

16th IEEE International Conference on Mathematical Methods in Electromagnetic Theory Held in Lviv, Ukraine

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On 5–7 July 2016, the 16th IEEE International Conference on Mathematical Methods in Electromagnetic Theory (MMET*2016) took place in the fascinating and beautiful city of Lviv in western Ukraine. The conference was inaugurated in 1990, just before the dissolution of the Soviet Union, as an exchange among Ukrainian and Western scientists and engineers, and has been held in the Ukraine ever since. The majority of the participants are young Ukrainian scientists, and speakers are invited from diverse countries. The program consists of plenary presentations and special sessions, and English is the working language.

HISTORY

Lviv is known as the *city of lions*, a thriving metropolis of 1 million that borders Poland, Slovakia, and Hungary. It was founded in the 1250s and has had a complicated history (Figure 1). Since the late 19th century, Lviv has been an important force in the Ukraine's shift from the Russian Empire and, later, from the Soviet Union toward Europe. As a consequence of the hostilities in

eastern Ukraine that began in 2014, a large portion of the Ukrainian information technology industry moved its operations to Lviv. This has had an uplifting impact on the city. Visitors are greeted by a refreshing air of optimism in a friendly and pleasant city that possesses the benefits of modern technology while preserving the legacy of its distinguished history.

MEETINGS

MMET*2016 was hosted by the I. Franko Lviv National University

(LNU). The plenary sessions were held in the same great hall where the Parliament of Galicia convened before 1918. Conference participants came from

- Ukraine (61)
- Japan (6)
- Greece (5)
- Russia (5)
- Turkey (4)
- United States (4)
- Czech Republic (3)
- Georgia (3)
- Spain (3)
- China (2)



FIGURE 1. A late-medieval view of Leopoldis (Lviv), dated 1526. (Image courtesy of Wikimedia Commons.)

- Italy (2)
- France (2)
- Germany (1)
- Poland (1)
- Slovakia (1).

The proportion of international participants may be an indication of support for Ukraine during the hard times it is experiencing.

MMET is organized and sponsored by the IEEE East Ukraine Joint Chapter, which is the largest IEEE Chapter in the Ukraine. Its 95 members, who reside mostly in the city of Kharkiv, are members of a broad range of IEEE Societies, including the IEEE Aerospace and Electronic Systems Society, the IEEE Antennas and Propagation Society, the IEEE Geoscience and Remote Sensing (GRS) Society, the IEEE Electron Devices Society, the IEEE Microwave Theory and Techniques Society, and the IEEE Nuclear and Plasma Sciences Society. They enjoy long-standing friendships and collaborations with Westerners in Lviv through numerous local research communities, such as LNU, the O.Y. Usikov Institute of Radiophysics and Electronics National Academy of Sciences of Ukraine (NASU) (Kharkiv), the G.V. Karpenko Institute of Physics and Mechanics NASU (Lviv), the IEEE Central Ukraine Joint Chapter, the IEEE Ukraine Photonics Society Chapter, the IEEE West Ukraine Joint Chapter, and the IEEE Institute of Radio Engineers NASU Kharkiv Student Branch. MMET*2016 was also supported by the International Union of Radio Science (URSI) the Optical Society, TICRA, and the IEEE GRS Society.

PRESENTERS

The plenary presenters were

- Dr. Grigorios Zouros of the National Technical University of Athens, Greece, on computational methods for inhomogeneous anisotropic objects
- Prof. Mario Lucido of the University of Cassino and Southern Lazio, Italy, on analytical regularization
- Prof. Marian Marciniak of the National Institute of Telecommunications, Warsaw, Poland, on the methods and physics of beam propagation
- Prof. Kazuya Kobayashi of Chuo University, Tokyo, Japan, on parallel-plate waveguides with material loading
- Prof. Zinoviy Nazarchuk of the Institute of Physics and Mechanics NASU, Lviv, Ukraine, on integral and functional equations in dynamics
- Prof. Francisco Medina of the University of Seville, Spain, on circuit models for stacked metal gratings
- Prof. Hiroshi Shirai of Chuo University, Tokyo, Japan, on ray-mode conversion
- Dr. Vitaliy Shcherbinin of the National Science Center, National Academy of Sciences of Ukraine, on gyro devices
- Dr. Mykhaylo Tymchenko of the University of Texas, Austin, on ultrathin nonlinear metastructures
- Prof. Akira Matsushima of Kumamoto University, Japan, on integral equations for nano metal strips
- Prof. Romanus Dyczij-Edlinger of Saarland University, Saarbrücken, Germany, on finite-element models with lumped ports
- Prof. Gerard Granet of the University of B. Pascal, Clermont-Ferrand, France, on modal analysis of crossed gratings
- Prof. Alejandro Alvarez of the Politechnical University of Cartagena, Spain, on integral equations for capacitive waveguide circuits
- Prof. Koki Watanabe of the Fukuoka Institute of Technology, Japan, on scattering from cylindrical objects near corrugated surfaces
- Prof. Vladimir Schejbal of the University of Pardubice, Czech Republic, on refraction and propagation over terrain
- Prof. Alexander Ramm of Kansas State University, Manhattan, on inverse scattering with nonoverdetermined data
- Dr. Georgiy Koshovy of the Institute for Radiophysics and Electronics NASU, Kharkiv, Ukraine, on prefractal gratings of perfect electrical conductor strips
- Prof. Peter Markos of Comenius University in Bratislava, Slovakia, on resonances in dielectrics, metallics, and metamaterials
- Prof. Stephen Shipman of Louisiana State University, Baton Rouge, on dynamic resonance
- Prof. Tsuneki Yamasaki of Nihon University, Tokyo, Japan, on inhomogeneous dielectric gratings loaded with conducting strips
- Prof. Dmytro Pesin of the University of Utah, Salt Lake City, on nonlocal electrodynamics of helical metals
- Prof. Fernando Quesada of the Technical University of Cartagena, Spain, on two-dimensional periodic structures and analysis of waveguide components
- Prof. Andrey Andrenko of Sun-Yat Sen University and Shunde IJRI, China, on radiation in the near field of planar antennas
- Prof. Zbynek Raida of the Brno University of Technology, Czech Republic, on body-area networks.

PROGRAMS

Special sessions addressed eigenvalue problems, remote sensing, nano-optics and plasmonics, analytical regularization, integral equations, nonclassical electromagnetics, antenna modeling, and inverse problems (Figure 2).

The welcome reception was held at the Lviv House of Scientists (Figure 3). The 150-year-old building had been a club for horse breeders before 1918 and a casino in the 1920s and 1930s. It is an architectural monument in the city center just around the corner from LNU. The designers of the project were the renowned Viennese architects H. Helmer and F. Felner, who also designed the Odessa Opera House. They were inspired by the spirit and traditions of the palace architecture of the Central European Baroque style. This was a wonderful venue for congenial conversations around science and for seeding professional and personal relationships.

The social program included a sight-seeing tour on a minitrain around the



FIGURE 2. A special session presentation by Dr. S. Mizrakhly of Kharkiv. (Image courtesy of MMET*2016.)



FIGURE 3. The MMET*2016 welcome reception in the Lviv House of Scientists. (Image courtesy of MMET*2016.)

historical center of Lviv and a guided walking tour. For centuries, Lviv has been inhabited by multicultural populations dominated by Poles and Ukrainians, with rich German, Jewish, Armenian, and Tartar communities. The so-called Ensemble of the Historic Centre of Lviv is the only collection of buildings in Ukraine included in the United Nations Educational, Scientific, and Cultural Organization's World Heritage List.

CULTURE

Today, Lviv is the coffee capital of Ukraine. At the Coffee Mine, one can see a real miner who digs already roasted coffee beans in a dark basement using an electric tool. Mathematicians on the tour were delighted to be taken to the famed Scottish Cafe, now part of a modern hotel, where the influential mathematician Stefan Banach and friends made seminal contributions to functional analysis, and to the coffee house across the street, which Banach had frequented. Tourists learned why the buildings in the historical city have three windows, how to decipher periods of rule in the cobblestones, about the legacy that Mozart's youngest son left after two decades of musical influence in Lviv, and about the constancy of the Ukrainian language among the people.

The day after the conference, participants were invited to take the Golden Horseshoe tour around Lviv, which included visits to castles in Olesko, Zolochiv, Svirzh, and Pidhirtsi. This was a lovely way for the conference attendees to get to know one another. The history shown by the castles and the conversations surrounding it deepened the ties through shared experiences of life and humanity.

AWARDS

The MMET conference presents two awards that are named after prominent Ukrainian scientists who worked in electromagnetics in the second half of the 20th century. The 2016 recipients were Prof. Mario Lucido of the University of Cassino and Southern Lazio, Italy, upon whom was conferred the V.G. Sologub MMET Award "for contributions to the development of the method of analytical regularization," and Prof. Kazuya Kobayashi of Chuo University, Tokyo, upon whom was conferred the M.A. Klyzhnyak MMET Award "for contributions to electromagnetic theory." The recipients of the Young Scientist Paper Contest (supported by the URSI) were

- Daria Titova, Southern Federal University, Taganrog
- Dr. Oksana Trischuk, the Institute of Physics and Mechanics NASU, Lviv
- Francesca Ortolani, University La Sapienza, Rome

- Nino Tkeshelashvili, the University of Georgia, Tbilisi
- Dr. Maksim Kaliberda, Kharkiv National University
- Sergii Kukhtaruk, the Institute of Semiconductor Physics NASU, Kiev.

CONCLUSIONS

The MMET conference was organized with precision and passion, and it was an unconditional success. It was striking to witness a team who took a personal interest in both the well-being of the attendees and the scientific content of the conference. MMET is founded on a recognition that science cannot be separated from humanity. This philosophy is felt palpably and nurtured just as much by the pointed scientific discussions and debates as by the opportunities for the participants to share each other's experiences, humanity, and reasons for pursuing science.

AUTHOR INFORMATION

Stephen P. Shipman (shipman@math.lsu.edu) is a professor of mathematics at Louisiana State University in Baton Rouge. He investigates problems of spectral theory in mathematical physics and linear and nonlinear waves. He has made contributions to the mathematical theory of resonance in electromagnetic structures that underlie photoelectronic devices.