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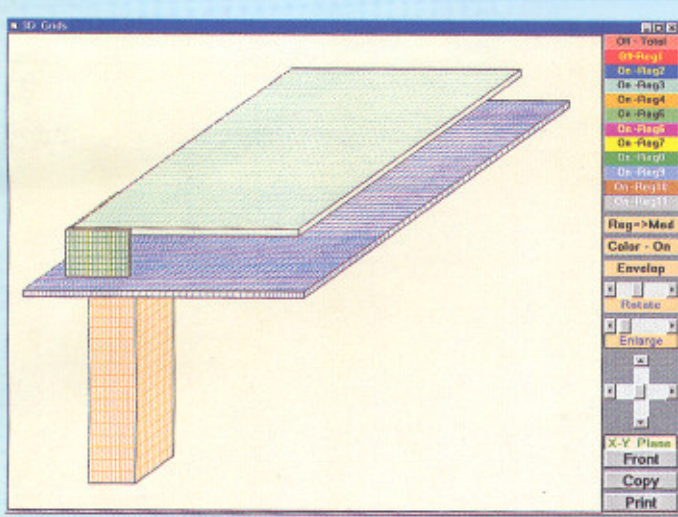
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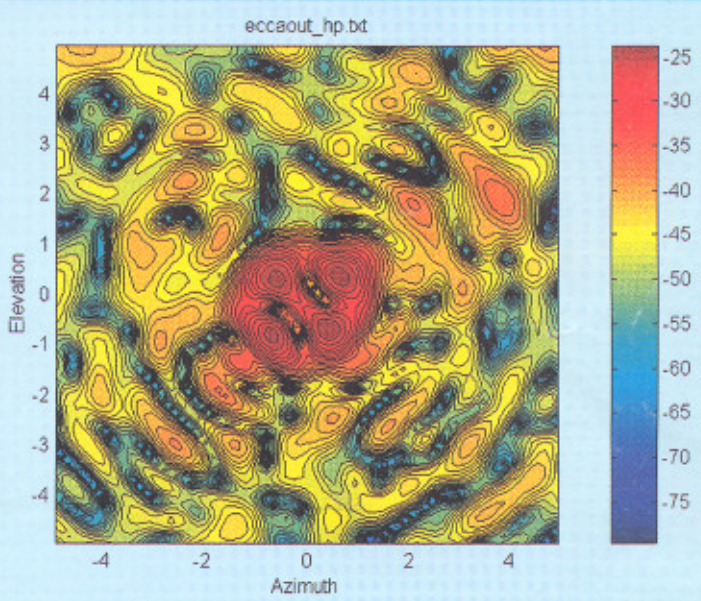
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The non-uniform, orthogonal-mesh grid pattern for FDTD analysis, produced by the program *AutoMesh*, for a U-shaped dual-frequency microstrip antenna (UDFA) for mobile communications. See the feature article by Mingwu Yang and Yinchao Chen.



A contour plot of the cross-polarized field of a six-foot-diameter reflector antenna, measured in a compact range having a focal length that was only four times the diameter of the antenna. The measurements were corrected using the Error Correction Code Algorithm. See the contribution by C.A. Rose and J.H. Cook in Don Bodnar's Measurements Column.

"Magnetic Response of a Hollow Ellipsoid"

Feature Article by Samir F. Mahmoud and James R. Wait

"AutoMesh: An Automatically Adjustable, Non-Uniform, Orthogonal FDTD Mesh Generator"

Feature Article by Mingwu Yang and Yinchao Chen

"The Third Annual Special Session on Image Reconstruction using Real Data, Part 2"

A series of mini-feature articles by Giovanni F. Crosta; P.M. van den Berg, B.J. Kooij, and R.E. Kleinman; W. Rieger, M. Haas, C. Huber, G. Lehner, and W.M. Rucker

"Mobile In-Home UHF Radio Propagation for Short-Range Devices"

Feature Article by Lambertus J.W. van Loon

A Report on MSMW'98

The Third International Kharkov Symposium "Physics and Engineering of Millimeter and Sub-Millimeter Waves" (MSMW'98) took place in Kharkov, Ukraine, on September 14-18, 1998. It was organized by the Usikov Institute for Radiophysics and Electronics of the National Academy of Sciences of Ukraine (IRE NASU); the Institute of Radio Astronomy of the National Academy of Sciences of Ukraine (IRA NASU); the Kharkov State University (KSU); the IEEE AP/ED/MTT/AESS-S Joint Chapters of Ukraine; and the Ukrainian URSI Committee. Holding such a symposium, in general, would not have been possible without the generous support of the MSMW'98 sponsors: URSI, the IEEE ED and MTT Societies, the US Army European Research Office, and the Science and Technology Center in Ukraine (STCU).

MSMW symposia were held several times in Kharkov, since 1978, as a regular Former Soviet Union meeting on millimeter and sub-millimeter waves and applications. This became a major event in this area and, since 1991, it has been well known as the International Kharkov Symposium.

Ukraine is located in the center of Europe, being the largest European country in territory, with a population of 52 million. The city of Kharkov (population about two million) was founded in 1656 as a frontier site, and has developed into an important industrial, educational, scientific, and culture center. It has a large research community, and long-standing educational traditions. There are more than 180 scientific institutions, design offices, and 21 universities and university-level colleges. The most famous of these is KSU. It is the oldest science university in Ukraine (since 1805), and it was a highly reputed university in mathematical and physical sciences in the Former Soviet Union.

The MSMW'98 sessions were held in the KSU meeting rooms. Other MSMW'98 Organizers included the IRE NASU and the IRA NASU, well-known institutions in millimeter and sub-millimeter-wave research and applications. The MSMW'98 International Program Committee included well known and respected members of the international microwave community.

The working days of the symposium were September 15 to 17; September 14 was the day of registration, and September 18 was filled with social events. Every day, the conference started with a plenary session of 40-minute invited lectures at a large auditorium. After this, four parallel, day-long sessions of 20-minute contributed papers were held. All the papers were presented in English.

The number of registered participants was 148, including 92 from Ukraine, 17 from Russia, eight from Germany, two from China, and one each from Great Britain, Japan, Belarus, Brazil, Mexico, and Turkey. In total, 198 papers out of 247 in the program were presented. The two-volume *MSMW'98 Proceedings*, containing over 800 pages in total, was published before the conference.

September 15

MSMW'98 was started at 8:30 am on September 15, 1998, with the opening ceremony at the "New Physical" auditorium of the Kharkov State University (KSU). First to address the participants was the MSMW'98 Chairman, Prof. Vladimir M.



Figure 1. A bird's-eye view of Kharkov (note: this figure and other views of Kharkov can be found via the top link at the URL: <http://www.kharkov.ua/home/>).



Figure 2. The MSMW'98 opening ceremony.

Yakovenko, Director of the Institute of Radiophysics and Electronics of the National Academy of Sciences of Ukraine (IRE NASU) and Vice-Chairman of the Ukrainian National URSI Committee. He remarked that Kharkov symposia on millimeter and sub-millimeter waves already had a 20-year history, and gained a high reputation and recognition in the Former Soviet Union (FSU) and worldwide. His speech was followed by welcoming words from the MSMW'98 Co-Chairmen: Prof. Leonid M. Lytvynenko, Director of the Institute of Radio Astronomy of the National Academy of Sciences of Ukraine (IRA NASU) and Vice-Chairman of the Ukrainian National URSI Committee; and Prof. Vasili A. Svich, Rector of Kharkov State University. They presented the main scientific developments of Kharkov radio-physicists to the

MSMW'98 participants. Next to make a welcoming speech was Dr. Valerij F. Mescheryakov, Vice-Head of Kharkov State Administration. He told the audience about the city of Kharkov, and its historical and cultural heritage. Prof. Alexander Nosich, of IRE NASU, then addressed the participants on behalf of the IEEE East Ukraine Joint Chapter of the Antennas and Propagation, Microwave Theory and Techniques, Electron Devices, and Aerospace and Electronic Systems Societies.

On the same morning, the first plenary session was held, consisting of three invited talks:

H.-G. Unger*, M. Shahabadi, and K. Schüenemann**, "A Review of the Principles of Holographic Power Combining at Millimeter and Sub-Millimeter Frequency," (*Institut fuer Hochfrequenztechnik, Technische Universitaet Braunschweig, Braunschweig; **Technische Universitat Hamburg-Harburg, Hamburg, Germany)



Figure 3. MSMW'98 Chairman Prof. Vladimir M. Yakovenko addressed the participants with opening words.



Figure 4. MSMW'98 Vice-chairman Prof. Leonid N. Lytvynenko and co-organizer Prof. Alexander I. Nosich discuss the program.



Figure 5. The MSMW'98 participants, with the Kharkov State University building in the background.



Figure 6. Prof. Hans-Georg Unger, of the Technical University of Hamburg-Harburg (Germany), talked about some nonstandard approaches in millimeter-wave engineering: holographic power combining using diffraction gratings.

R. Judaschke, K. Schüenemann, "InP Transferred Electron Devices for Power Generation at Frequency about 130 GHz," (Technische Universitat Hamburg-Harburg, Hamburg, Germany)

V. M. Yakovenko, "Transition Radiation of Charged Particles and the Possibility of Sub-Millimeter Waves Generation in Plasma Like Media," (IRE NASU, Kharkov, Ukraine)

After a coffee break, the conference continued working with four simultaneous sessions:

B. Electronics of millimeter and sub-millimeter waves, including quantum and relativistic electronics

C. Wave processes in finite-size semiconductors, solid-state structures and HTSC materials

E. Millimeter and sub-millimeter wave propagation

H. Millimeter and sub-millimeter devices based on the planar and quasi-optical transmission lines (passive and active components, antennas)

In these sessions, the following invited papers were presented:

V. D. Naumenko*, K. Schünemann**, V. Ye. Semenuta*, D. M. Vavriv*, V. A. Volkov*, "Millimeter-Wave Transmitter Using Magnetrons with Cold Secondary-Emission Cathode," (*IRA NASU, Kharkov, Ukraine; **Technische Universität Hamburg-Harburg, Hamburg, Germany)

B. G. Kutuza*, G. K. Zagorin*, A. Schroth**, A. Hombostel**, "Value Estimations of the Third Stokes-Vector Component Both Precipitation Microwave Emission and Sun Scattered Radiation Observations," (*Institute of Radio Engineering and Electronics of Russian Academy of Sciences, Moscow, Russia; **DLR, Deutsches Zentrum fuer Luft- und Raumfahrt, Institut fuer Hochfrequenztechnik, Oberpfaffenhofen, Germany)

A. A. Kirilenko, L. A. Rud', V. I. Tkachenko, L. P. Mos'pan, D. Yu. Kulik, "Integrated Software Package for Synthesis, Analysis and Optimization of Frequency-Selective Devices of Millimeter and Centimeter Waves," (IRE NASU, Kharkov, Ukraine)



Figure 7. Prof. Anatoly A. Kirilenko, of IRE NASU (Ukraine), told about the advanced single-pass CAD tools developed by his team for waveguide circuit design.



Figure 8. Prof. Peter Kordog, of the Research Center of Jülich (Germany), delivered a talk about new trends in Ga-As-based devices for the generation of millimeter and sub-millimeter waves.



Figure 9. Prof. Konstantin A. Lukin, of JRC-Ispra and IRE NASU (Italy-Ukraine), spoke about the developments of his laboratory in the field of noise radar technology.



Figure 10. Prof. Dmitro M. Vavriv, of IRA NASU (Ukraine), and Prof. Alexander A. Kuraev, of Belarus State University (Belarus).

On the same evening, at 7:30 pm, A welcoming party was organized at the university cafeteria. Before it started, MSMW'98 participants were invited for a short visit to the roof lookout space, on top of the 14-level main tower of the university building. The September weather was fine, and allowed aerial views of the city of two million, full of green trees and busy streets, to be enjoyed. At the welcoming party, Ukrainian "Champaign" was served. This event created a perfect atmosphere in which to relax and shake off the troubles of long and sometimes tiresome journeys, which participants had to undertake to reach MSMW'98

September 16

At the conference's morning plenary session, the following invited papers were presented:

G. Duxbury*, K. Smith*, M. McPhail*, R. McPheat*, J. Ballard**, and D. Newnham**, "The Synergy of Sub-Millimeter and Infrared Spectroscopy in Predicting Global Warming Effects of CFC Replacement Molecules," (*Department of Physics and Applied Physics, Glasgow, UK; Molecular Spectroscopy Facility, Rutherford Appleton Laboratory, Oxfordshire, UK)

P. Kordoš, "New Trends in GaAs-Based Devices for Generation of Millimeter and Sub-Millimeter Waves," (Institute of Thin Film Ion Technology, Research Centre Juelich, Juelich, Germany)

K. A. Lukin, "Millimeter Wave Noise Radar Technology," (JRC-Ispra, Italy and IRE NASU, Kharkov, Ukraine)

G. P. Kulemin, "Remote Estimation of Soil Parameters by Radar Method," (IRE NASU, Kharkov, Ukraine)

This day, the regular sessions of contributed papers consisted of:

A. New principles of generating and receiving millimeter and sub-millimeter waves

D. Problems of the theory of wave diffraction

F. Communications and radars; remote sensing

L. Biomedical applications of millimeter and sub-millimeter waves

In Session F, the following invited paper was presented: E. P. Kropotkina, A. N. Lukin, S. B. Rozanov, S. V. Solomonov, "Remote Sensing of the Atmospheric Ozone at Millimeter Waves," (P. N. Lebedev Physical Institute of Russian Academy of Sciences, Moscow, Russia). On the same evening, the conference banquet was held at the university cafeteria. This was a lovely event, accompanied with live music, dancing, and speeches. The dominant tone, however, was the joy of meeting old friends and colleagues, and making new ones.

September 17

On the third day, the morning session looked as follows:

L. V. Lubyako, E. V. Suvorov, A. V. Burov, A. M. Shtanuk, Yu. A. Dryagin, L. M. Kukin, N. K. Skalyga, "Detection Systems for the Measurement of Collective Thomson Scattering in Fusion Plasmas," (Institute of Applied Physics of Russian Academy of Sciences, Nizhny Novgorod, Russia)

V. N. Balabanov, E. M. Ganapolskij, A. V. Golik, V. M. Efimov, A. P. Korolyuk, A. C. Kurekin, A. G. Sergeev, V. V. Tarakanov, and V. N. Tsymbal, "Hypersonic Delay Lines: Physical Base, Technology and Using in the Space Radar Engineering" (IRE NASU, Kharkov, Ukraine)

Parallel sessions of regular papers that day went along the following topics:

G. Millimeter and sub-millimeter-wave radio astronomy

I. millimeter and sub-millimeter-wave spectroscopy

J. Millimeter and sub-millimeter-wavelength instrument making for scientific research (hot-plasma diagnostics, control of technological processes)

K. Electromagnetic metrology

In these sessions, the following invited papers were presented:

V. M. Shulga*, I. I. Zinchenko**, "Millimeter and Sub-Millimeter Wave Spectroscopy of Interstellar Medium," (*IRA NASU, Kharkov, Ukraine; **Institute of Applied Physics of Russian Academy of Sciences, Nizhny Novgorod, Russia)

B. A. Rozanov*, S. B. Rozanov**, "Low-Noise Millimeter and Sub-Millimeter Wave Receivers," (*Moscow State Technical Universitet, Moscow, Russia; ** P. N. Lebedev Physical Institute of Russian Academy of Sciences, Moscow, Russia)

A. F. Krupnov, M. Yu. Tretyakov, V. N. Markov, E. N. Karyakin, G. Yu. Golubyatnikov, V. V. Parshin, S. A. Volokhov, A. M. Shitov, V. V. Bichkov, I. I. Leonov, "Precise Measurement in Millimeter and Sub-Millimeter-Wave Range Based on Phase-Locked Primary Radiation," (Institute of Applied Physics of Russian Academy of Sciences, Nizhny Novgorod, Russia)

V. V. Meriakri, "Material Properties in Near Millimeter Wave Range," (Institute of Radio Engineering and Electronics of Russian Academy of Sciences, Fryazino, Moscow Region, Russia)

Yu. V. Bykov, A. G. Ereemeev, V. V. Holoptsev, K. I. Rybakov, V. E. Semenov, "Processing of Materials Using Millimeter-Wave Radiation," (Institute of Applied Physics of Russian Academy of Sciences, Nizhny Novgorod, Russia)

M. Wollitzer*, J. Buechler*, J.-F. Luy**, U. Siart*, and J. Detlefsen**, "Millimeter Wave Radar Sensor for Vehicle Applications," (*Diemler-Benz Forshung Ulm, Ulm, Germany; **Lehrstuhl fur Mikrowellentechnik, Technische Universitat Munchen, Munchen, Germany)

A. S. Kleiman, "The Elaboration Measurement Accuracy Problems of the Frequency Characteristics of the Sources of High Stability Oscillations in the Millimeter and Sub-Millimeter Range and of the Means of their Traceability," (State Scientific-Industrial Association "Metrology", Kharkov, Ukraine)



Figure 11. Dr. Peter N. Melezhik, Vice-Director of IRE NASU (Ukraine), and Prof. Arne F. Jacob, of the Technical University of Braunschweig (Germany), talk about the future.



Figure 12. The symposium banquet was a memorable evening of Ukrainian foods and music in the university restaurant. Prof. Boris I. Makarenko, of the Scientific Research Institute of Radio Engineering Measurement (Ukraine), is shown proposing a toast for millimeter and sub-millimeter waves.

The closing ceremony of MSMW'98 took place in the "New Physical" auditorium of KSU at 5:30 p.m. Several awards of the conference were announced and handed to the awardees. Eight MSMW'98 awards "In recognition of remarkable presentation at the young scientists paper competition" went to the following young scientists:

Rolf Judaschke (Technische Universitat Hamburg-Harburg, Hamburg, Germany)

Michael Wollitzer (Diemler-Benz Forshung Ulm, Ulm, Germany)

Koki Watanabe (Kyushu University, Fukuoka, Japan)

Alexander Zamyatin (Moscow Institute of Physics and Technology, Dolgoprudnyi, Moscow Region, Russia)

Kirill Rybakov (Institute of Applied Physics of Russian Academy of Sciences, Nizhny Novgorod, Russia)

Vladimir Tkachenko (KSU, Kharkov, Ukraine)

Andrey Serebryannikov (IRA NASU, Kharkov, Ukraine)

Andrey Andrenko (IRE NASU Kharkov, Ukraine)

Each MSMW'98 award consisted of a colorful certificate, signed by the MSMW'98 Chairman, and a bottle of Crimean "Champaign." The final closing address was done by Prof. Vladimir M. Yakovenko. He informed the audience that, in all, the number of registered participants was 147. The number of non-registered participants was estimated at around 50, mainly from Kharkov universities and research establishments. Of 247 papers included into the MSMW'98 program, 205 had been presented, according to the preliminary information. After that, Vladimir M. Yakovenko announced that the next symposium, MSMW'2001, will be held most probably again in Kharkov, in 2001. He thanked the organizers for creating an unprecedented forum for scientific discussions, and expressed the hope that the MSMW series will continue.

September 18

After the closing of MSMW'98, the participants were offered a dense social program, in order to relax after three days of intensive work, and to strengthen the links originated at the symposium. On Friday, September 18, a field trip was organized to the UTR-2 Observatory of the IRA NASU. This world's largest decameter-wavelength radio telescope is located about 80 km south from Kharkov. After visiting the radio telescope, a barbecue party was held.

We hope that The Third International Kharkov Symposium, "Physics and Engineering of Millimeter and Sub-Millimeter Waves," aroused great interest, and had such a favorable impression on the research community that the participants will remember it for a long time. We hope that they will have a strong desire to visit the future Kharkov MSMW in the next millennium.

Alexei A. Koostenko
MSMW'98 Co-Organizer

Alexander I. Nosich
East Ukraine IEEE AP/MTT/AES
/ED Chapter Secretary
MSMW'98 Co-Organizer

Usikov Institute for Radiophysics and Electronics
of the National Academy of Sciences of Ukraine
12, Ac. Proskura St.
Kharkov, 310085, Ukraine
Tel/Fax: +380 (572) 441105
E-mail: ire@ire.Kharkov.ua