

## XXIII rd International Seminar/Workshop on Direct and Inverse Problems of Electromagnetic and Acoustic Wave Theory (DIPED-2018) Report

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The XXIII rd International Seminar/Workshop on Direct and Inverse Problems of Electromagnetic and Acoustic Wave Theory (DIPED-2018) was organized by the IEEE MTT/ED/AP Georgia and MTT/ED/AP/EP/SSC West Ukraine Chapters. This year, DIPED was held at the Ivane Javakhishvili Tbilisi State University (TSU), Tbilisi, Georgia, on September 24-27, and it was dedicated to 100<sup>th</sup> anniversary of TSU and 80<sup>th</sup> anniversary of Prof. Revaz S. Zaridze, one of founders of the DIPED Seminar/Workshop. The IEEE Ukraine Section and Pidstryhach Institute for Applied Problems of Mechanics and Mathematics, NASU, Ukraine, were the co-organizers of DIPED-2018. IEEE Electron Devices, Microwave Theory & Techniques, and Antennas & Propagation Societies provided the Technical Co-Sponsorship for the Seminar/Workshop. Prof. Revaz S. Zaridze, Chairman of the Organizing Committee, Dr. Tamar Gogua, IEEE MTT/ED/AP Georgian Chapter Secretary, and Prof. Kakhaber Tavzarashvili, IEEE MTT/ED/AP Georgian Chapter Chairman, put a lot of effort for the general and local organization of the event.

The DIPED-2018 technical program consisted of 50 papers, including 7 invited talks. Scientists from Georgia, Germany, Greece, Israel, Japan, Philippines, Poland, Russia, Tunisia, Turkey, USA, and Ukraine submitted their papers. The papers were arranged at the following sections:

- Diffraction and Scattering,
- Waveguides and Transmission Lines,
- Analytical and Numerical Techniques,
- Inverse Problems and Synthesis,
- Antenna Design,
- Medical and Geophysical Applications,
- Modeling in Electronics,
- Acoustics and Applications.



*Figure 1. Group photo of DIPED-2018 Participants before Opening Ceremony*

The DIPED-2018 Plenary Session started with invited talk “Physical Channel Models for Emerging Wireless Communication Systems” of Prof. Madhu S. Gupta, Department of Electrical & Computer Engineering, San Diego State University. The presentation was devoted to an tutorial introduction to the modeling of RF wireless communication channels. It was aimed to specialists in the diffraction and scattering community, who have no background in radio-frequency wireless communication systems. It clarified the reasoning behind the choice of parameters used in channel modeling, their utility, and their relationship to the physical phenomena taking place within the channel. The distinguishing features of the mm-wave wireless channel, expected to be deployed in future 5G cellular systems, wireless networks, and Internet-of-Things, were briefly summarized, which highlight the need for developing mm-wave channel models. The report was

listened with great attention, a number of questions were asked from the audience, and lively discussions on the subject of the report were continued in the lobby of the Conference.



Figure 2. Prof. Madhu S. Gupta giving the invited talk on the modeling of RF Wireless Communication Channels



Figure 3. Prof. Koji Nishimura presenting the last results on the De-Broadening Algorithm for Atmospheric Radar

Others plenary presentations were given by Prof. Faik Bogdanov, Dept. of Radio Engineering and Broadcasting, Georgian Technical University (GTU) and Electromagnetic Consulting and Software, EMCoS Ltd Tbilisi, Georgia (MoM Solution to Scattering Problem on Multi-Region Composite Structures with Various Type Material Junctions), Prof. Koji Nishimura, Research Organization of Information and Systems, National Institute of Polar Research, Tachikawa, Japan (A Beam De-Broadening Algorithm for Atmospheric Radar), and Prof. Irma Shamatava, Dartmouth College, Hanover, New Hampshire, USA (Accessing UXO Classification Technologies at a Challenging Live-UXO Site). All given presentations contained the results of recent research in the relevant fields and caused a substantive discussion.

A large group of regular students, Ph.D. students and young scientists attended DIPED-2018. The following participants were granted by the DIPED-2018 Best Young Speaker Award:

- Mrs. Dariia Yevtushenko (Kharkiv National University of Radio Electronics, Kharkiv, Ukraine) for the presentation “Optical Diffraction Radiation of a Beam of Particles Flowing Near a Circular Silver Nanowire”;
- Mr. Ivan Petoev (Tbilisi State University, Tbilisi, Georgia) for the presentation “Localization of the Scattered Field’s Singularities Using the Method of Auxiliary Sources”;

- Mr. Ihor Zhadynskyi (Pidstryhach Institute for Applied Problems of Mechanics and Mathematics, NASU, Lviv, Ukraine) for the presentation “Acoustic Filtering Properties of 3D Elastic Metamaterials Structured by Crack-Like Inclusions”;
- Mr. Vakhtang Barbakadze (Tbilisi State University, Tbilisi, Georgia) for the presentation “Directed Circular Polarized Antenna”;
- Mrs. Tamar Nozadze (Tbilisi State University, Tbilisi, Georgia) for the presentation “Mobile Phone Antenna’s EM Exposure Study on a Homogeneous Human Model inside the Car”.

The recipients of Award were recognized by the especial certificate from the Program Committee and financial grant from the Organizing Committee.



*Figure 4. DIPED-2018 Young Best Speaker Award Recipients (l-r): Vakhtang Barbakadze, Ivan Petoev, Tamar Nozadze, Dariia Yevtushenko, and Ihor Zhadynskyi*

Following the DIPED tradition, the conference participants spent lot of time in free lobby discussions. The concert of folk ensemble of TSU students, bus excursion to Mtsheta, first capital of Georgia, walking tour of Tbilisi were organized within the social program of the Seminar/Workshop. It was connected with acquainting with most interesting architectural sights of the Georgian capital city.

After the Seminar/Workshop technical program was completed, a traditional dinner was held. The Best Young Scientist Awards were presented there. The future improvement of the Seminar/Workshop format was discussed and participant suggestions were taken into consideration. It was announced that the next XXIVth DIPED-2019 Seminar/Workshop will be held at the Pidstryhach Institute for Applied Problems of Mechanics and Mathematics, NASU, Lviv, Ukraine, in the middle of September, 2019. The previous attendees and new participants are cordially invited.



*Figure 5. Group of DIPED-2018 Participants during the excursion tour to Mtsheta, first capital of Georgia*



*Figure 6. Farewell toast from Prof. Revaz Zaridze (l) and Prof. Madhu S. Gupta (r)*