

XIIIth International Seminar/Workshop DIPED-2008

The XIIIth International Seminar/Workshop on Direct and Inverse Problems of Electromagnetic and Acoustic Wave Theory (DIPED-2008) was organized by the IEEE MTT/ED/AP Republic of Georgia and MTT/ED/AP/CPMT/SSC West Ukraine Chapters.

The DIPED seminar series has been started in 1982, later it has revived as an IEEE event since 1995. Now this event holds annually by turn at the Tbilisi State University (TSU), Tbilisi, Georgia and Institute of Applied Problems of Mechanics and Mathematics (IAPMM), Lviv, Ukraine.



Fig. 1. Tbilisi State University – venue of DIPED-2008.

DIPED-2008 was held on September 22-25, 2008, at the Tbilisi State University, Tbilisi, Georgia. The IEEE Antennas & Propagation, Electron Devices, and Microwave Theory & Techniques Societies provided the Technical Co-sponsorship for the event. The Solid State Circuits Society, and Section Ukraine were the supporting IEEE institutions.

Prof. Revaz S. Zaridze from TSU and Prof. Nikolai N. Voitovich from IAPMM, the organizers of the Georgian and West Ukraine Chapters, were Co-Chairs of the Organizing and Program Committees. Most of the hard work for general and local organization was done by Dr. Mykhaylo Andriyчук and Dr. Tamara Gogua, the Secretaries of General and Local Organizing Committees, respectively.

The aim of the Seminar/Workshop was to provide the possibility for the efficient exchange of scientific ideas and results, and for the emergence of new friendships and international research collaboration in the area of electromagnetic and acoustic wave theory, antennas, and mathematical methods of their investigation.

Seminar was held right after the dramatical events connected with the Russian-Georgian military conflict. In the introductory word, Prof. N. N. Voitovich has expressed his anxiety for these events and read an appeal

to the international scientific community (the appeal is printed as a foreword to the DIPED Proceedings).

Because of the mentioned conflict, some participants could not come to Tbilisi. Instead, few sessions were held as Internet conferences with participants delivering their reports online from Ukraine, Russia, Germany and Israel.

The DIPED-08 technical program consisted of 35 papers including 4 invited talks. The papers were grouped at the following sections:

- Diffraction, Scattering, and Signals,
- Antenna Theory and Techniques,
- Propagation in Waveguides and Crystal Structures,
- Numerical Simulation and Inverse Problems,
- Acoustics and Signal Processing.

After opening ceremony, the plenary session was opened by presentation of Prof. Boris Z. Katsenelenbaum (Naharia, Israel, online) titled “Matching the Complex Impedance of the Body with the Field of Incident Wave”.



Fig. 2. Prof. Revaz S. Zaridze accompanying the online presentation of Prof. B. Z. Katsenelenbaum.



Fig. 3. Prof. Nikolai N. Voitovich leading the online conference from Lviv, Ukraine.

The main result of paper is that surface impedance of the body can be matched with the wave field structure in such a way that the scattered field is small in the direction opposite to that of the incoming wave as well as in the close directions. Such physical effect can find the both theoretical and practical application.

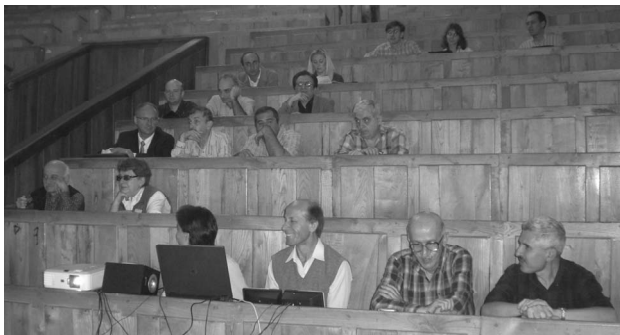


Fig. 4. Short pause between Internet presentations.

Prof. Guram Sh. Kevanishvili presented two talks about theoretical aspect and some unexpected results for simple antennas. The modern theory of the dipole antenna based on the correct solution of the Hallen's integral equation was discussed. New relation for the axial current was received. It was shown that besides of sinusoidal (classical) term, it contains new terms as well, created due field interaction of the arms of dipole.



Fig. 5. Prof. G. Sh. Kevanishvili talking about new effects of simple dipole antennas.

The system of integral equations for strict electrodynamic analysis of Uda-Yagi type antenna was derived. The unknown axial currents arising in antenna dipoles are presented by the delta-like generalized functions. The system of integral equations is reduced to system of functional (summatory) equations relative to Fourier's coefficients of axial currents. The solution of this system gives simple way to determine the currents and directivity properties of antenna.

The interesting paper "Computational Aspects of Constructing the Approximating Herglotz Functions in Inverse Scattering Problems" was presented online by

Mr. Oleg Kusyi from the Kassel University, Germany. The paper develops a novel approach to solving the body reconstruction problems at its resonant frequencies.



Fig. 6. Mr. Kusyi presenting his paper from Kassel University, Germany.

The DIPED Organizing Committee traditionally pays a significant attention to encouraging the young scientists and students. One of the ways to do this is awarding the young scientists by prizes for the best papers and presentations. This year, the following young speakers were awarded:

- Mrs. Natalia Bondarenko (Tbilisi State University, Laboratory of Applied Electrodynamics, Tbilisi, Georgia) for "Hybrid MOM Scheme with Integrated Finite Sized Equivalent Glass Antenna Model in Application to Automotive EMC Problems".



Fig. 7. Active discussion during the presentation of Natalia Bondarenko (right). Dr. David Karkashadze (center) making comments on the numerical results concerned to electromagnetic compatibility.

- Mrs. Oksana Trishchuk (Physico-Mechanical Institute, NASU, Lviv, Ukraine) for "Axial Symmetric Electromagnetic Illumination of a Finite Conical Screen by The Magnetic Ring Source".
- Mr. Mikhail Prishvin (Tbilisi State University, Laboratory of Applied Electrodynamics, Tbilisi, Georgia)

for “Numerical Simulation of Heat Transfer in Human Tissue According to Improved Vascular Structure Model”.

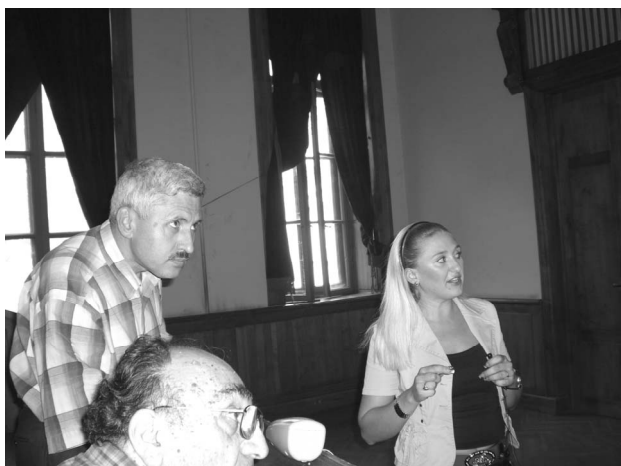


Fig. 8. Mrs. Oksana Trishchuk, recipient of the Best Young Speaker Award, explaining her results.



Fig. 9. Mr. Mikhail Prishvin (right), one more Best Young Speaker Award recipient, being in high feather after his presentation. Prof. Revaz Zaridze (left) as co-author waiting for questions.

A unique social event to visit Mtskheta - the oldest capital of Georgia was given for the DIPED-2008 participants. Placed within 30 km from Tbilisi, this beautiful rare architectural ensemble of XIth century is unique in one's own way. Standing at the confluence of the Aragvi and Mtkvari rivers, one of the oldest towns in Georgia, Mtskheta has been populated since the second millennium BC. It was the capital of the Eastern Georgian kingdom of Iberia from the third century BC. It is thought that the name "Mtskheta" comes from the name for the "father of all Georgians, the son of Kartlos - Mtskhetos". Mtskheta is designated as a UNESCO World Heritage Site and is a living museum, with many architectural and historical monuments.

We visited firstly the Jvari Church (6th-7th cc) - cross-shaped church in plan of the early Medieval Period. St. Nino erected the first wood cross at the site, at the dawn of Christianity in the 4th c. Different Caucasian Christian tribes used to come to pray.



Fig. 10. The fantastic view from the Jvari Church height.

The Svetitskhoveli - the biggest Christian temple in Georgia - was erected in the 11th c in the same place where the first Christian church in Georgia stood in the 4th c (see Fig. 9). Jesus Christ's robe is buried within the cathedral. All the interior of the cathedral is covered with mural paintings.

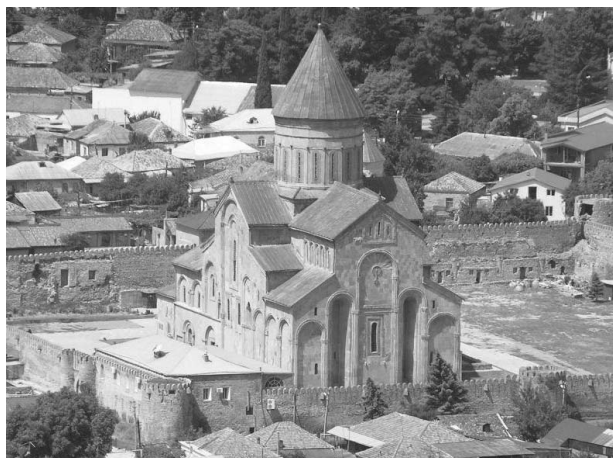


Fig. 11. The Svetitskhoveli temple from the bird's fly.

Traditional Seminar/Workshop dinner was held after completing the technical program. The Best Young Speaker Awards were granted there. The original Georgian dishes and splendiferous wine made for the beautiful sentiments and contribute for intimate friendship of participants and guests.

The next Seminar/Workshop DIPED will be held at the Institute of Applied Problems of Mechanics and Mathematics NAS of Ukraine, Lviv, Ukraine, on September 2009.



Fig. 12. The photo on memory after Closing Ceremony.

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