

# XIVth International Seminar/Workshop DIPED-2009

The XIVth International Seminar/Workshop on Direct and Inverse Problems of Electromagnetic and Acoustic Wave Theory (DIPED-2009) was organized by the IEEE MTT/ED/AP/CPMT/SSC Chapter of the Western Ukraine and the MTT/ED/AP Chapter of the Republic of Georgia. The DIPED seminar series started in 1982. In 1995, the seminar was transformed into an IEEE event. This event is now held annually either at the Institute of Applied Problems of Mechanics and Mathematics (IAPMM), Lviv, Ukraine, or at Tbilisi State University (TSU), Tbilisi, Georgia.

DIPED-2009 was held September 21-24, 2009, at the Institute of Applied Problems of Mechanics and Mathematics (Figure 1). The IEEE Electron Devices, Antennas and Propagation, and Microwave Theory and Techniques Societies provided technical co-sponsorship for the event. The Solid State Circuits Society and Ukraine Section were the supporting IEEE institutions.

Prof. Revaz S. Zaridze from TSU and Prof. Nikolai N. Voitovich from IAPMM, the organizers of the Georgian and Western Ukrainian Chapters, were also co-Chairs of the Organizing and Program Committees. Most of the “heavy lifting” for general and local organization was done by Dr. Mykhaylo Andriychuk and Dr. Tamara Gogua, the Secretaries of the General and Local Organizing Committees, respectively.

This year, the DIPED Seminar/Workshop was dedicated to the 90th anniversary of Prof. Boris Z. Katsenelenbaum (Figure 2). His role in the birth of our Seminar and his support of its continuing existence were fundamental. Organized by his initiative as an annual informal meeting of the scientists from Moscow, Tbilisi, and Lviv, the seminar subsequently attracted scientists and engineers from other cities and even countries, and became known as an international event. His articles were included in the programs of almost all DIPED events, and presented at their sessions in one form or another. For the last ten years, he has been living in Israel. It is even more amazing that although he has been physically isolated from the scientific community there, he works especially intensely and productively. At this time, he has published three books, and is working on a fourth book. His articles appear regularly in scientific journals. During the recent Israeli-Lebanese war, he worked in his apartment in close proximity to the border (around 30 km), when the rockets flew over his apartment and exploded in front of his house. With his usual humor, he summed up: “With that precision, they will never hit.”

The main goal of the Seminar/Workshop was to provide an opportunity for the efficient and effective exchange of scientific ideas and results. It was also to provide an opportunity for the emergence of new friendships and international collaboration in research and development in the areas of electromagnetic and acoustic wave theory, antenna and waveguide structures, and the mathematical methods for their investigation. The DIPED-09 technical program consisted of 60 papers, including four invited talks. Scientists from China, Georgia, India, Israel, Poland, Russia, Turkey, USA, and Ukraine presented their papers. The papers were divided into the following sections:

- Theoretical Aspects of Electrodynamics

- Scattering and Diffraction
- Propagation in Complex Media
- Waveguide and Photonic Crystal Structures
- Inverse Problems and Synthesis
- Antennas and Antenna Arrays
- Numerical Methods
- Acoustics: Theory and Applications

After the opening ceremony, the plenary session was initiated by an online presentation of Prof. Boris Z. Katsenelenbaum (Naharia, Israel) entitled “The Problems We Choose.” This was dedicated to the problems of ethics in scientific research. The next



Figure 1. The DIPED-2009 participants, with the IAPMM building in the background.

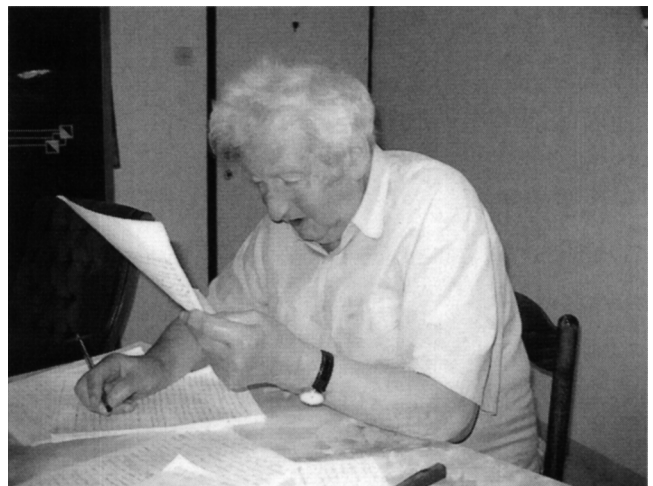


Figure 2. Prof. B. Z. Katsenelenbaum at work, Naharia, Israel, 2005.

presentation, “Contributions of B. Z. Katsenelenbaum’s Theory into High Power Microwave Electronics” was made by Prof. Mikhail I. Petelin from the Institute of Applied Physics (RAS, Nizhniy Novgorod, Russia). It was dedicated to the elegant innovations introduced by Prof. Katsenelenbaum in theoretical electrodynamics, which were effectively utilized in the development of high-power microwave (HPM) generators and amplifiers. Presently, HPM generators powered by high-current electron accelerators produce gigawatt RF pulse power. Scientists designing such generators still use the theory of Prof. Katsenelenbaum. In concluding, Prof. Petelin indicated that the current and potential future applications using the theories of B. Z. Katsenelenbaum included controlled thermonuclear plasma fusion (Figure 3), near-space radar, deep space network, microwave technology, dynamic nuclear polarization (DNP), and electron-positron colliders.

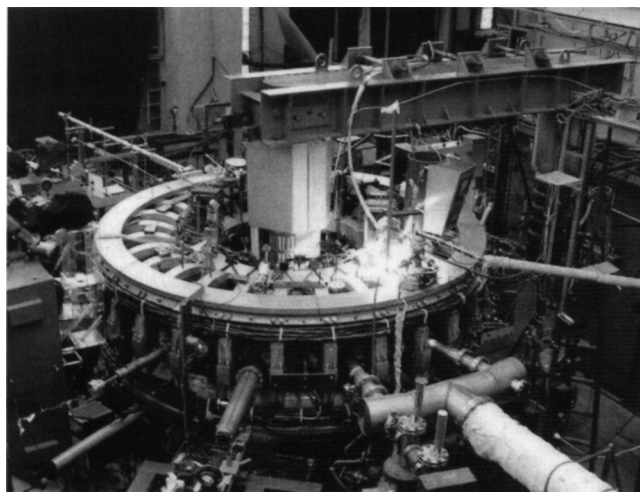
A series of interesting papers concerning innovative results in theoretical electrodynamics was presented in the section “Propagation in Complex Media.” Prof. Sergiy Vorobyov (Institute of Radioastronomy, NASU, Kharkiv, Ukraine) presented the latest results in the area of electromagnetic wave diffraction by a planar semi-infinite strip grating (Figure 4). New diffraction effects appear when the incidence angle tends to zero at some range of frequencies. It was established that due to the interference of incident waves in the near field, the amplitude of the field normally reflected from the structure’s plane is rather different in the regions over the strips, corresponding to amplitude maxima.

Prof. Boris M. Levin (Holon Institute of Technology, Israel) presented recent results related to the problems of matching feed lines and antennas. A feed line for exciting a monopole was modified in such a way that it provided behavior similar to a dipole with two feed points. Taking into consideration the mutual coupling between closely located radiators of this type, it is possible to achieve better matching between the feed line and the antenna. The use of the compensation method achieves a weak field in the area above the antenna.

Additionally, an interesting contribution was presented by Mrs. Olga Kostylyova (Figure 5). It concerned propagation phenomena in bounded periodic ferrite-dielectric structures. It was shown that surface electromagnetic waves can propagate along the contact interface. This makes it possible to control the surface waves’ properties by an external magnetic field.

The DIPED Organizing Committee traditionally pays significant attention to the professional development of young scientists and students. One way to do this is by recognition of their contributions to the work of the seminars, and by awarding prizes for the best papers and presentations. More than half of the participants (40 out of 70) attendees were young scientists, of 30 years or younger. This year, the following young participants were recognized:

- Mrs. Lali Bibilashvili (Tbilisi State University, Tbilisi, Georgia) for “Relationship Between Temperature Rises with SAR in a Head Tissue in Bandwidth Exposure” (Figure 6).
- Mr. Lyubomyr I. Kapko (Physico-Mechanical Institute, NASU, Lviv, Ukraine) for “Microwave Testing of Exfoliation in a Dielectric Plate.”
- Mrs. Olga V. Kostylyova (Institute of Radiophysics and Electronics, NASU, Kharkiv, Ukraine) for “Surface



**Figure 3. The controlled fusion plant L-2M in the GP Institute, Moscow, Russia.**



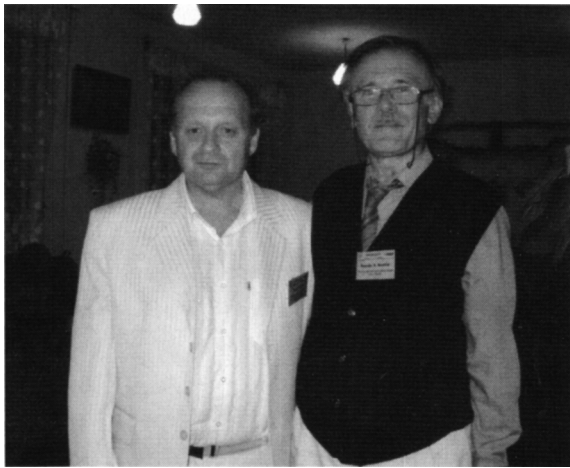
**Figure 4. Prof. Sergiy Vorobyov presented novel results concerning the diffraction effects for a planar semi-infinite strip grating.**



**Figure 5. Mrs. Olga Kostylyova presented the paper that received a Best Young Speaker Award.**



**Figure 6. Mrs. Lali Bibilashvili received a Best Young Speaker Award from Prof. Nikolai N. Voitovich, Organizing Committee Chairman.**



**Figure 7. A photo in memory of Prof. V. Yatsyk (left) and Prof. D. Kuryliak (right) at the DIPED-2009 dinner.**



**Figure 8. The group of participants who reached the High Castle in Lviv city.**

Waves on the Interface of the Periodic Ferrite-Dielectric Structure Bounded with the Semiconductor Media.”

- Mr. Sergiy G. Alexin (Dnipropetrovsk National University, Ukraine) for “Inverse Problem Solving for Layered Dielectric Structure Using Newton-Kantorovich Iterative Scheme with Increased Accuracy.”
- Mr. Evgeniy A. Antonenko (V. N. Karazin Kharkov National University, Ukraine) was recognized by the special Prof. Boris Z. Katsenelenbaum Award, established by Prof. Nikolai N. Voitovich, Chair of the Organizing Committee, for Mr. Antonenko’s presentation, “The Cell Phone Antenna Test Results.”

The traditional seminar/workshop dinner was held after completion of the technical program (Figure 7). The Best Young Scientist Awards were presented there, as well as discussions about the improvement of the seminar/workshop format, and proposals for future participants. The original Ukrainian dishes and splendid drinks contributed to the intimate atmosphere of friendship among the participants and guests.

The social events included an excursion around the city of Lviv, a unique architectural pearl of Eastern Europe. The DIPED-2009 participants had an opportunity to acquaint themselves with a great number of architectural marvels, dating back to the XIIIth century. The most attractive of all the tours was the ascent to the highest peak around Lviv (High Castle), from which a fantastic panorama of Lviv city and its outskirts was open to all the participants (Figure 8).

As announced by the organizers, the next Seminar/Workshop DIPED will be held at the Tbilisi State University, Tbilisi, Georgia, September 27-30, 2010.

(The photos incorporated in this report were presented by Olga Kostylyova and Julia Mangushina, NASU, Kharkiv, Ukraine, and Prof. Mikhail Petelin, RAS, Nizhny Novgorod, Russia.)