLAN Applications 3125
Jayshri Kulkarni, Abdullah G. Alharbi, Chow-Yen-Desmond Sim, Jaume Anguera

Radio Transparency Control of Road Electromagnetic Barriers for C-V2X Communications 3130
Bruno Tribovane, Rafael Caldeirinha

2-bit Digital Anisotropic Low-RCS Metasurfaces with Puzzles'-type Modules with Improved Diffusion Scattering 3134
Andrey Semenikhin, Diana Semenikhina

High-Gain Wideband and Superdirective Electronically-Beam-Switchable Antenna for Smart Communication Objects 3137
Lotfi Batel, Antonio Clemente, Christophe Delaveaud

Accurate Ranging Exploiting a 32-patch Frequency Diverse Array with Circular Symmetry 3142
Enrico Fazzini, A. Baris Gok, Alessandra Costanzo, Diego Masotti

Bessel Beam Radiating System for Focused Transcranial Magnetic Stimulation 3147
Sabrina Rotundo, Danilo Brizi, Agostino Monorchio

Wearable Slotted Waveguide Textile Antenna 3151
Davorin Mikulic, Evita Sopp, Davor Bonefacic, Zvonimir Sipus

Author Index