

2017 XI International Conference on Antenna Theory and Techniques (ICATT 2017)

**Kyiv, Ukraine
24-27 May 2017**



**IEEE Catalog Number: CFP17540-POD
ISBN: 978-1-5386-2922-2**

**Copyright © 2017 by the Institute of Electrical and Electronics Engineers, Inc
All Rights Reserved**

Copyright and Reprint Permissions: Abstracting is permitted with credit to the source. Libraries are permitted to photocopy beyond the limit of U.S. copyright law for private use of patrons those articles in this volume that carry a code at the bottom of the first page, provided the per-copy fee indicated in the code is paid through Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923.

For other copying, reprint or republication permission, write to IEEE Copyrights Manager, IEEE Service Center, 445 Hoes Lane, Piscataway, NJ 08854. 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:	CFP17540-POD
ISBN (Print-On-Demand):	978-1-5386-2922-2
ISBN (Online):	978-1-5386-2921-5

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

CURRAN ASSOCIATES INC.
proceedings
.com

Contents

Invited papers

- 1. Measurements of non-linear sub-THz quasi-optical devices**
Rostyslav F. Dubrovka, Oleksandr Sushko, Melusine Pigeon, Peter Lawrence Alizadeh, Andre Sarker Andy, Robert Donnan, Clive Parini, James W.E. Kneller, Theo Kreouzis 9
- 2. Two approaches to solving the antenna synthesis problems according to the amplitude radiation pattern**
Mykhailo I. Andriychuk 14
- 3. Ultrawideband tapered slot, waveguide and dipole antenna arrays**
F. F. Dubrovka, Sergiy Ye. Martynyuk, D. O. Vasylenko, O. S. Postulga 20
- 4. Introducing quasi-optical terahertz circular dichroism spectroscopy**
Junyi Qui, Oleksandr Sushko, Yang Zeng, Bin Yang, Richard Pickersgill, Robert S. Donnan 26
- 5. Recent advances in computational electromagnetics for microwaves in IRE NASU**
Anatoliy A. Kirilenko, S. A. Steshenko, L. P. Mospan, D. Yu. Kulik, A. O. Perov 30
- 6. Antenna pattern measurements: UWB impulse and multifrequency signals comparison**
G. P. Pochanin, O. A. Orlenko, V. P. Ruban, V. G. Korzh, M. V. Andreev, Oleg O. Drobakhin 36
- 7. Tuning range of microwave devices with micromechanical control**
Victor Kazmirenko, Yuriy V. Prokopenko, Yuriy Poplavko 40
- 8. Millimeter-range radiometric system for perspective problems of meteorology and telecommunication**
V. V. Pavlikov, N. V. Ruzhentsev, A. D. Sobkolov, A. I. Tsopa, D. S. Sal'nikov 46
- 9. Adaptive methods of control for signals in the digital channels of the troposphere communication**
Volodymyr I. Rudakov 52
- 10. Achievements in antennas research at Lviv polytechnic national university**
Viktor V. Hoblyk, V. A. Pavlysh, N. M. Hoblyk, Ye. I. Yakovenko, O. M. Liske, I. V. Nychai, D. V. Nevinskyi, D. A. Nikolayev, I. Yu. Teplakov 58
- 11. Radome integrated slotted waveguide antennas**
Stanislav S. Sekretarov, D. M. Vavriv 64

12. Modeling and optimization of microwave heating in cylindrical volumes

Gennadiy A. Morozov, Vladimir I. Anfinogentov, Oleg G. Morozov, Sergey V. Smirnov, Svetlana R. Ganieva 68

13. Nonlinear composite media on opal matrixes and metalocarbon nanostructures

Gennady P. Sinyavsky, Dmitry A. Bezuglov, Larissa V. Cherckesova, Georgy N. Shalamov 74

14. X-ray optics: Transmission diffractive patterns of large microchannel plates

Aleksander M. Lerer, M. I. Mazuritskiy N/A

General antenna theory, propagation, numerical and analytical methods

15. Numerical solution of nonlinear spectral problems in sythesis theory of antennas with flat aperture

Petro O. Savenko, Myroslava Tkach 84

16. Near-field calculation for reflector antenna with shape of asymmetrical cutting from a paraboloid of revolution

Sergey V. Nechitaylo, Oleg I. Sukharevsky, Vitaly A. Vasilets 88

17. Radiation Fields of a Radial Dipole Located on a Metal Sphere Coated by a Layer of Metamaterial

Yuriy M. Penkin, Victor A. Katrich, Mikhail V. Nesterenko, Sergey L. Berdnik, Svetlana V. Pshenichnaya 92

18. Electromagnetic near-field of circumferential slot cut in coaxial line shield

V. A. Lyashchenko, N. V. Medvedev, A. V. Olefir 96

19. Electromagnetic Fields in the Near Zone of Aperture Antennas with Round Opening

Nikolay N. Gorobets, Ye. Ye. Ovsyannikova 100

20. Directional properties of linear and V-antennas

Boris Levin 104

21. Director Antenna with In-Phase Currents

Boris M. Levin 110

22. Log-periodic antennas with in-phase currents

Boris M. Levin 114

- 23. Artificial Neural Networks in Time Domain Electromagnetics**
Oleksandr M. Dumin, S. Khmara, D. Shyrokora 118
- 24. Airy pulse transformation on time-spatial jumps of refractive index**
Alexander G. Nerukh, O. V. Kuryzheva N/A
- 25. Excitation of the nonmagnetic isotropic media with linear dependence characteristic impedance along the direction of plane wave propagation**
O. Sh. Dautov 125
- 26. Analysis of Axially Symmetric Diffraction Grating**
Maxim N. Legenkiy 128
- 27. Performance Evaluation of an Improved ITU-R rain attenuation prediction model over Malaysia Equatorial Region**
Folasade Abiola Semire, Rosmiwati Mohd-Mokhtar, Isaac Akinwale Akanbi N/A
- 28. Active and Reactive Energy of Electromagnetic Waves**
Victor I. Naidenko 135

Antenna arrays, adaptive and smart antennas

- 29. Odd Symmetry of Weights Vector in Linearly-Constrained Adaptive Arrays with Desired Signal**
Victor I. Djigan 140
- 30. Analysis and optimization of the decoupling in antenna systems consisting of antenna arrays**
Vladimir N. Lavrushev, A. I. Murtazina 145
- 31. Frequency and Pattern Reconfigurable Antenna Array Based on Liquid Crystal Technology**
Yi-Zhe Zhao, An-Yong Qing N/A
- 32. Radiation, scanning and matching characteristics of the new design of phased antenna array of printed bow-tie dipoles**
F. F. Dubrovka, Oleg E. Vydalko, V. I. Gouz 151
- 33. Cylindrical antenna array development and measurements for DOA-estimation applications**
Yu. B. Nechaev, Ilia W. Peshkov, N. A. Fortunova 155
- 34. Random incoherent antenna arrays focused in the near field zone**
Denis A. Vedenkin, Aydar R. Nasybullin, Yuri E. Sedelnikov 159

- 35. Mutual coupling influence on parameters of arc E-plane antenna array of vibrator radiators**
Siarhei Zavadski 162
- 36. Radiation pattern of linear antenna array with control of directivity and super-selectivity properties**
V. M. Koshevyy, Anna A. Shevchenko N/A
- 37. Planar Ku band antenna for perspective telecommunication facilities**
Viktor I. Klassen, Evgeniy Yu. Oleinik, Yuri E. Sedelnikov, Mokhamed Shaaban 169
- 38. W Band Patch Antenna Array for Maglev Smart Grid Technology**
Alexey B. Gnilenko, Sergey V. Plaksin N/A
- 39. Evaluating the influence of intrasystem perturbations of the observations covariance matrix on the DF response of adaptive antenna array**
Valery V. Skachkov, Victor V. Chepyki, Alexander N. Efymchykov, Hennadii D. Bratchenko, Vladislav I. Pavlovich 174
- 40. Spatial Distribution of the Amplitude of Electromagnetic Waves in the Near Zone of Linear and Flat Antenna Arrays**
Nikolay N. Gorobets, A. S. Lebedev, A. A. Elizarenko 180
- 41. Electrodynamics algorithm of calculation of horns phased antenna array**
V. Morozov, V. I. Magro, M. Hnatyuk 183
- 42. Effect of the Ground Screen on Sensitivity of Low-Frequency Radio Telescope Array Element**
Peter L. Tokarsky, Alexander A. Konovalenko, Serge N. Yerin 186
- 43. Array of the two arc monopoles on a sphere with surface impedance**
V. M. Dakhov, S. L. Berdnik, N. K. Blinova, Yu. M. Penkin 190
- 44. Features of photonic beamformer model based on DWDM approach and fiber dispersion**
S. I. Ivanov, A. P. Lavrov, Igor I. Saenko 194
- 45. Choice of number, structure and placement of compensation modules in the radar with planar PAA**
V. P. Riabukha, D. I. Lekhovytskiy, A. V. Semeniaka, Y. A. Katiushyn 197
- 46. Origins of the digital antenna array theory**
Vadym I. Slyusar 199

UWB, low-gain, communication and printed antennas

47. Variants of the double-frequency GPS antennas

A. A. Galischuk, V. M. Maslyey, O. L. Ol'shevs'kiy, Y. D. Romanenko, V. V. Zaznabin 202

48. Near field zone of the UWB bow-tie dipoles

A. A. Orlenko, L. A. Varianytsia-Roshchupkina 206

49. Combining electric and magnetic dipoles in the construction of antennas

V. A. Katrich, A. I. Karpov, S. A. Yarmolchuk, N. A. Syvozalizov, Ye. Antonenko N/A

50. Modeling of ultra-wideband antennas for multi-purpose broadband systems

S. V. Bukharov, V. D. Ryabchiy 213

51. Active loop sensor for receiving pulse magnetic fields of nanosecond duration

P. V. Kholod, T. N. Ogurtsova 221

52. SNRs of Two Active Antenna Designs: Inverted V vs Horizontal Dipole

Alexander A. Konovalenko, Peter L. Tokarsky, Igor N. Bubnov, Serge N. Yerin 224

53. Active antenna with switchable beams for wireless sensor networks and IoT

J. M. Rigelsford, H. Hussein, Radhwan J. Alkhudhairi 228

54. Large Current Radiator for Long Range GPR Applications

Vladimir G. Sugak, Fang Gyfang N/A

55. Study of perturbing factors effect on the performance data of antennas focused in the near-field zone for microwave application problems

Yu. E. Sedelnikov, Olga V. Potapova, D. V. Nikishina 236

56. Using of Printed Antennas to Evaluate the Permittivity of Materials

S. V. Bukharov, Leonid A. Filins'kyi 239

57. Investigation of the electrodynamic characteristics of fractal double-ring antenna

T. A. Tsaliev, Kirill V. Kutsuk 242

58. Microwave irradiator in the form of a piece of rectangular waveguide with dielectric insertion and narrow slot

Natalya K. Blinova, Ludmila P. Yatsuk, Andrey V. Selutin 246

59.Characteristics of Directivity of Vibrator Antennas Placed Parallel to Flat Screen

A. A. Bulgakova, Nikolay N. Gorobets, V. A. Lyashchenko 250

60.Microstrip Antenna with Complex Configuration of Radiators

Leonid N. Lytvynenko, Sergey A. Pogarsky, Dmitriy V. Mayboroda, Artem V. Poznyakov 254

61.Miniaturized Broadband Printed Unidirectional Antenna with Parasitic Slots for Indoor Wireless Applications

Ali Houssein Harmouch, Rayane Mourad 257

62.Modeling Microstrip Antennas for UHF RFID Tags

Dmitry N. Borisov, Sergey A. Zuev 261

63.Methods for calculating electrically small wire antennas

Victor V. Ovsyanikov, Elena R. Beznosova, Victoria A. Barma, Sergei I. Veklich 264

64.Two-band circular polarization antenna for Argos-3

Alexandr A. Bezgin, Alexandr A. Savochkin 267

65.Optimization of Circularly Polarized Radiation of Inphase Crossed Impedance Dipoles with Screen

Alexey N. Gorobets, N. P. Yeliseyeva, V. A. Katrich, M. V. Nesterenko 270

Microwave components and feeds

66.Compact polarization plane rotator for arbitrary angle

Dmitry Y. Kulik, S. O. Steshenko, A. A. Kirilenko 273

67.Novel high performance coherent dual-wideband orthomode transducer for coaxial horn feeds

Fedor F. Dubrovka, Stepan I. Piltyay 277

68.Dual band feed horn for mm-wave applications

Mykola M. Lytvyn, Serhiy M. Lytvyn, Oleksandr Yu. Sushko, Yuriy A. Ovsianyk 281

69.High Performance Extended C-Band 3.4–4.8 GHz Dual Circular Polarization Feed System

Stepan I. Piltyay 284

70.Use of structure symmetry for the design of passive microstrip devices

Valeriy I. Oborzhytskyy, Ivan Prudyus 288

71.Forming the sensitive area of microwave motion sensor

Ivan N. Prudyus, V. G. Storozh, N.-V. I. Naida 291

- 72. Investigation of 3D Printed Dielectric Structure for Microwave Lens Prototyping**
Grigory K. Uskov, P. A. Kretov, V. A. Stepkin, N. S. Sbitnev, A. M. Bobreshov 294
- 73. Tunable RX filter with Ferroelectric Capacitors for DCS, PCS and IMT Communication Systems**
Alexander V. Zakharov 297
- 74. Unconventional Connection of Ferroelectric Capacitors to Resonators in Tunable Filters**
Alexander V. Zakharov 301
- 75. Fabry-Perot Resonator with Evanescent Coaxial-Sector Holes**
Yulia V. Antonenko, A. V. Gribovsky N/A
- 76. Bragg Structures with Thin Lossy Layers**
M. V. Andreev, Valentin F. Borulko, O. O. Drobakhin, D. V. Sidorov 312
- 77. Packet Suppression of a Leakage of Microwave Power from Industrial Heating Systems via the Higher Modes of Open Waveguide Ports**
Lyudmila P. Mospan, Anatoly A. Kirilenko 315
- 78. Adaptive Control of Hybrid Modes in a Longitudinally Magnetized Gyroelectromagnetic Circular Waveguide**
Illia V. Fedorin, Volodymyr I. Fesenko, Vladimir R. Tuz 318
- 79. Coupling of waveguide with resonator through diaphragm with slot with dielectric slab**
A. F. Lyakhovsky, L. P. Yatsuk, A. A. Lyakhovsky 321
- 80. Features of the dispersion characteristics of planar dielectric waveguide-grating system**
Anatolii V. Hnatovskyi, S. A. Provalov 325
- 81. Helicon isolator with quarter-wave nonreciprocal transformer**
Vladimir S. Vountesmery, Youry V. Vountesmery 328
- 82. Autodyne Effect Application for Stability Analysis of the Steady-State Mode of UHF Oscillating Systems**
Gennadiy P. Ermak, A. S. Vasiliev, V. Ya. Noskov, K. A. Ignatkov, A. P. Chupahin, S. M. Smolskiy 332
- 83. Signal Analysis of Double-Diode Autodyne**
Gennadiy P. Ermak, A. S. Vasiliev, V. Ya. Noskov, K. A. Ignatkov, A. P. Chupahin, S. M. Smolskiy 338

84. Radiofrequency Deterministic Chaos Oscillator Based on Transistor Structure with Negative Resistance. Numerical Researching

Andriy O. Semenov 343

85. Influence of the Autodyne Oscillator Coupling Degree with Antenna upon Its Transfer and Noise Characteristics

Gennadiy P. Ermak, A. S. Vasiliev, V. Ya. Noskov, K. A. Ignatkov, A. P. Chupahin, S. M. Smolskiy 348

86. Coaxial Horn Antenna and Its Usage Perspectives in Ground-Penetrating Radar Systems

Vitaliy D. Sakhatsky, Sergii Ianushkevych 354

Remote sensing antennas, signal processing and communications

87. Equipment Optimization for Weather Balloon and Ground-Based Weather Stations Using GNSS

Anatolii G. Laush 357

88. Analytical Description of Polar Coordinates of Random Vectors in Case of Arbitrary Fluctuations of Its Cartesian Coordinates

Shamil M. Chabdarov, Alexey A. Korobkov 360

89. Segmentation for Detecting Buildings in Infrared Space Images

Alexey N. Gorobets 364

90. DOA Estimation Using Beamspace Root-MUSIC Based Estimator Bank

V. I. Vasylyshyn 367

91. Remote Sensing of Plane-Layered Media with Losses Using UWB Signals

Dmitry O. Batrakov, Mariya S. Antyufeyeva, Alexandr V. Antyufeyev, Angelika G. Batrakova 370

92. Radiophotonic Method for Spectrum Analysis of SHF-Band Signals Based on Stimulated Mandelstam-Brillouin Scattering

Daniil S. Dmitriev, Oleg G. Morozov, Lutsiya M. Sarvarova, Pavel V. Gavrilov, Igor A. Makarov, Anvar A. Talipov 374

93. Identification Approach for Defining Radiosignal Frequency

Dmytro P. Kucherov, A. L. Berezkin 378

94. Radio Signal Distortion Assessment by non Directional Antennas of the Helicopter

Vladimir A. Ivanov, Olexandr S. Zadorozhniy 382

95. Method of Adaptive Selection of Channel Number in MIMO System

Andrei V. Shyshatskyi, A. G. Zhuk, S. N. Petruk N/A

96. Experimental Evaluation of the Shading Effect of Accelerating Lens in Azimuth Plane

V. M. Astapenya, V. Yu. Sokolov 388

97. Combined Antenna of Unmanned Aircraft Vehicle for Early Warning System Against Dangerous Wind Shears

Yurii N. Ulianov, Vitalii L. Misailov N/A

98. Quasi-Optical Approach to the Analysis of the Energy Model of Millimeter Wave Propagation and Antenna Characteristics

Yana A. Kremenetskaya, Igor O. Liskovskiy, Elena R. Zhukova 394

Measurements and applications of microwave technologies

99. Frequency Domain Measurement of Permeability of M400HH Ferrite Rods in the VHF Range

T. N. Ogurtsova, P. Kholod, G. Klochko, G. Pochanin, S. Berdnik, O. Dumin 398

100. Estimation of Clutters from Aircrafts during Ionospheric Measurements using Incoherent Scatter Radar with 100-meter Two-Mirror Antenna

Yakiv Chepurnyy, Leonid Emelyanov, Dmytro Iskra, Maryna Shulga 401

101. Studying the Properties of Different Materials Using Terahertz 3D Imager Radar

Mykola A. Kosovets, O. I. Pavlov, L. Tovstenko 406

102. Two-Frequency Method for Probing of Ionospheric Resonance Inhomogeneities

A. R. Nasybullin, D. A. Vedenkin 411

103. Measurement Method of the Object Surface Deflections Using Antennas Theory

O. V. Poliarus, E. O. Poliakov, Ya. S. Brovko 414

104. Parameters of Foam Layers Definition for Calculation of Reflection Coefficients

Leonid A. Filins'kyy 417

105. Investigation of Reflection in the Foamed Structures

Leonid A. Filins'kyy, V. M. Morozov 421

- 106. Radiophotonic Method for Instantaneous Frequency Measurement Based on Principles of “Frequency-Amplitude” Conversion in Fiber Bragg Grating and Additional Frequency Separation**
Alexander A. Ivanov, Oleg G. Morozov, Vladimir A. Andreev, Artem A. Kuznetsov, Lenar M. Faskhutdinov 425
- 107. Effect of the Low Energy Electromagnetic Radiation of Cell Phone Frequency (1.8 GHz, 2.4 GHz) on the Chromatin State in Cells of Human Buccal Epithelium**
Andrey Y Mudrak, Alexey A Demchenko, Nikolay N Kolchigin, Yuriy G. Shckorbatov N/A
- 108. Optimization of Microwave Heating of Dielectrics Taking into Account the Errors of the Amplitudes of the Excitation Electromagnetic Field Emitters**
Vladimir I. Anfinogentov, Gennadiy A. Morozov, Nataliya E. Stakhova, Sergey V. Smirnov, Svetlana R. Ganieva 433
- 109. Investigation of Processing of Dense Oily Sludge Using Microwave Energy**
Denis A. Vedenkin, Dmutry E. Sharonov 437
- 110. Retrieving the Reflection Coefficient of a Sample from the Frequency Response of a Special Open Resonator**
Yu. I. Choni, A. G. Romanov, V. N. Lavrushev 440
- 111. Technology of Wireless Transmission of Energy to Remote Objects Based on Multi-Frequency System of Transmitters**
Igor Yurievich Grishin, Rena R. Timirgaleeva, Sergey Vl. Titov, Yelena V. Titova 443