

XVIth International Seminar/Workshop DIPED-2011

The XVIth International Seminar/Workshop on Direct and Inverse Problems of Electromagnetic and Acoustic Wave Theory (DIPED-2011) was organized by the IEEE MTT/ED/AP/CPMT/SSC West Ukraine and MTT/ED/AP Georgian Chapters.

The DIPED Seminar started in 1982, as a form of scientific cooperation among the Institute of Radioengineering and Electronics, Academy of Sciences of USSR (Moscow); Tbilisi State University, Tbilisi (TSU), Georgia; and Institute for Applied Problems in Mechanics and Mathematics (IAPMM), Lviv, Ukraine. Its initiator and permanent leader is Prof. B. Z. Katsenelenbaum. Until 1990, it was held annually in Lviv and Tbilisi and it joined the scientists and engineers from many cities of the former Soviet Union (Moscow, Tbilisi, Lviv, Kharkiv, Chelyabinsk, Novosibirsk, Saint Petersburg, etc.).

At the beginning of the 1990s, the work of DIPED was temporarily interrupted due to non-scientific reasons. Thanks to the technical and financial support of the IEEE, the seminar was renewed in 1995 as the annual joint Seminar/Workshop of both the MTT/ED/AP/CPMT/SSC West Ukraine and the MTT/ED/AP/EMC Georgian Chapters. Its topics were expanded, and it became even more international. The peculiarities of the DIPED seminars are the following:

- The topics of discussion are defined by a group of the participants, on the basis of which a stable group rests;
- The time given up to the free lobby discussions is comparable to the time of the section discussions.

This year, DIPED was held September 25-29, 2011, at the Institute for Applied Problems in Mechanics and Mathematics (Figure 1). 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 Ukraine Section were the supporting IEEE entities.

Prof. Revaz S. Zaridze from the TSU and Prof. Nikolai N. Voitovich (Figure 2) from the IAPMM, the organizers of the Georgian and West Ukraine Chapters, were co-Chairs of the Organizing and Program Committees. Most of the “heavy lifting” for general and local organization was done by Dr. Tamar Gogua and Dr. Mykhaylo Andriyчук, the Secretaries of the Local and General Organizing Committees, respectively.

The main goals of the seminar/workshop is to provide the opportunity for effective exchange of scientific ideas and results, and the emergence of new friendships and international collaboration in research and development in the areas of electromagnetic and acoustic wave theory, antenna and



Figure 1. The DIPED-2011 participants with the IAPMM building in the background.



Figure 2. Prof. Nikolai N. Voitovich presenting the plenary paper.

waveguide structures, and mathematical methods of their investigation. The DIPED-2011 technical program consisted of 46 papers, including four invited talks. Scientists from Bulgaria, China, Georgia, Israel, Korea, Poland, Russia, USA, and Ukraine presented their papers. The papers were contributed into the following sections:

- Theoretical Aspects of Electrodynamics
- Propagation in Complex Media
- Diffraction and Scattering
- Waveguide and Layered Structures
- Antenna Synthesis and Inverse Problems

- EM Field Applications
- Acoustics, Analytical and Numerical Methods

Prof. Magdalena Salazar-Palma, 2011 IEEE Antennas & Propagation Society President, was an honorary guest of the event. The perspectives of widening the cooperation between the Antennas and Propagation Society and the Georgian and West Ukraine Chapters were discussed in the lobby of the seminar/workshop. Dr. Iryna Ivashenko, West Ukraine Chapter Chair, and Dr. Giorgi Ghvedashvili, Georgian Chapter Chair, participated actively in the exchange of views, and received a good portion of knowledge for improving Chapter activities.

After the opening ceremony, the plenary session (Figure 3) was started by the presentation of Prof. Nikolai N. Voitovich (Figure 4) in cooperation with Prof. Boris Z. Katsenelenbaum (Naharia, Israel), entitled “Optimal Dielectric Antiradar Coating for Metallic Plane and Circular Cylinder.” This discussed novel results on the problems of electromagnetic compatibility related to antenna design.

The next presentation, “Near Field of Plane Aperture,” was conducted online by Prof. Boris Z. Katsenelenbaum from

field in the whole half-space (including the near zone) by its tangential electric components given on the aperture plane. The standard technique based on the (scalar and vector) Green functions was applied to solve this non-classical problem. It was emphasized that the results were valid at any finite distance from the plane’s aperture.

One more plenary talk was presented by Dr. David Kakulia (Tbilisi, Georgia). It was devoted to a comparative analysis of the computed SAR and temperature rise due to EM exposure of a child and an adult man. The actual problem of analyzing realistic exposure scenarios for a child model by means of numerical computations was discussed. The aim was to determine and compare peak values of SAR and temperature rise for a human child model, and to compare them to results for the human adult model.

Widespread interest and active discussion stimulated the presentation of Prof. Pavlo Tymoshchuk (Lviv, Ukraine) on “Stability and Convergence Analysis of Model State Variable Trajectories of Analogue KWTA Neural Circuit.” A continuous-time mathematical model of a K-winners-take-all (KWTA) neural circuit, consisting of the state equation with discontinuous right-hand side and output equations, was discussed in detail. The model can process any finite distinct signals, with arbitrary specified minimal speed controlled by its single parameter.

A series of interesting papers concerning innovative results in antenna design was presented in the section on “Antenna Synthesis and Inverse Problems.” Dr. Son Soo Oh (ETRI, South Korea; Figure 5) discussed a simulation study for an EIRP measurement technique for base-station antennas using the Fresnel-region measurement method. A simple phase-retrieval method for magnitude data obtained in one plane was



Figure 3. The seminar/workshop audience at the plenary session.



Figure 4. Dr. V. Borulko (l) discussed electromagnetic compatibility with Prof. N. Voitovich.



Figure 5. Dr. Son Soo Oh presented a report related to an antenna measurement technique for mobile phones.



Figure 6. A photo for memories taken after the closing ceremony.



Figure 7. The start of the DIPED-2011 Seminar/Workshop dinner.



Figure 8. Mr. V. Yashchenko (r) receiving the DIPED-2011 Young Speaker Award from Prof. Magdalena Salazar-Palma.



Figure 9. Dr. Son Soo Oh (r) receiving the grant for the most-distant trip to participate in the DIPED-2011 Seminar/Workshop.

proposed for the antenna measurements. Base-station antennas installed in real environments unavoidably suffer far-field multipath interference, so the Fresnel-region measurement method is optimum. The simulation results demonstrated that the transformed far-field pattern agreed closely with the reference far-field pattern.

Dr. Lesya Klaklovykh (Lviv, Ukraine) presented a contribution on antenna synthesis with limitations in the Fresnel zone. Some specific aspects related to the electromagnetic ecology problem that leads to a decrease of the antenna's radiation in the near zone were discussed in the report.

The DIPED-2011 Seminar/Workshop attracted great attention from young scientists, students, and PhD students. Mr. Vadym Vashchenko (Zaporizhzhia National Technical University, Ukraine) was given an award for the presentation "Scattering of TE_{10} Mode in an E-Plane Waveguide Bend with Jump of Permittivity." Several papers were recognized by stimulatory grants, and were proposed for publication in the IEEE Antennas and Propagation publications.

A traditional seminar/workshop dinner (Figures 7-9) was held after completion of the technical program. The Best Young Scientist Awards were presented there. There were also discussions about the improvement of the seminar/workshop format, and proposals of the participants were taken into consideration. The original Ukrainian dishes and splendid drinks contributed to the intimate atmosphere of friendship between the participants and guests.

As it was announced by the organizers, the next DIPED Seminar/Workshop will be held at the Tbilisi State University, Tbilisi, Georgia, September 24-27, 2012.

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