

2017 XXIInd International Seminar/Workshop on Direct and Inverse Problems of Electromagnetic and Acoustic Wave Theory (DIPED 2017)

**Dnipro, Ukraine
25-28 September 2017**



**IEEE Catalog Number: CFP17458-POD
ISBN: 978-1-5090-0606-9**

**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:	CFP17458-POD
ISBN (Print-On-Demand):	978-1-5090-0606-9
ISBN (Online):	978-1-5090-0605-2
ISSN:	2165-3585

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

Table of Contents

Plenary Session

<i>A. I. Nosich</i> , Dramatic History and Impact of Decimeter-Wave Radar “Zenit” Developed in Kharkiv in the 1930s	11
<i>O. O. Drobakhin</i> , Timeline of Department of Applied and Computer Radiophysics of Oles Honchar Dnipro National University (50-year anniversary)	15
<i>P. Prokopiou, N. L. Tsitsas</i> , Low-frequency Inverse-Source Algorithms for Spherical Media.....	20
<i>V. Tabatadze, B. Baratashvili, I. Petoev, R. Zaridze</i> , Tunnel Detection and Visualization Using the Method of Auxiliary Sources	25
<i>L. Gheonjian, T. Paataashvili, G. Kapanadze</i> , ELF Radio Emission Associated With Strong M6.0 Earthquake	29

Diffractiⁿ and Scattering

<i>A. I. Nosich, M. V. Balaban, V. O. Byelobrov, D. M. Natarov, T. L. Zinenko</i> , Basic Ideas and Advantages of the Method of Analytical Regularization in Computational Optics - (invited)	33
<i>A. B. Gnilenko, V. I. Magro</i> , Method of Partial Overlapping Regions for Solving Electromagnetic Problems	36
<i>N. P. Yeliseyeva, V. A. Katrich, M. V. Nesterenko</i> , Resonant Characteristics of Impedance Monopole Placed on Flat Infinite Metal Screen	42
<i>B. Levin</i> , Calculating Fields of Three-dimensional Structures	47
<i>M. V. Andreev, O. O. Drobakhin, N. P. Stognii, N. K. Sakhnenko</i> , Fractional-Rational Representation of the Frequency Spectrum of the Scattered Field for a Drude-Metal Nanowire Resonating on Localized Surface Plasmons	53
<i>N. Sydorchuk, S. Prosvirnin</i> , Analysis of Terahertz Wave Reflection by an Array of Double Dielectric Elements Placed on a Reflective Substrate	58
<i>S. L. Berdnik, Yu. M. Penkin, V. A. Katrich, M. V. Nesterenko</i> , Diffraction Radiation of a Slot into a Space over an Impedance Screen	64

Acoustics and Applications

<i>G. I. Koshovy</i> , Mathematical Models of Acoustic Wave Scattering by Impedance Strip	71
<i>A. Taranchuk, S. Pidchenko</i> , Diagnosis Methods of Cardiovascular Disease, Based on the Acoustic-Mechanotron Principle of Pulse Wave Sensing	75

<i>V. Chekurin, O. Khymko</i> , A Mathematical Model for Propagation of Long Acoustic Waves in The Flow of a Gas Pipeline	N/A
<i>L. A. Frolova, O. I. Kushnerov, A. V. Derimova</i> , Synthesis of Cobalt Ferrite Nanoparticles by Ultrasonic Wave-Assisted Technology	84
<i>V. Z. Stankevych, I. O. Butrak</i> , SH-Wave Diffraction on a Crack in Two-Layer Composite .	N/A

Waveguide and Layered Structures

<i>L. Angermann, V. V. Yatsyk, M. V. Yatsyk</i> , Methods for the Analysis of Wave Scattering and Generation by Layered and Periodic Structures	93
<i>I. Petoev, V. Tabatadze, M. Prishvin, R. Zaridze, G. Afridonidze</i> , Application of the Method of Auxiliary Sources to Toroidal Resonator Study	97
<i>E. A. Gevorkyan</i> , On the Theory of Propagation of Electromagnetic Waves in a Waveguide with Multiperiodically Modulated Filling	100
<i>M. V. Maiboroda, V. L. Pazynin, H. O. Sliusarenko</i> , Electromagnetic Pulses Compression in Helically Coiled Dielectric Waveguide	104
<i>Y. V. Antonenko, A. V. Gribovsky</i> , The Fabry-Perot Resonator with Coaxial-Sector Apertures and Waveguide Loads	108
<i>V. M. Kochin, D. V. Mayboroda</i> , The Research of Eigenmodes of Magnetodielectric Layer, Screened by an Isotropic Impedance Surface	N/A
<i>N. Yashina, A. Brovenko, N. Melezhik, P. Melezhik, A. Poyedinchuk, O. Troshchylo</i> , 1D Inverse Problems of Electromagnetic Theory of Layered Inhomogeneous Anisotropic Media	118
<i>S. L. Berdnik, V. A. Katrich, V. I. Kiyko, M. V. Nesterenko, Yu. M. Penkin</i> , T-junction of Rectangular Waveguides with Monopole-Slot Coupling Structure and Elements Coated by a Metamaterial	123

Inhomogeneous Media

<i>Yu. O. Averkov, Yu. V. Prokopenko, V. M. Yakovenko</i> , Interaction a Tube Beam of Charged Particles with a Dispersive Medium of Cylindrical Configuration - (invited)	131
<i>K. G. Zloshchastiev</i> , Quantum-statistical Description of Electromagnetic Waves in Dissipative Media	137
<i>V. N. Gorev, A. I. Sokolovsky</i> , On the Kinetics of a Many-Body Dissipative System Placed in a Random Field	142
<i>V. O. Pashchenko, V. S. Khandetskyi, N. V. Karpenko</i> , Dissipative Losses at Nonstationary Electromagnetic Probing of Orthotropic Low-conducting Composites	148

<i>V. O. Brzhezytskyi, M Y. Laposha, V. V. Mykhailenko, Y. V. Peretyatko</i> , Mathematical Model of the Compensating High Frequency Line Reactor	152
<i>V. A. Katrich, V. A. Lyashchenko, N. V. Medvedev, A. V. Olefir</i> , Electromagnetic Near-Field of Arc Slot, Cut in Coaxial Line Shield	157
<i>E. Shulga, A. Poedinchuk, I. Kuzmichev, A. Popkov</i> , Interaction of Eigen Oscillations in a Cylindrical Cavity with Composite Material	162

EM Field Application

<i>L Gheonjian, T. Paatashvili, G. Kapanadze, L. Bebiava, R. Kereselidze, A. Rikadze, D. Samkharadze, P. Tsotskolauri, I. Buzaladze, T. Dighmelishvili, G. Dolidze, S. Evajian, S. Gachechiladze, L. Giorgobiani, I. Kuprashvili, G. Lomidze, M. Oragvelidze, Sh. Rakviashvili, A. Tkhinvaleli, I. Ubiria</i> , Tbilisi State University Extremely Low Frequency Radiation Research Net (ELFTSU Net): the First Measurements at Station Locations	169
<i>V. Dzhala, A. Synyavskyy</i> , Microwave Subsurface Imaging of Inhomogeneous Dielectrics and Composite Structures	N/A
<i>T. Gavasheli, T. Gegechkori, G. Ghvedashvili, G. Mamniashvili</i> , Study of Self-healing and Self-assembly Processes in Polymer Nanocomposites Synthesized with Carbon Nanoparticles Doped by Magnetic Nanoclusters	178
<i>E. Yavolovskaya, G. Gabriadze, G. Chiqovani, R. Jobava</i> , Human Exposure Analysis for Several Different Human Voxel Models	183
<i>A. V. Gomozov, D. V. Gretskih, V. A. Katrich, M. V. Nesterenko</i> , Functional Neutralization of Small-size UAVs by Focused Electromagnetic Radiation	187
<i>O. I. Sukharevsky, G. S. Zalevsky, V. A. Vasilets</i> , Iterative Algorithm for Simulation of EM Scattering by Objects, Contained Constructive Elements of Different Electric Sizes	190

Antenna Design

<i>O. V. Pylypenko, A. V. Doronin, N. B. Gorev, I. F. Kodzhespirova</i> , Two-Probe Displacement Measurement Technique Accounting for the Antenna Reflection Coefficient	197
<i>V. M. Dakhov, S. L. Berdnik, N. K. Blinova, Yu. M. Penkin</i> , Array of the Four Arc Monopoles on a Sphere with Surface Impedance	201
<i>Ye. A. Antonenko, A. I. Karpov</i> , Small-size Antenna Array of Cylindrical Dielectric Radiators	205
<i>T. Nozadze, V. Jeladze, V. Tabatadze, I. Petoev, M. Prishvin, R. Zaridze</i> , Base Station Antenna's EM Exposure Study on a Homogeneous Human Model Located Inside the Car	209
<i>B. Levin</i> , Effect of Concentrated Loads on Characteristics of Antennas with Different Currents Distribution	214

<i>M. V. Andreev, O. O. Drobakhin, A. L. Makarov, V. O. Sydoruk</i> , Reduction of the Side-lobe Level of the Radiation Pattern of the Multielement Linear Radiator Based on a Trough Waveguide	217
---	-----

Numerical Computational Techniques

<i>O. O. Bulatsyk, N. N. Voitovich</i> , Complex Zeros of Solutions to the Synthesis Problem of Irregular Linear Antenna Array by Amplitude Radiation Pattern	223
<i>P. Savenko, M. Tkach</i> , Investigation of Nonunique Solutions in the Synthesis Problems of Radiating Systems with a Flat Aperture According to the Prescribed Amplitude Directivity Pattern	227
<i>M.I. Andriychuk, Y.F. Kuleshnyk</i> , Solving the Electromagnetic Wave Scattering Problem by Integral Equation Method	233
<i>Yu. P. Topolyuk</i> , Investigation of the Regularization Procedures in Synthesis Problems of Radiating Systems according to Power Radiation Pattern	N/A
<i>S. A. Sokolovsky</i> , On Theory Nonlinear Relaxation in Polyaron Sybsystem of Polar Semiconductors	242
<i>D. Kakulia, N. Sazandrishvili, G. Ghvedashvili</i> , Application Notes on a Lossy Medium Model in the Method of Auxiliary Sources and Solving of Eigenvalue Problems	248
<i>A. A. Breslavets</i> , Analysis of Input Pulse Parameters for Numerical Solutions of Maxwell Equations by Finite Difference Method	252
<i>M. V. Andreev, V. F. Borulko</i> , Polynomial and Rational Approximate Models of Microwave Elements	256
<i>S. F. Lyagushyn, A. I. Sokolovsky</i> , Computation Scheme for Collective Spontaneous Radiation in a Medium of Two-Level Emitters	260
<i>S. Yu. Polevoy, L. I. Ivzhenko, S. I. Tarapov, V. V. Yachin</i> , Faraday Rotation Enhancement by Gyrotropic Metasurface	264
<i>N. V. Kolomoyets, V. V. Skalozub</i> , Color Structure of Gluon Magnetic Mass	268
<i>T. Oğuzer, A. Altintas</i> , Scattering and Absorption Performance of a Microsize Graphene-Based Parabolic Reflector in the THz Range Illuminated by a Complex Line Source	273
<i>Index of Authors</i>	277