From the President

At the General Assembly in Kyoto it was decided by Council to join the "Bulletin" and the "Radioscientist" in a single publication. To improve the continuity, Prof. Dick Dowden agreed to act as Editor of the "Radioscientist" section for the first few issues of the new publication, while the URSI Secretariat took care of the "Bulletin" section.

During 1994 the Board of Officers reviewed the organisational aspects of the new publication as well as the financial consequences. At their Board Meeting in August 1994, they had before them a request from Professor Dowden to stand down from the Editorship of the Radioscientist and, after careful consideration, accepted his offer with regret. We should like to record our gratitude to Professor Dowden and his assistant for their considerable efforts during the initial phase.

Subsequently, we received a proposal from Professor Delogne indicating his willingness to act as Editor of this new publication which offers URSI considerable simplification of the editing process. Although the first issue contains essentially Bulletin information, it is expected that subsequently scientific articles will appear and we are very pleased that the Associate Editors have indicated their willingness to continue with the new publication.

P. Bauer, URSI President
P.J.B. Clarricoats, Vice President on publications

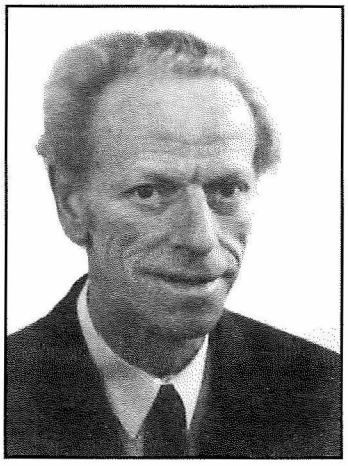
Editorial

Dear URSI Correspondent,

The moment you will receive this issue, 1994 will already lie behind us. First of all I would like to wish all of you the very best for a successful 1995, both in your personal relations as in your professional life. The past year has brought us happy moments, scientific success, but also tragic moments as we lost, much too soon, some good friends and fellow scientists, among them also Prof. T. Okoshi, Vice President of URSI. Our thoughts go to all of them and especially their family and colleagues.

1994 has however also been very important for URSI, not only because our Union reached the age of 75 years, which will be celebrated in the spring of 1995, as you will find out elsewhere in this issue, but most of all the face and outlook of our publications changed a lot.

Traditionally the"Bulletin" has been the official URSI publication issued by the Secretariat. It essentially contained official information, sometimes with a rather administrative character, and was, until recently, sent only to the Member Committees and to individuals holding an official position in the URSI structure. For years, besides special issues related to the General Assembly, URSI had no regular scientific journal.



The problematic of URSI publications has been discussed at length during numerous meetings of the Board, of the Publications Committee and of the Council. A persistent conclusion has been that there already exists a large number of scientific journals covering the whole range of URSI activities, and that it would not be useful to add one more and to compete with existing ones. The question was also discussed, along with others, at the Corsendonk brainstorming meeting in 1987, where the need for a more direct link of URSI with the individual scientists was identified. This was the origin of the "Radioscientist" and of the electronic newsletter "URSI-News". Both are due to huge efforts developped by Professor Dowden.

Establishing a direct relation with individual scientists supposes that these are identified. Clearly the publications and membership issues were related. The association of individuals with URSI was resolved with the definition of a network of correspondents. It was then also a logical step to join the "Bulletin" and the "Radioscientist" in a single publication sent to all URSI correspondents. The logical end point of this evolution, following Professor Dowden's wish to resign from editorship of the "Radioscientist", has been the merging into a single journal. The URSI community should be grateful to Professor Dowden for his extreme devotedness to the sake of URSI publications. Without him the new journal would not exist. I am happy to inform you that Professor Dowden will nevertheless continue to edit the electronic "URSI News".

The name of the new journal, the Radio Science Bulletin, recalls its origin. It will contain a scientific part, in addition to the official information and announcements issued by the URSI Secretariat. I have accepted the charge of editor for the scientific part. Geographical proximity and close relations with the Secretariat will certainly ease coordination. However I would have been reluctant to accepting this charge without active support from a number of colleagues. I am very grateful to the Associate Editors of the "Radioscientist" that have indicated their willingness to continue with the new journal. In addition, two colleagues from my laboratory, Professors Sobieski and Vandendorpe, accepted to join the group.

The journal is addressed to all members of the URSI community, and this should be reflected in its content. We will mainly accept papers of interest to a large number of URSI correspondents. The Radio Science Bulletin is certainly not the place where you should submit your latest study on a highly specialized topic. Whereas there are many journals — perhaps too many — through which you can reach readers interested by papers of this category, there are not so many publications where your best papers with a broader objective will receive the visibility they merit. The Radio Science Bulletin is there to fill the gap.

Being generic however is not synonymous of mediocre. The editorial board and myself intend to give a high scientific profile to the new journal. Contributions on the history of radio science and of URSI will be accepted as previously, but they should not form the core of the journal. The preference will be given to high-level papers with a tutorial and/or prospective character in all areas covered by URSI. This is in accordance with the multidisciplinary nature of our Union. There will also be room for shorter, more specific, articles, provided they are of general interest to the URSI community.

This objective is ambitious. I am aware that it can be fu achieved only with the active collaboration of all UR correspondents, but I am quite confident about this. Thi your journal, dear correspondent ! It deserves your b contributions.

P. Delogne, Edito

URSI

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The object of the International Union of Radio Science (Union Radio-Scientifique Internationale) is to stimulate and to coordinate, on an international basis, studies in the field of radio, telecommunication and electronic sciences and, within these fields:

a) to promote and organize research requiring international cooperation, and the discussion and dissemination of the results of this research ;
b) to encourage the adoption of common methods of measurement, and the intercomparison and standardisation of the measuring instruments used in scientific work ;
c) to stimulate and coordinate studies of :
   - the scientific aspects of telecommunications using electromagnetic waves, guided and unguided.
   - the generation and detection of these waves, and the processing of the signals embedded in them.

In Memoriam

TAKANORI OKOSHI
1932-1994

Professor Takanori Okoshi, Vice-President of our Union, passed away on 4 November 1994 at the age of 62. He was born in Tokyo in 1932. He received the Bachelor degree of Engineering in 1955, the Master of Engineering degree in 1957, and the Doctor of Engineering degree in Electronic Engineering in 1960 from the University of Tokyo. In 1960, immediately after getting his Doctor degree from the University of Tokyo, he was appointed lecturer in the same University, where he served as associate professor in 1961, and professor in 1977 at the Electronic Engineering Department. In 1987 he was elected the Founding Director of the Research Center for Advanced Science and Technology (RCAST), a newly established interdisciplinary research institute in the University of Tokyo. He retired from the University of Tokyo in March 1993 with the rank of Professor Emeritus. Prior to his retirement, since January 1993, he was the Founding Director-General of the National Institute for Advanced Interdisciplinary Research (NAIR), a newly established governmental institute on basic science and technology, belonging to the Ministry of International Trade and Industry (MITI).

Prof. Okoshi's research covers a wide variety of topics relating to radio waves from microwave to lightwave frequencies, and it could be classified into three areas. Firstly, in 1970 and early 1980s he developed a number of new methods for analyzing fiber propagation characteristics and for measuring fiber refractive index profiles, and further, a fully computer-oriented method for synthesizing the optimum refractive index profile. He also wrote three technical text books, one in English and two in Japanese, systematizing the optical fiber theory, and made enough contribution to the early-stage research, development and production of optical fibers.

Secondly, in 1979 he initiated and advocated the research on coherent optical fiber communications, which would become one of basic technologies in the next generation terabit/s and super-multiplexed optical communications. First, he overcame a number of early-stage technological difficulties by devising novel light-source control and measurement techniques. Later, he invented and developed various new receiving methods. Then he wrote English and Japanese technical books systematizing this area, and contributed to the explosive research and development in this area in 1980s.

The third area is the transmission and control technologies for single-polarization lightwaves in optical fibers, which is one of the key technologies in ultra-long span and coherent optical fiber communications. He devised and developed a variety of novel fiber structures, polarization-control techniques, and polarization-independent receiving techniques. Incidentally, Prof. Okoshi received three Distinguished Achievement Awards from the Institute of Electronics, Information and Communication Engineers, Japan (IEICE) for his work in each of the above three areas.

Other significant achievements of Prof. Okoshi could be summarized as (1) pioneering research and development of "short-landing" electron collector for high- efficiency microwave tubes (1968-1972) (2) invention of various three-dimensional imaging techniques, development of three-dimensional image information theory, and publication of one English and two Japanese technical books, systematizing these areas (1968-1982) (3) the

proposal for the concept of, and initiation of the research on the analysis and synthesis theories of microwave "planar circuits" which should be positioned between distributed-constant (i.c. 1-dimension) and waveguided circuits (i.c. 3-dimension), and the publication of English and Japanese technical text books, systematizing this newly created academic area. He had been very active on his research until he died. His recent main research interests were in high-speed and multiplexed optical fiber communication.

He is the author of eighteen books, including four in English entitled "Three-Dimensional Imaging Techniques" (Academic Press, 1976), "Optical Fibers" (Academic Press, 1982), "Planar Circuits" (Springer, 1984), and "Coherent Optical Fiber Communications" (KTK/Kluwer, 1988, with Dr. K. Kikuchi).He received twenty-five awards from two ministries in the Japanese Government, including the 1989 M.N. Liebmann Memorial Award of the IEEE, the Japan Academy Prize in 1993, and C&C Prize in 1994. Prof. Okoshi has also been known for his positive involvement in socio-technical issues, such as urban elegance and its degradation in Japan by open line power/information networks.

In addition to his academic achievements, Prof. Okoshi made great contribution to the R&D organization in Japan through his tremendous effort as the Founding Director of RCAST and Founding Director-General of NAIR. He also contributed to society as the President (1993-1994) and Vice-President (1989-1991) of the Institute of Electronics, Information and Communication Engineers, Japan (IEICE); President (1989-1990) and Editor-in-Chief (1986-1988) of the Institute of Television Engineers, Japan (ITE); Chairperson of IEEE MTTS Tokyo Chapter (1983-1984); Associate Editor of IEEE Transaction on Microwave Theory and Techniques (1973-1980); Member of Telecommunications Technology Council, Ministry of Posts and Telecommunications (1986-1993); Member of the Broadcast Engineering Council (1989-); Chairman of Broadcast Engineering Research Committee (1987-1989), Japan Broadcasting Corporation; Vice-President (1994-) and Member of the Board (1991-1994) of the Engineering Academy of Japan; Member of the Science Council of Japan (1994-) and Foreign Member of the Royal Academy of Belgium (1991-). He also served as the Organizing Committee Chairperson of the major international conferences such as International Conference on Optical Fiber Sensors (OFS '86), Chairperson of the International Conference on Integrated Optics and Optical fiber Communications (IOOC '95).

Prof. Okoshi was a member of URSI Commission D since 1987, and was the Vice-Chairman (1984-1987), and the Chairman (1987-1990) of Commission D, Chairman of Japanese National Committee from 1985 to 1991, and was elected Vice-President in 1990. When the 24th General Assembly of URSI was held in Kyoto in 1993, he worked very hard as a Chairman of the Organizing Committee, and its success was due to his great contribution.

While he had been keeping very busy in devoting himself to wide variety of activities on research, administration and education, he had various good hobbies such as reading books, gardening and music. He had a special ability in musical composition. When the party was held for celebrating his honour of receiving the Japan Academy Prize, he gave us a compact disc which was recorded "Ten Pieces for Flute and Piano" composed by him

He had the first surgical operation for gastric cancer three years ago, and we were informed that it was not serious. Since he left the hospital, he worked very hard and had been producing remarkable achievement in various fields. I sometimes worried because he looked thinner after the operation, and advised him not to work too hard. He, however, always told me that he had been overweighted before the operation, and his present physical condition was just right. When I visited him in the hospital three days before his second operation, he told me "I came to the hospital to have physical examinations, but I was told it would be better to have an operation. I feel easy because I had finished most of my duty including a report on URSI matter".

Seven weeks after his second operation, the Awarding Ceremony of the C&C Prize to him was scheduled. He was eagerly willing to attend the Ceremony, but two days before the Ceremony he called me from the hospital and informed me that he would not be able to attend the Ceremony. However, his memorial lecture prepared in the hospital was read by his friend at the Ceremony, and gave audiences a deep impression.

His sudden death gives a great loss to the academic world. I am sure that he will be widely missed by everyone who knows him including his students, his colleagues and his friends.

Sogo Okamura
President
Tokyo Denki University
Former URSI Vice-President

FEDOR IVANOVICH FEDOROV
1911 - 1994

At the Secretariat we received 2 obituaries on Prof. F.I. Fedorov which we combined below.

Academician Fedor I. Fedorov passed away suddenly on 13 October 1994 at his home in Minsk, Belarus. He was 84 years old. His sudden death is a severe bereavement not only to his colleagues and his family but also to all scientific physical community. Professor Fedorov was a famous scientist, one of the founders of theoretical physics in Belarus, President of Belarussian Physical Society, Academician and Member of Presidium of Belarussian Academy of Sciences. Fedor Ivanovich Fedorov was born on June 19, 1911, in the village of Turez in the Minsk region of the Russian Empire. (Today this area is part of the Republic of Belarus). His father was a village teacher at that time and became - under the pseudonym Yanka Mavr - one of the most famous Belarussian writers.

Fedor Fedorov graduated from the Belarussian State University in Minsk as a school teacher in physics. Continuing his studies in the Leningrad Institute of Physics and Engineering, he received the degree Kandidat Nauk (Candidate of Sciences, which is equivalent to a Ph.D. degree) in 1936. This was the first Candidate degree in physics earned by a Belarussian scientist. His thesis was on quantum electrodynamics under the supervision of the famous Professor Fock. In 1938, F.I. Fedorov became chairman of the theoretical physics group at the Minsk State University. During the hard and turbulent times of the Second World War, Fedorov moved eastwards. He was teaching physics in the Novosibirsk region in Siberia.

Fedorov defended his Doctor of Science thesis in 1954. This is the highest academic degree in the Former Soviet Union and Russia, and it corresponds to the Habilitation degree in some Western European countries. Again, this was the first doctoral thesis of a Belarussian scientist. His work was in the field of anisotropic media optics. Since 1954 Dr. Fedorov was with the Institute of Physics of the Belarussian Academy of Sciences as Laboratory Director. At the same time he continued his teaching at the Belarussian State University in Minsk where he was Department Chairman in theoretical physics (1938-1962) and Faculty Dean (1943-1950). Professor since 1957, Fedorov was elected Corresponding Member of the Belarussian Academy of Sciences in 1956, and has was Full Member since 1966. Academician Fedorov published more than 300 scientific papers, and several books, among which we may mention: "Optics of anisotropic media" (1958); "Theory of elastic waves in crystals" (1965 and English translation 1968); "Reflection and transmission of light by transparent crystals" (together with V.V. Filippov, 1976); "Theory of gyrotropy", (1976); "The Lorentz group" (1979).

Fedorov made important contribution to quantum electrodynamics, relativistic theory, and gravitation theory. In electromagnetics his work on bianisotropic media was pioneering. In the early fifties, he developed so-called covariant methods which are extremely suitable in the study of electromagnetic fields in anisotropic crystals, because covariance makes the analysis independent of any co-ordinate system. In fact, Fedorov introduced and developed dyadic formalism in the optics of crystals. Later on, Fedorov applied his method to acoustics of anisotropic media, boundary problems in crystal optics, electromagnetics of chiral and bianisotropic media, and to elementary particles physics.

Among his famous results we should mention the general theory of electromagnetic waves in absorbing crystals, constitutive relations for chiral and bianisotropic media, the study of the boundary conditions for interfaces between complex media, and the general theory of electromagnetic waves in bianisotropic crystals. As an example of the results of Fedorov's studies of the reflection phenomena in crystals, we may mention a new phenomenon, a ray shift such that the incident and reflected rays do not possibly belong to the same plane. Fedorov discovered this effect in 1954, and the phenomenon was experimentally confirmed in 1969.

Professor Fedorov was not only a remarkable scientist-investigator, but also an excellent teacher. A large number of his disciples now form the Belarussian scientific school in theoretical physics - Fedorov's school. He educated about 40 doctors and 100 candidates of sciences among whom there are many famous scientists, academicians and state prize laureates.

Remaining very active in his senior age, Fedor Ivanovich was always working with his students and colleagues. He was also well-known to the Western electromagnetic community. In May 1994, he acted as the co-chairman of the International Workshop Chiral'94 in Perigueux, France, and gave a scientific presentation there on reciprocity of uniaxial bianisotropic media. The readers of the Radioscientist came to know Academician Fedorov through his recent article on the wave normal equation in bianisotropic media, which appeared in the March 1994 issue. Up to the time of his death, Professor Fedorov was President of Belarussian Physical Society, Honorary Member of Russian Gravitational Association, Member of the American Mathematical Society, Honorary Member of the Russian Optical Society, Member of the Coordinate Committee of the European Physical Society and Vice-President of the URSI Committee in Belarus.

Fedor I. Fedorov will be remembered across the boundaries of our world as a talented scientist, perfect teacher, splendid organizer, fascinating and heartfelt man. He will be widely missed by everybody who knew and worked with him.

Anatoly Serdyukov
Gomel State University, Belarus

Sergei Tretyakov
St. Petersburg State Technical University, Russia

Ari Sihvola
Helsinki University of Technology, Finland

Peter D. Kuharchik
Belarussian State University, Minsk

Vladimir Ivanovich Siforov
1905 - 1993

Professor Vladimir Ivanovich Siforov, an outstanding scientist in the field of information theory and statistical communication theory, radio engineering and radio reception theory, Doctor of Sciences (technical sciences), corresponding member of the Russian Academy of Sciences, died on October 2, 1993, at the age of 88. His death is a tremendous loss to the Russian and international scientific communities.

V.I. Siforov was the author of more than 500 scientific and popular works, many of which have been translated and published internationally. Particularly well-known is his book "Radio Receiving Devices", which has been used as a text by several generations of Russia's radio engineers.

The scientific work of V.I. Siforov was always distinguished by its novelty and originality, dealing with leading-edge topics but strongly tied to practical application. The results of his fundamental research have served as a scientific and technical basis for the development of noise-immune and efficient radio systems.

In 1929, V.I. Siforov graduated from the Leningrad Electrotechnical Institute. In 1936, having skipped the Candidate of Sciences degree, he presented his Doctor of Science thesis, entitled, "A Study of Radio Reception Methods Based on Amplitude, Phase, and Continuance Selection", to the same institute and he defended it brilliantly. In 1938, V.I. Siforov received a professorship, with his appointment to the Chair of Radio Receiving Devices. In 1953, he was elected a corresponding member of the USSR Academy of Sciences.

From 1954 until 1966, V.I. Siforov headed the Laboratory for Radio-Relay Communication and Radio Reception that he himself had created in the Institute for Radio Engineering and Electronics of the USSR Academy of Sciences. During these prolific years, he worked in the field of theory of noise and fading accumulation in main radio-relay lines, creating a theory of noise immunity of lines with error-correcting codes, and developing a capacity theory of radio channels with random parameters. V.I. Siforov carried out pioneering work in the theory of complex radio-electronic devices and systems.

V.I. Siforov was an outstanding organizer and leader. In 1954-55, he was a Vice Minister of the Radiotechnical Industry of the USSR. From 1966 until 1989, he was the Director and from 1989 to the end of his life, the Honorary Director of the Institute for information Transmission Problems of the Russian Academy of Sciences. Under his leadership, the Institute carried out a number of fundamental studies in the area of information transmission, distribution, processing, storage and transformation in physical, technical, and biological systems. Due to his talent as a scientist and organizer, the Institute gathered a strong scientific team that has made it internationally renowned. This was greatly supported by V.I. Siforov's original research in information theory, coding and processing of images, and his widely known work in the long-term prognosis of scientific and technical progress, on various aspects of gnosiology, and on the philosophical problems of modern natural sciences and technology.

V.I. Siforov devoted much effort to teaching activities. During his years of work at the Leningrad Institute for Electrical Communication, A.F. Mozhaiskij Air Force Academy, and Moscow Power Engineering Institute, V.I. Siforov supervised the work of more than 80 young scientists - future Candidates of Science and Doctors of Science.

V.I. Siforov was well-known among specialists in radio engineering and information theory world-wide. The Institute of Electrical and Electronic Engineers elected him an Honorary Member. S.V. Siforov was an Honorary Member of the Hungarian Academy of Sciences, a member or chairman of many international committees and editorial boards, and a winner of the International Award in Television (1967, Montreux, Switzerland).

V.I. Siforov was known by the wide scope of his organizational activities in science. For over 35 years, beginning in 1954, he was Chairman of the A.S. Popov Society RIT.

From 1966 until 1991 he was Editor-in-Chief of "Problemy Peredachi Informacii" and a member of editorial board of "Radiotechnika", "Radiotechnika and Elektronika", "Elektrosvyaz", and other journals. He was the official member of URSI Commission C for Russia.

Until the end of his life, V.I. Siforov retained a lively interest in science, people, and life, and an urge toward creative work. His last work, a book entitled "The Survival Tangent", was written and published in 1991.

V.I. Siforov has a generous and kind character. He was warm-hearted, considerate, and open. He helped greatly his colleagues and those who sought his assistance. The death of V.I. Siforov has filled our hearts with deep sorrow. Our generation of engineers and scientists will preserve the memory of Vladimir Ivanovich Siforov forever.

Prof. Dr-Ing. I.A. Ovseevich
Deputy-director Inst. for Info. Trans. Problems
Russian Academy of Science

Electromagnetic field calculations for wireless telephones

LUC MARTENS

Introduction

Applications of wireless communication systems are growing all over the world. In the field of Personal Communication Services, there is a growing demand for communication links using a mobile telephone. In Europe an important impulse to these activities has been received from the standardisation of the mobile systems such as the GSM (Global System for Mobile Communication) and the DECT (Digital European Cordless Telecommunications) system. As broadband technologies will be introduced in mobile communications, high-frequency effects will become important.

While phoning with a wireless telephone, the antenna is placed very close to the head of the user. This means that the head will disturb the radiated field pattern of the antenna. In the near-field region, the fields of the antenna can be quite strong. Therefore, hearing aids could be troubled by interference. Also interference with other electronic systems must be considered. So, increased awareness about the potential problems caused by the proliferation of mobile communications must be coupled with measures to ensure electromagnetic compatibility (EMC) of the mobile telephone with its environment.

An other important issue is the absorption of electromagnetic power in the head of the user. The knowledge of the electromagnetic fields induced in the head of the user of a wireless telephone can be used for optimal antenna design as well as for a better interpretation of potential biological effects. A lot of work is currently done in evaluating the fields in the head. Both theoretical calculations and measurements are going on. Among the methods for calculations used, the most popular ones are the Finite Difference Time Domain (FDTD)-method [1] [2] and the Multiple MultiPole expansion (MMP) method [3]. At the University of Gent, we are using

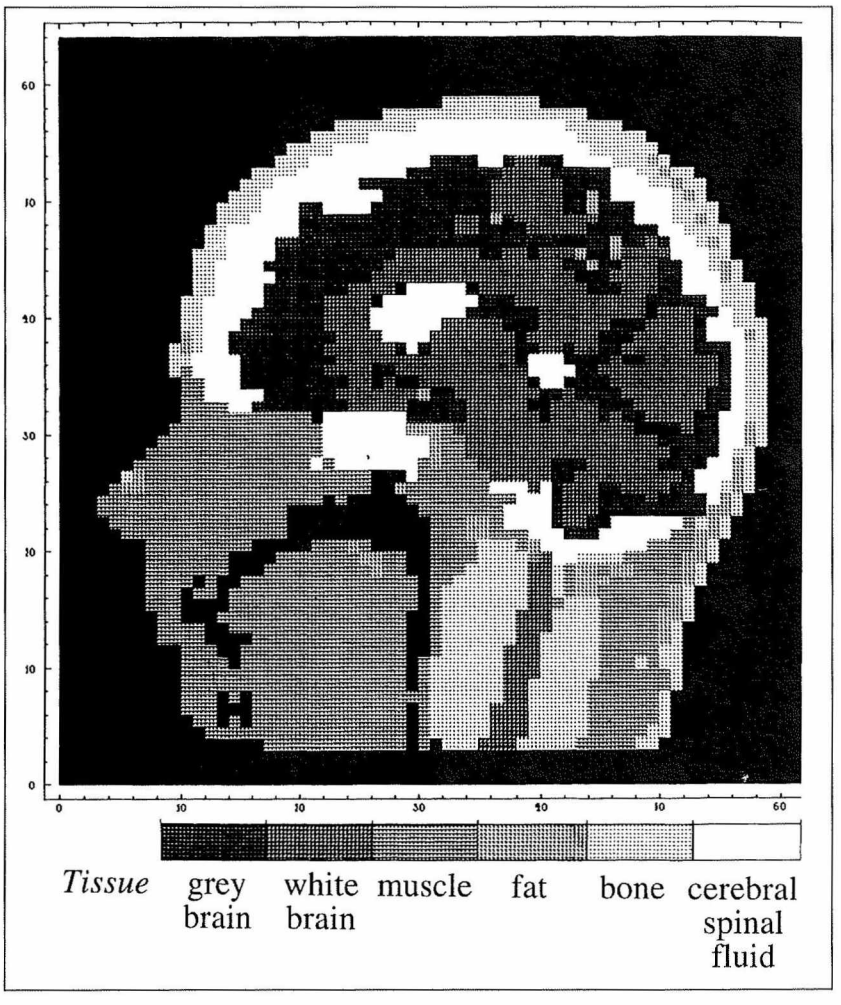

Figure 1: Discretised NMR-image ready for use in the electromagnetic calculations

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the FDTD-method for solving the time-domain Maxwell's equations in and around the human head. This method is very convenient for modelling complicated structures such as the human head and the wireless telephone.

Methodology

In order to model the electromagnetic problem as realistic as possible, accurate models are needed for both the antenna and the human head, which is very heterogeneous for electromagnetic fields.

For the antenna a box-model (quarter-wavelength wire mounted on top of a perfectly conducting box) was used. We obtained an accurate three-dimensional head model by distinguishing 6 different tissues in a complete set of NMR (Nuclear Magnetic Resonance) images of a human head. Figure 1 shows one of the discretised images of the head with indication of the different tissues.

different antenna models in the calculations which was proved by comparing the box-model antenna with a classical half-wavelength dipole antenna. The presence of the head also introduces strong disturbances due to scattering and absorption of the incident fields. Figure 2 shows the grid discretisation for the antenna (box-model or monopole and dipole antenna) and for the human head. The position of the antenna with respect to the head can be easily varied in the software. Figure 3 shows two far-field radiation patterns in the horizontal plane through the gap of the antenna: one with and one without the presence of the operator of the mobile antenna. The patterns are drawn in dB with respect to the maximum found in the case without operator. When the user is present more than 50 % of the antenna power (more than 1 Watt for a 2 Watt hand-held telephone) is dissipated in the human head. From a telecommunication point of view, this is a lost of signal power and therefore decreases the signal-to-noise ratio of the system. New antenna design is needed to reduce this absorbed power.

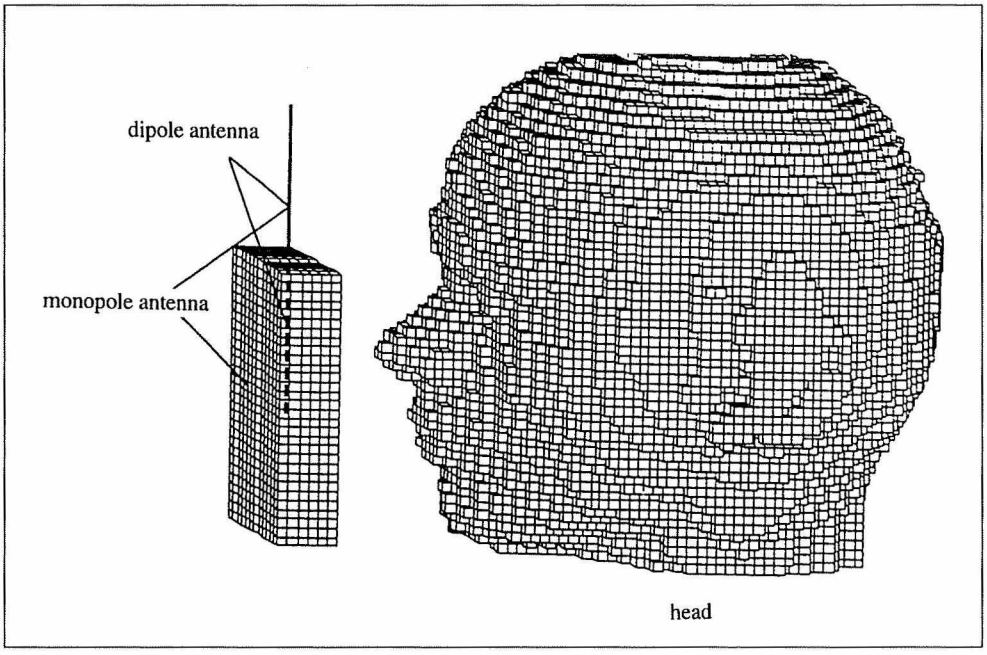

Figure 2: Grid discretisation for the antenna (box-model or monopole and dipole antenna) and for the human head

As excitation of the antenna a continuous wave of 900 MHz (frequency band of the GSM system in Europe) was used and the antenna was placed near the ear of the user. Radiation patterns, antenna impedance, absorbed power and SAR (Specific Absorption Rate) distribution were calculated. The first three quantities are important for calculation of the performance of the link between the mobile telephone and the base-station. Impedance as well as radiation pattern can drastically change when using

Discussion

There are still many questions to be answered. Difference between the modelled and real field values in the head will be due to the inaccuracies in the antenna and the human head model for which the tissue dielectric properties vary over a wide range in the literature. We are currently estimating the effect of the inhomogeneity of the head by comparing the results with the case where the head is filled

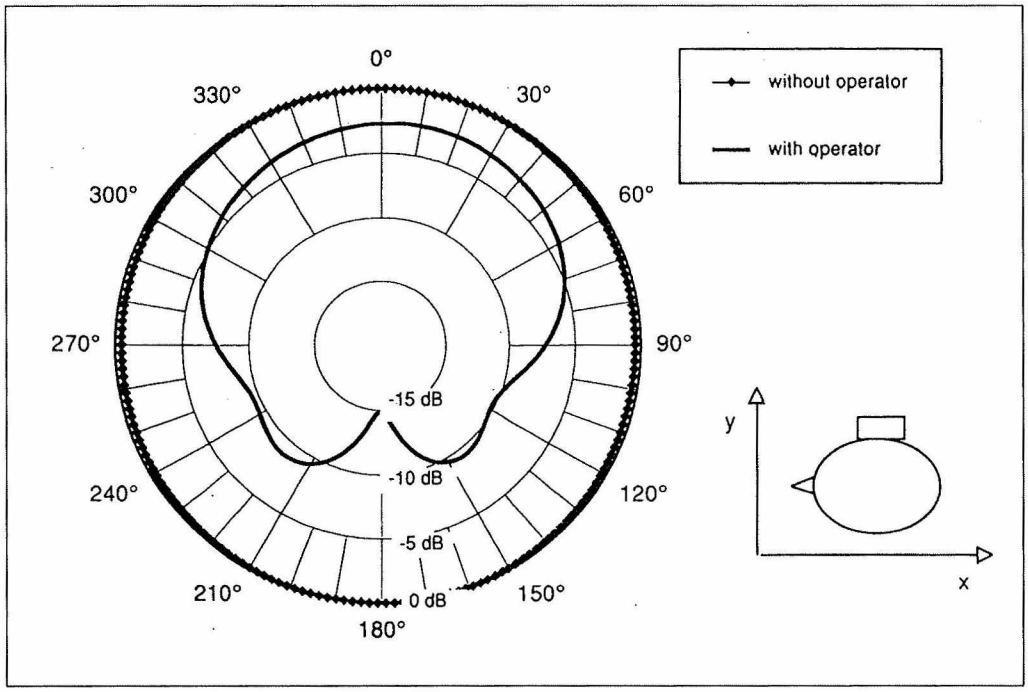

Figure 3: Far-field radiation pattern with or without the presence of the operator

with a homogeneous tissue with average dielectric properties. Further, the head of the user and the position of the antennas are quite variable. So, a single calculation can not be generally representative for the fields induced in the head while phoning. Research have to be done to find the values for the variables that deliver the worst-case situation. Once the worst-case has been found, SAR levels should be compared with levels specified in recommendations by international organisation such as ANSI, IEEE, IRPA or CENELEC (European standardisation committee). The final crucial question is to find the link between the macroscopic electromagnetic fields in the head and the potential biological effects. All these questions initiated a European project within the COST research program (COST 244). In this project, a multi-disciplinary group of engineers, physicians, and biologists are investigating the link between the fields absorbed in the head of the operator of a wireless telephone and possible health effects.

Acknowledgements

This research is done in co-operation with the University Hospital of the University of Gent (Magnetic Resonance Department and Department of Radiotherapy and Nuclear Medicine, responsible for the research: Dr. C. De Wagter). The author also thanks Jan De Moerloose for the calculations.

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URSI - 75 Years

75th ANNIVERSARY

SPACE AND RADIO SCIENCE
SYMPOSIUM ORGANIZED AT THE OCCASION OF THE 75TH ANNIVERSARY OF URSI
26-27 APRIL 1995, BRUSSELS, BELGIUM

PRACTICAL ORGANIZATION

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Already more than 1 year ago, at one of its meetings, the Belgian URSI Committee decided not to let the 75th anniversary of URSI go by without celebration. Many contacts between members of the Belgian URSI Committee, the Board of Officers and the URSI Secretariat lead to the decision to organize a 2-day Symposium in Brussels. The celebration of the 60th Anniversary of URSI, also held in Brussels, served as an example.
The meetings will be held in the Academy House on April 26 and 27, 1995 (address: Hertogsstraat - 1 - rue Ducale, Brussels, Belgium). The inaugural session is scheduled to start at 10.00 AM on April 26, and King Albert II has agreed to be present. The two Belgian Academies of Sciences, Letters and Fine Arts are hosting the meeting.
In view of the attendance of King Albert II, and because of the limited number of seats in the Auditorium, a strict procedure has to be followed with regard to attending the Symposium. May we therefore ask you to return the reply form by 20 February 1995 (at the latest), indicating clearly which sessions you wish to attend. Formal invitations cards will then be mailed to you at the beginning of March. They will be required at the entrance, particularly so at the inaugural session.

LOCAL ORGANIZING COMMITTEE

Chairman :	Prof. J. Van Bladel	Universiteit Gent
Secretary:	Prof. P. Van Daele	Universiteit Gent
Members:	Prof. A. Barel	Vrije Universiteit Brussel
	Prof. M. Blondel	Faculté Polytechnique de Mons
	Prof. L. Bossy	Université Catholique de Louvain
	Prof. P. Delogne	Université Catholique de Louvain
	Prof. E. Schweicher	Ecole Royale Militaire
	Prof. A. Van De Capelle	Katholieke Universiteit Leuven
	Prof. J.L. Van Eck	Université Libre de Bruxelles

How to reach the Academy House, Brussels?

Brussels, Belgium can easily be reached by car, train or by plane via its international Airport. Arriving by plane at the airport a short train ride (20 min) brings you directly to the center of Brussels (Central Railway Station). The Academy House can then be reached by taxi or by a short walk (10 min). It is located at the East corner of the Royal Palace (address: Academy House, Hertogsstraat 1 rue Ducale, Brussels).

Brussels has many hotels, quite a few of those close to the Academy House. Since Brussels is also the location of many of the Organizations and Institutions of the European Union, reservations are advisable. The URSI Secretariat can always provide you with suggestions.

75th ANNIVERSARY

ABOUT THE PROGRAMME

PROF. PAUL DELOGNE
CHAIRMAN OF THE SCIENTIFIC PROGRAMME COMMITTEE
Université Catholique de Louvain, Telecommunications and Remote Sensing
Place du Levant 3, Bâtiment Stévin, B-1348 Louvain-la-Neuve, Belgium
Tel: + 32 (10) 47 23 07 Fax: + 32 (10) 47 20 89

In early 1994 the URSI Board decided to organise a two days symposium to celebrate the 75th anniversary of URSI. The decision was also made to put the emphasis on a central scientific theme which would enlighten URSI's activities at the forefront of science representative of all Commissions. It appeared that Space can play this central role. The preference was also expressed for a high-level symposium based on a limited number of invited lectures given by internationally renowned scientists.

A preliminary list of topics was prepared by the URSI Board, which also appointed an international scientific committee comprising more than twenty members. Its task was to identify the subjects and to propose speakers. A first run of ideas in the programme committee started in January 1994. This produced a preliminary list of 18 topics and 24 potential authors. The selection process could start. The final programme was completed in October 1994. Key elements in the choice were the interest of topics, the quality and, of course, the availability of speakers, a good balance between the areas covered by the URSI Commissions and a wide international representation.

It is my pleasant duty to express warm thanks to the members of the international programme committee for their enthusiastic suggestions. My gratitude also goes to the authors who accepted the heavy task of preparing oral and written contributions. Their quality guarantees the success of the symposium.

SCIENTIFIC PROGRAMME COMMITTEE

J. Bach Andersen	Aalborg University Centre	Denmark
P. Bauer	CNRS	France
R. Bonnet	ESA	France
G. Brussaard	Eindhoven University of Technology	The Netherlands
P.J.B. Clarricoats	Queen Mary & Westfield College	United Kingdom
P. Delogne	Université Catholique de Louvain	Belgium
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P. Lagasse	University of Gent	Belgium
J. Lemaire	Institut d'Aeronomia Spatiale	Belgium
H. Matsumoto	Kyoto University	Japan
A.P. Mitra	Council Scientific & Industrial Research	India
T. Okoshi (†)	NAIR	Japan
V. Radhakrishnan	Raman Research Institute	India
R. Sagdeev	University of Maryland	USA
T.B.A. Senior	University of Michigan	USA
J. Van Bladel	University of Gent	Belgium

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75th ANNIVERSARY

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SPACE AND RADIO SCIENCE
Academy House, Brussels (Belgium), 26-27 April 1995

Scientific Programme

Session 1 (26 April, AM) Opening Ceremony

* Prof. J. Van Bladel, President of the Koninklijke Academie
  "Welcome. The first years of URSI"
* Dr. P. Bauer, President of URSI
  "The activities of URSI since its first General Assembly in 1922"
* Musical Programme
* Dr. J. Ponsonby (Nuffield Radio Astronomy Laboratories, UK)
  "Global Satellite Navigation Systems: Uses of Space-Time Fixes from Geodesy to Sailing"

Session 2 (26 April, PM)

* Prof. Y. Rahmat-Samii (University of California, Los Angeles, USA)
  "Antennas in Space : Modern Developments and Future Challenges"
* Dr. L. Chiariglione (CSELT, Italy)
  "The future of Digital TV and HDTV by Satellite"
* Dr. Shuzu Kato (NTT Radio Communication, Japan)
  "Personal Communication Systems and Low Earth Orbit Satellites"
* Prof. M.A. Stuchly (University of Victoria, Canada)
  "Mobile Communication Systems and Biological Effects on Their Users"

Session 3 (27 April, AM)

* Prof. A. Kalmykov (IRE, Kharkov, Ukraine)
  "Real-Aperture Radar (RAR) Imaging from Space"
* Prof. W. Alpers (University of Hamburg, Germany)
  "Measurements of Mesoscale Oceanic and Atmospheric Phenomena by ERS-1 SAR"
* Dr. D. Massonet (CNES, Toulouse, France)
  "SAR Interferometry and the Monitoring of the Earth Surface at Centimeter Level"
* Prof. R.T. Schilizzi (Joint Institute for VLBI in Europe)
  "Future Developments in VLBI Astronomy on the Ground and in Space"

Session 4 (27 April, PM)

* Prof. C. Salomon (Ecole Normale Supérieure, Paris, France)
  "Cold Atoms and Microgravity Clocks"
* Dr. D.B. Snyder (NASA, USA)
  "Dynamic Interactions Between Ionospheric Plasma and Spacecrafts"
* Prof. D. Gurnett (University of Iowa, USA)
  "Solar System Plasma Waves"
* Prof. H. Matsumoto (Kyoto University, Japan)
  "Microwave Power Transmission from Space and Related Nonlinear Plasma Effects"

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75th ANNIVERSARY

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REPLY FORM

(to be returned before 20 February 1995)

To be returned to the URSI Secretariat:
University of Gent / INTEC
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B-9000 Gent
BELGIUM
Tel: + 32 (9) 264 33 20
Fax: + 32 (9) 264 42 88
e-mail: heleu@intec.rug.ac.be

[...] Yes, I definitely intend to attend the following sessions

[...]April 26, AM (opening Ceremony)
[...]April 26, PM
[...]April 27, AM
[...]April 27, PM

[...] No I will not attend the Symposium

Name : .....
Affiliation : .....
Address : .....
Postal Code / City : .....
Country : .....
Tel : .....
Fax : .....
e-mail : .....

The Opening Ceremony will start with a welcome address by Prof. J. Van Bladel, Chairman of the Local Organizing Committee and President of the Belgian Academy of Sciences. Prof. J. Van Bladel will also address the founding and the first years of URSI. Dr. P. Bauer, President of URSI will then give an overview of the activities of URSI during its 75 years of existence, followed by a musical intermezzo. The Opening Ceremony will then continue with:

Global Satellite Navigation Systems : Uses of Space-Time Fixes from Geodesy to Sailing

Dr. John E.B. Ponsonby
University of Manchester, Nuffield Radio Astronomy Laboratories, Jodrell Bank,
Macclesfield, Cheshire, SK11 9DL, United Kingdom
Fax: + 44 (477) 57 16 18

There are two global satellite navigation systems, the American GPS (Global Positioning System) which consists of a complete constellation of 24 operational satellites and the Russian GLONASS, which does not yet have its full complement of 24 satellites in orbit. The two systems are very similar and operate at closely adjacent frequencies at L-band. They follow in the long tradition of earlier means of global navigation, being based on precise ephemerides for the movement of celestial bodies and the use of precision portable clocks.

Unlike earlier methods however the celestial bodies are now man made, the satellites themselves, and by the use of radio technology, position is established by the measurement of range rather than of angle. Using one of these systems it is now possible to establish one's position on or near the Earth to within a few metres in all weathers and at all times. This is a remarkable development, a remarkable application of radio science, and it promises to revolutionise the navigation of all classes of vehicle form space craft to sailing dinghies. By making prolonged measurements at fixed locations it is possible to obtain position with geodetic accuracy of a few cm.

The essence of both systems is the measurement of the range of a receiver from the known positions of the satellites by measuring the one-way transmission times of radio signals. If in general four or more such measurements are made simultaneously, it is possible to obtain a fix for the receiver in 4-dimensional space-time. To do this of course the 4-D coordinates of the satellite transmission events must themselves be made know to the receiver. This is made possible by the satellites carrying knowledge of precise time in on-board atomic clocks and by them broadcasting the necessary elements of their orbits. This is achieved to an accuracy of a few nanoseconds of time and a corresponding few metres of space.

The details of the two systems will be described and compared. Their potential range of application will be outlined and the current technical and institutional obstacles to their widespread adoption for all navigational and timing purposes discussed. These obstacles are such as to have provoked proposals for the establishment of a third, wholly civilian and international Global Navigation Satellite System (GNSS) with a larger constellation of some 30 to 40 satellites.

This Opening talk will be attended by King Albert II of the Belgians and will be followed by a reception offered by the Academy of Sciences of Belgium. This reception will also be held in the prestiguous House of the Academies, Brussels, Belgium. In view of the attendence of King Albert II, formal invitations cards are strictly required and can be obtained by sending the reply form to the URSI Secretariat.

75th ANNIVERSARY

ANTENNAS IN SPACE : MODERN DEVELOPMENTS AND CHALLENGES

PROF. Y. RAHMAT-SAMII
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Advanced satellite communications systems, modern astronomical missions, and high resolution earth observation platforms require utilization of sophisticated antenna configurations. Large aperture antennas exceeding several meters in diameter have been considered as one of the major components in many of the currently planned missions operating in a wide range of frequencies. For example, NASA's mobile satellite communications program (MSAT) and the emerging personal access communications system (PASS) concept have considered the application of large space antennas to achieve high performance capability by providing multiple beams and high gain. Such large antennas are also needed for many scientific applications such as the earth observation (higher resolution radiometers) and the earth orbiting VLBI.

In order to confidently use these large, low sidelobe and multiple beam antennas novel RF, structural and control evaluation methodologies must be investigated to allow performance prediction in the 0-g and space environment. It would also be desirable to compensate for slowly varying surface distortions which may result from thermal effects. These types of distortions will adversely affect the antenna performance.

Among the various antenna concepts, reflector antennas still enjoy strong support among the planners of systems requiring large radiating apertures. In this presentation, a brief review of deployable antenna concepts, such as, mesh deployable, inflatable, etc., is first given. The modern aspects of reflector diffraction synthesis will be summarized by demonstrating how the reflector shaping will allow the generation of contour beams for satellite communications. Next, modern applications of reflector surface distortion compensation techniques and reconfigurable methodologies will be highlighted. Finally, an overview of the recent advances in developing novel RF measurement techniques applicable to large space antennas is presented with focus on such techniques as bi-polar near-field, microwave holography/diagnostics and in-space measurements. Representative results will be presented to demonstrate the maturity status of each of the techniques.

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THE FUTURE OF DIGITAL TV AND HDTV BY SATELLITE

DR. LEONARDO CHIARIGLIONE
Multimedia and Video Services, Centro Studi e Laboratori Telecomunicazioni (CSELT)
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The characteristics of the satellite channel make it suitable for an accelerated introduction of digital techniques. This is being done or planned in several countries.

The MPEG-2 standard has been developed to be very flexible and can accommodate a variety of configurations for different numbers of information streams and picture resolutions.

The MPEG-2 standard can also provide a convenient way of describing the nature and characteristics of the streams carried. This is essential for giving support to future evolution of the types of services.

75th ANNIVERSARY

Personal Communication Systems and Low Earth Orbit Satellite

Dr. Shuzo Kato
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To realize the ultimate goal of communications, "communications with everyone at anywhere and anytime", a number of efforts have been made in various fields. The key issues are frequency utilization efficiency to accommodate as many customers as possible in the limited frequency bands and cost effective realization of nation-wide or world-wide coverage. These lead to the research and development of advanced system concepts, multiple access, modulation/demodulation, forward error correction, voice coding/decoding, channel assignment schemes and so on in addition to hardware implementation technologies which directly affect portability characteristics such as size, weight, talk time, mobility, service coverage and menus available and so on. Cellular and mobile satellite communications systems employ macro cells, from half a km to several km cell size for terrestrial cellular and at least several hundred km cell size for mobile satellite communications, to realize high mobility. Since system capacity is proportion to $1/R^2$ (R: cell diameter), these systems employ low bit rate codecs to achieve high system capacity. On the other hand, digital cordless systems employ micro cells, a couple of hundreds meter in diameter and most of them have been employing a 32 bit/s ADPCM codec. This is because micro cell systems can achieve larger system capacity and cordless phone systems must realize toll quality voice transmission for use at home or offices. Currently, the next (2.5) generation systems in cellular, cordless and mobile satellite communications are being researched, developed and tested. These are DCS 1800 based on GSM, DECT and PHS based on cordless phone systems and personal mobile satellite communication systems such as IRIDIUM, GLOBALSTAR and so on. Since personal communication systems are supposed to be used in wide variety of situations and environments, a compromise must be reached between high quality voice transmission (must-be for home use) and mobility (must-be for mobile passengers), and integration must be carried out between terrestrial and satellite personal communications to offer cost effective mobile communication services nation-widely and/or world-widely. Communications with everyone at anywhere and anytime by one common hand set will be seen in the third generation mobile communication era.

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Mobile Communication Systems and Biological Effects on Their Users

Prof. Maria A. Stuchly
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As the second century of wireless communication is approaching, both the new applications and the old ones, particularly the mobile or personal communication services (PCS), are rapidly growing and spreading. Health effects of human exposure to radio and microwave radiation have been investigated for over half a century and considerable knowledge has been accumulated. This has resulted in development of similar protection standards in various countries. But as new technologies, particularly mobile and cellular telephones proliferate, new questions are asked. These questions and associated research issues are related to the effect of close proximity of an antenna to the telephone user's head, and the specific waveform of the transmitted signal. Both of these issues will be considered in this presentation. As an important observation of how technological achievements and health protection are interrelated and have compatible solutions is illustrated by the fact that the antenna design that improves its radiation performance also limits energy deposition in the user's head.

75th ANNIVERSARY

Real-Aperture Radar (RAR) Imaging from Space

Prof. A.I. Kalmykov
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The main purpose of the RAR application is to observe large-scale and mesoscale dynamic processes in the sea surface, in sea ice and glaciers. The RAR facility is an effective instrument for the study of ocean-atmosphere interactions.

The first RAR was mounted on the satellite "Cosmos-1500" in 1983. In the Arctic region it provided an effective assistance to rescue the convoy of 22 ships carrying cargo for the polar night. In 1985 the ice-breaker "Mikhail Somov" was successfully freed from an ice trap in the Antarctic area. The RAR facility has become the principal means of the Earth remote sensing state operational system "Ocean" and 7 satellite launchings have been made within the framework of this system.

The specific features of the RAR implementation and the experience gained from the practical application of the data provided by this facility are discussed in this report.

In conclusion, analysis is made of the prospects for the joint use of both RAR and SAR within the framework of the National space programme "SITCH" that is currently being worked out in Ukraine.

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Measurement of Mesoscale Oceanic and Atmospheric Phenomena by ERS-1 SAR

Prof. Werner Alpers
Institute of Oceanography, University of Hamburg
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Tel: + 49 (40) 4123 5432 Fax: + 49 (40) 4123 5713

Radar images acquired over the ocean by the synthetic aperture radar (SAR) aboard the First European Remote Sensing Satellite ERS-1 delineate oceanic as well as atmospheric phenomena. The oceanic phenomena visible on ERS-1 SAR images include surface waves, internal waves, eddies, oceanic fronts, underwater bottom topography, and surface slicks. The atmospheric phenomena include katabatic wind fields, internal gravity waves, atmospheric boundary layer rolls, convective cells above the sea, atmospheric undular bores and vortices behind islands. Examples of ERS-1 SAR images showing sea surface manifestations of mesoscale oceanic and atmospheric phenomena are presented and interpreted in terms of oceanic and atmospheric models.

In particular, it is shown how model calculations about the generation and propagation of internal waves in the Straits of Gibraltar and Messina can be validated by using ERS-1 SAR images. Another topic discussed in detail in this presentation is, how information on the variation of the sea surface wind velocity associated with marine boundary layer phenomena can be extracted from ERS-1 SAR images.

SAR Interferometry and the Monitoring of the Earth Surface at Centimeter Level

Dr. D. Massonnet
Centre Spatial de Toulouse, CNES
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Proposed some twenty years ago for the assessment of the topography, Synthetic Aperture Radar interferometry demonstrated its huge potential only recently, when a large amount of high quality data was provided by ERS1, and, later on, by J-ERS1.

Its topographic capabilities were confirmed by these data, sometimes with an unprecedented accuracy. However, an interferometric image, obtained from two radar images taken at different times, reveals the sub-centimeter displacements between the acquisition times once the topographic contribution has been subtracted. This capability was spectacularly demonstrated by the determination of the coseismic displacements of the Landers earthquake. The technique has also been applied to more earthquakes, as well as volcanoes, landslides, artificial or natural subsidence, tectonic fault slip or expansion. Troposheric and ionospheric propagation delays were also characterised by this mean.

Being an advanced measurement tool, SAR interferometry is likely to discover previously unknown phenomena. Surface phase changes have been obtained with Seasat data and repeatedly with ERS1 data, in relation with moisture and surface occupation, indicating more potential applications in environment monitoring.

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Future Developments in VLBI Astronomy on the Ground and in Space

Prof. R.T. Schilizzi
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Very-Long-Baseline Interferometry (VLBI) is poised to take a major step forward in 1996, with the launch of the Japanese Muses-B satellite carrying an 8-m diameter radio telescope into Earth orbit.

The mission, called VSOP for VLBI Space Observatory Programme, will combine the space borne antenna with its ground-based counterparts around the world to form radio interferometers of dimensions 30000 km and maximum angular resolution of better than 100 micro-arcseconds. A second mission called RADIOASTRON is also in the final stages of preparation in Russia and is expected to be launched in 1997 or 1998 into an orbit providing interferometer baselines of 85000 km, about ten times the maximum possible on Earth. This missions will explore the morphologies of cosmic radio sources on scales hitherto inaccessible from the ground at these wavelengths, and hopefully provide clues on the origin of the prodigious energy generation in the nuclei of active galaxies and quasars and its transport, outwards, as well as pointers to the geometry of the universe.

Space VLBI is unique as space science in that the space and ground segments are of equal value in realising the scientific aims. This lecture will cover both segments, technological developments and scientific expectations.

75th ANNIVERSARY

Cold Atoms and Micro-Gravity Clocks

Prof. Christophe Salomon
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Recent progress in laser cooling and trapping of neutral atoms is paving the way for the development of more accurate caesium atomic clocks. Producing micro-Kelvin atoms having an r.m.s. velocity of 1 cm/s requires no more than two diode lasers and a small glass cell.

This paper will survey the progress of ground-based fountain clocks, reporting in detail on some recent results obtained with the prototype clock operating at LPTF. Satellite-based clocks, by taking advantage of a reduced-gravity environment, should enable the full potential of laser cooling to be realized, opening the fascinating possibility to achieve performances superior to those of their ground-based counterparts.

The expected relative stability of fountain and satellite clocks is 1 10^{-16} per day with an accuracy in the 10^{-16} range. The intercomparison of clocks with these performances raises interesting challenges in the time and frequency transfer domain and should also allow a new generation of tests of general relativity.

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Dynamic Interactions Between Ionospheric Plasma and Spacecraft

Dr. David B. Snyder
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In recent years, studies of the interactions between Space Station Freedom and ionospheric plasma have led to an improved understanding of the dynamics of these interactions. Plasma currents from the ionosphere control surface potentials, but the charge stored across dielectric surfaces becomes an important consideration in predicting dynamics of arc development. Timescales for the resulting interactions can be scaled for appropriate circumstances. In addition, active surfaces such as antennae and switched solar array surfaces have fostered thought on the interactions of AC systems. These systems can, under certain conditions, give rise to radiation and enhanced sputtering of surfaces. This paper will review the work performed for the SSF program to understand the dynamics of spacecraft interactions, and will discuss applications to other spacecraft.

Solar System Plasma Waves

Prof. Donald A. Gurnett
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The study of waves in space plasmas has its origin in ground- based observations of whistlers and various very-low-frequency radio phenomena that were discovered in the first half of this century. The launch of the first Earth-orbiting satellites in the late 1950's opened an entirely new era in which many complex plasma wave phenomena were discovered throughout the solar system. These phenomena are particularly interesting for the magnetized planets, where the strong magnetic fields leads to the formation of radiation belts, and highly non thermal plasma distributions. The purpose of this presentation is to describe some of these plasma wave phenomena.

Space plasma waves can be divided into two types, electrostatic waves that have no magnetic field, and electromagnetic waves that have both electric and magnetic fields. Both types of waves can be spontaneously generated by non thermal plasma distributions, such as beams and trapped particle populations. These plasma wave emissions are somewhat analogous to the generation of coherent light in a laser, with the free energy of the non thermal plasma playing a role similar to the population inversion in the lasing material. Some of the electromagnetic emissions from the radiation belts of the magnetized planets are very intense. For example, the Earth radiates almost 10^9 Watts in the frequency range from about 100 to 500 kHz, and Jupiter radiates as much as 10^{11} Watts in the frequency range from 1 to 40 MHz. In addition to producing very powerful planetary radio sources, many of these plasma wave emissions play a crucial role in the dynamics of planetary radiation belts, and in the interactions of the planetary plasma with the interplanetary medium.

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Microwave Power Transmission from Space and Related Nonlinear Plasma Effects

Prof. Hiroshi Matsumoto
Radio Atmospheric Science Center
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We first present a brief historical review of the development of technology and scientific research related to the transmission of electrical energy via radio waves. The idea of radio power transmission was first conceived by Tesla about a century ago. However, the first such use of radio waves was for transmitting information, and not for transmitting electrical power per se. At the close of World War II, engineers and scientists re-examined the original Tesla idea of transmitting electric power to a distant place via radio, as high-power microwave technology became available. These efforts resulted in the Solar Power Satellite (SPS) which was proposed by P. Glazer in 1968.

The NASA/DOE concept of the SPS was extensively developed in the late 1970's. After reviewing this concept, and also the more recent model of the SPS, we will discuss the current status of research on microwave power transmission from space. Our focus will be on related experiments conducted in the 1980's and 1990's including those on ground-to-ground microwave energy transmission, ground-to-aircraft power transmission, and rocket-to-rocket power transmission. The latest rocket experiment was carried out to examine a possible nonlinear interaction of intense microwaves with the ionopsheric plasma. Finally we will consider related nonlinear plasma effects caused by mutual interactions among radio waves, electron beams, and space-structures. Such problems of interaction must be resolved before space-to-ground and space-to-space power transmission can be realistically developed.

Conferences

CONFERENCE REPORTS

1994 URSI Commission F "Microwave Specialist Symposium on Microwave Remote Sensing of the Earth, Oceans, Ice, and Atmosphere"
18-20 May 1994, Lawrence, Kansas, USA

URSI Commission F held the latest in a long series of specialist symposia on microwave signatures in Lawrence, Kansas, U.S.A. on May 18-20, 1994. These specialist symposia are held between General Assemblies, and are intended for small groups working directly in the field to interact more closely than possible in a large meeting. Attendance at the 1994 symposium was 82 individuals from 12 countries. Students in attendance totalled 26. Six young scientists attended with support from URSI and the University of Kansas Institute for International Studies.

Topics of papers presented included:

Oceans:	11
Ice:	11
Vegetation and Soil:	7
Systems and Calibration:	8
Atmosphere:	7
ERS-1 Results:	12

Papers on oceans covered a wide range of topics, from scattering theories through modulation of signals by wave motion to algorithm development for wind-vector spaceborne scatterometers. Notable were papers on use of polarimetry in radiometric observations. Ice papers dealt with both active and passive sensing of sea ice and continental ice sheets. Vegetation and soil papers included theory of scattering from vegetated surfaces, measurements of soils and a paper on a ground-penetrating radar. Various new radar and radiometer systems were described in the Systems session. Papers in the Atmosphere session ranged from rain measurements to profiling of atmospheric absorption and water vapour. The ERS-1 sessions included papers on numerous topics, including calibration, combination of data from ERS-1 with visible/IR sensors and with JERS-1. Some of them dealt with oceans, ice, and vegetation/soil, so the totals in those categories are higher than shown in the list for the specific sessions.

The conference banquet recognized the retirement from teaching (but not research) of Prof. Richard K. Moore of the University of Kansas.

The meeting was organized by Prof. S. P. Gogineni of the University of Kansas with the help of an international technical program committee chaired by Prof. Kenneth Jezek of Ohio State University.

Partial support for the symposium was provided by the U.S. Office of Naval Research, the U.S. National Aeronautics and Space Administration, and the University of Kansas.

Richard K. Moore

SCOSTEP Bureau Meeting &
8th International Symposium on Solar Terrestrial Physics
5-10 June 1994, Sendai, Japan

The Eight International Symposium on Solar Terrestrial Physics (dedicated to Solar Terrestrial Energy Programme) was held in Sendai, Japan from June 5-10, 1994. The symposium was held for the first time independent of meetings of other ICSU bodies: in the past the International STP Symposia were held jointly with COSPAR. The Bureau met on 3, 7 & 9 June and the STEP Steering Committee met on 4 and 5 June, 1994. The meeting on June 5 was basically devoted to post-STEP programmes. There was a special Evening Session on 7 June.

It was a very well organised meeting with about 150 scientists from outside Japan and about 170 from Japan. Partial or full financial support was given to 43 scientists including about 30 from developing or transitional economy regions. There was no specific support programme for young scientists.

There were over 50 invited papers and 280 poster papers. In addition, there were three tutorial lectures as follows :

T1 C. De Jager : "Solar Flares; Ignition and partical acceleration"

T2 T.J. Williams : "Global Energy Flow in the magnetosphere-ionosphere system"

T3 G.C. Reid : The impact of solar irradiance variations on the middle and lower atmosphere"

The organisation and contents of the symposium were first rate. Of the many matters discussed in the Bureau, those of interest to the URSI concern:

(i) relevant URSI people as Discipline Representatives
(ii) post-STEP programmes
(iii) ICSU decision on the future of SCOSTEP.

Of the 40 Scientific Discipline Representatives at present an appreciable number comes from the URSI community - principally from Commissions F, G, H and J. Of these those will retire at the end of 1994 include:

P. Bauer, President, URSI
J. Rottger

Altogether 26 new entrants are needed. From the URSI side I have suggested some names from the Radar community. The present major SCOSTEP programme (Solar Terrestrial Energy Programme : STEP) will end in 1997. There was considerable discussion about post-STEP programmes. Two view points were expressed. One was having a cluster of moderate-sized programmes covering different areas and the other was of having a large programme of STEP magnitude. It as agreed that such post-STEP large activity should be undertaken only from 2000 A.D. onwards. The period 1998 - 1999 should be devoted to : "Data Analysis and Modelling and Simulation Interval".

The major programmes suggested from 2000 AD onwards were the following:

1. SPESS : Studies on Planetary and Earth Environment in the Solar System (suggested by the Japanese STEP Committee)
2. IDSCS : International Decade of Solar Cycle Studies (suggested by the Soviet Group and supported by IAU Commission X)
3. Interplanetary Climate and Weather (suggested by .....)
4. Middle Atmosphere & Thermosphere monitoring and modelling (suggested by Fukinishi, Fuji, Ogawa and Fukao)

A group has been formed by SCOSTEP to process these and other proposals for post-STEP programmes consisting of the following:

Vincent (Chairman)
A.P. Mitra
Wu

For the STEP Data Analysis Project, following group was formed:

H. Oya (Chairman)
Rostoker
J. Allen

The third matter concerns the future of SCOSTEP. The 31st General Committee of ICSU held on 1st and 2nd October, 1993 has the following comments in the Report of the General Committee :

" The Treasurer presented the review of SCOSTEP. All members of the review panel agreed on SCOSTEP's efficiency in promoting and conducting international programmes bringing the international scientific community together in designing research campaigns, effecting data collection and conducting scientific analyses. However, some members were of the opinion that other ICSU bodies, such as COSPAR and IAGA, could perform such tasks. As a compromise, the review panel recommended that SCOSTEP, when planning its post-STEP programme, consider alternative modes of operation and that cooperation with other ICSU bodies should be strengthened. SCOSTEP has accepted the recommendations of the review panel and the General Committee looks forward to the actual implementation of these recommendations."

The SCOSTEP Bureau had strong reservations on this matter. It pointed out that the SCOSTEP has not accepted the recommendations fully although it has agreed to look into all possibilities of strengthening the cooperation with other ICSU bodies.

SCOSTEP has a remarkable record of achievements and of successfully conducting several major programmes (such as the MAP, IMS and now the STEP). Its inter-disciplinary nature has been addressed quite effectively through cooperative activities with other relevant bodies such as the URSI, IAU, IUGG, COSPAR. It is very efficiently and economically run. At the same time, its thrust on the science of solar-terrestrial relationship is uniquely its own and best conducted by a body of this nature. STEP is an example of the effectiveness of SCOSTEP. It would be a pity to force a merger of SCOSTEP with another ICSU body.

Another matter discussed extensively was the question of cost-free availability of meteorological and geophysical data and the present crisis in maintaining long-term data bases. On the first a resolution was framed on free transfer of meteorological, geophysical, solar and magnetic data for STP/IGBP scientists. On the second, concern was expressed on the possible termination of funding support of research in and infrastructure of solar-terrestrial physics in Canada.

The new officers elected for SCOSTEP are :
President : C.H. Liu
Vice-President : H. Oya
Scientific Secretary : J. Allen

Dr. A.P. Mitra
URSI Representative on the SCOSTEP Bureau

12TH INTERNATIONAL WROCLAW SYMPOSIUM ON ELECTROMAGNETIC COMPATIBILITY
28 JUNE - 1 JULY 1994, WROCLAW, POLAND

At the Secretariat we received 2 reports on this Symposium and both are printed below. the first was received from Prof. Dr. F.L.H.M. Stumpers, the official URSI representative and Program Chair at the Symposium, the second report was written by the Symposium Organizers.

Report by Prof. Dr. F.L.H.M. Stumpers URSI Representative

This symposium was attended by 250 persons from many countries. A survey was given by myself in Electromagnetic Compatibility 1994 (late papers) and for Lightning by Prof. Ianoz (321-325). There is not enough place to repeat all this here.

Dr. C. Baum started the symposium on Monday, June 27 with a tutorial on EMP. The clarity of his lectures is well-known, this was no exception. Tuesday, June 28, at 9 o'clock the opening session of the symposium, had introductory papers by professor Majewski, chairman Symposium Council, Professor Bem, symposium chairman and myself as chairman scientific program committee. At 11 o'clock a special ceremony took place in the Aula, led by the Rector, prof. Wiszniewski, (with ermine mantle) in which the Senate conferred the degree of doctor honoris causa on me. Three vice rectors, nine deans, two scepters were present, as well as my promoter professor Bem. The university choir sang the national anthem, the polonaise "Farewell to the fatherland", Mozart's "Laudate Dominum" and the academic anthem "Gaude Mater Polonia" during pauses in the ceremony. After the ceremony a reception was held, during which many symposium attendees came to congratulate me, as well as ministers and other polish personalities. For myself and my wife it was an unforgettable day. In the afternoon I chaired a special session, in which professor Sir Francis Graham Smith spoke on "The radio Universe". The following session, chaired by dr. Spoelstra treated "Interference effects in radio astronomy". In the evening there was a cocktail party in the medieval townhall.

The European Community required in its E.C. Directive on EMC, that all equipment, placed on the European market should comply with a set of harmonized standards, covering both interference and immunity. The aim of this Directive is clear : to avoid, that an apparatus disturbs the working of other electrical apparatus in its neighbourhood, and that its own working is disturbed by interference, occurring in its normal environment. In EMC the role of a generic requirement is limited, as any specific product standard overrules the generic standard. The generic standard measures EMC fields between 30 MHz and 1 GHz, whereas the household appliances standard measures between 30 and 300 MHz, and with regard to immunity the draft household appliances. Standard does not require any test for household appliances, containing no electronic control. This directive created a shortage of relevant engineering skills in the UK., where Marvin set up an M.Sc. course at York and Hull universities, and a consortium of these universities with those in Paderborn (Germany), Patras (Greece) and Rome (Italy) plans to agree on a pan-European M.Sc.See Marvin, Anaheim EMC Symp. 158-163, 1992. Professor Habiger criticized in this Symposium an ESD requirement (IEC 801-2), that an apparatus should withstand 10 pulses at each level 2, 4, 6, 8 kV, and thinks this number should be increased to 100, 500 or 1000. Obviously this would require automatization. Bochkov did tests for noise immunity, in order to improve on the tests of IEC 801-4, using methods of experimental design theory. His new multi-factorial tests are an improvement on the test, discussed here in his 1992 paper. Vrolijk also starts from IEC 801-2 and 4. He discusses a draft immunity standard for household appliances. For mass-produced appliances the CISPR 80/80 method could be used (80% of the appliances comply with the requirements with at least 80% confidence). Another paper on immunity of a different type was given by Pietranik and Zarko. They propose to use the third order intermodulation factor as the parameter, that characterizes the receiver's immunity against intermodulation. Immunity will be on our agendas for several more years.

In the biological effects section, rats and mice are the favourite animals. One wonders, whether there will be enough correlation between the effects on humans, and the effects on these small animals. Yoshino drew attention to the danger of sitting to near to the cathode ray screen, as computer people usually do. He suggested the use of a conductive transparent coating film, that also found application in USA. Sweden was one of the first countries, to draw attention to this danger. So far CENELEC has not found it necessary, to follow in this direction. Yoshino sees also a danger in car transmitters and walkie-talkies in cars, if the head of the operator is too near to the antenna. Antennas should be installed with care, and preferably above the head of the operator. Studies were done at wavelengths of 2 m, 70 cm and 24 cm. Further study is necessary.

Seismogenic emissions preceding earthquakes have been a subject of interest in the (former) USSR and Japan (Gokhberg, Yoshino). A group of Greek scientists around Kopanas and Varotsos came up with a formidable result : They predicted on March 1,994, that an earthquake of magnitude 6.0 would occur between April 11 and 18 in the sea area between the western Peloponesus and Zakynthos island. It really happened on April 16 and the magnitude was 5.8. The Greek authorities have confirmed this. We really hope to see a follow-up !

To protect radioastronomy reception by a 25 meter high screen around the antenna was tried at Arecibo, and Nancay is studying the effect of a 30 to 40 meter high screen around its telescope. The general knowledge of radio-astronomers is exemplified by Ponsonby, who showed the Russians,

how they might decrease the sidebands of their GLONASS transmitters and in that way help the radio astronomers, without any disadvantage to themselves.
We had a number of papers on printed circuit boards by John and his colleagues at Siemens-Nixdorf. Analogous research is done at Philips Research and it will be possible to compare results at the Zurich Symposium.
Professor Kikuchi drew attention to the effect of chaos and chaotic fluctuations in gas discharges. From an EMC point of view it is interesting to find out whether it is easier to suppress the chaotic fluctuations or to suppress their effects.
Mayher, Parlow, Boe and Goddard have drawn attention to the relation between EMC and Frequency Management in this and earlier Wroclaw EMC Symposia.
Other subjects we can only mention : Antennas and Propagation. EMC in Power engineering. Lightning and LEMP. EMI Reduction Techniques. Whistlers.
As you may see on the example of this symposium, EMC is really a multidimensional field of research and in our highly technological civilization, an indispensable one. Without attention to Compatibility this civilization based on intensive use of electromagnetic energy cannot develop further.

Prof. Dr. F.L.H.M. Stumpers
Honorary President URSI

Report by the Symposium Organizers:

The Symposium was organized by the Association of Polish Electrical Engineers, the Institute of Telecommunications, and the Wroclaw Technical University. It was co-sponsored by URSI and supported by ITU-R, ITU-T, and other international organizations as well as by national associations of electrical and electronic engineers from 17 countries.
The Symposium Council was chaired by Prof. W. Majewski (Poland) with vice chairman Prof. R. Struzak (Poland), and the Scientific Program Committee by Prof. F.L.H.M. Stumpers with vice chairmen Mr. Th. Irmer (ITU-TSB), and Mr. R.C. Kirby (ITU-BR). The co-chairmen of the Symposium were Prof. D.J. Bem and Mr. J. Rutkowski, and the Organizing Committee was chaired by Mr. W. Moron.
There were 250 participants from 26 countries. The most numerous groups were from Poland (117), Russian Federation (21), Germany (15), Hungary (10), UK (10), France (8), Japan (8), USA (8). Some people came from Canada, China, Thailand, Greece and the Republic of South Africa.
Because of the financial problems some authors (especially from China and the former Soviet Union) had to resign from the participation, but they declared their willingness to come to the next Wroclaw Symposium.
Proceedings containing 134 papers accepted for presentation, delivered by 281 authors and co-authors from 26 countries were available to all the participants during the Symposium.
On the day before the Symposium opening, a Tutorial Lecture was given by Dr. C.E. Baum (USA). He presented the topic "EMP and Related Matters".
The Symposium was opened by its chairman, Prof. D.J. Bem. On behalf of Symposium Patron the Minister of Posts and Telecommunications of the Republic of Poland, the audience was greeted by the PTT vice-minister, Mr. M. Rusin.
After the Symposium opening a rather unusual event took place. It was a sublime ceremony of conferment of a honorary doctor's degree on Professor F.L.H.M. Stumpers granted as an appreciation of fruitful cooperation in the field of EMC by the Technical university of Wroclaw, the symposium host and one of its co-organizer. All Symposium participants were invited to attend that ceremony. Prof. Stumpers has been the Scientific Program Chairman of the Symposium since 1975.
Plenary sessions were held on the first and third day. The following two papers were presented :

- "The Radio Universe" by Prof. Sir F. Graham-Smith (UK),
- "The International Framework for Spectrum Management" by Mr. M. Goddard (UK).

The third plenary paper "Biological Effects of Electromagnetic Fields" by Prof. L. Miro (France) was not presented because the author could not come, nevertheless the paper was inserted into the Proceedings.
Twenty three regular and six poster sessions covered various fields of EMC. Only 94 papers out of 134 contained in the Proceedings were presented because of some authors absence. All the sessions were held in English.
The core of the Symposium was formed of the following invited sessions :

- High Power Electromagnetics, organizer Dr. C.E. Baum (USA)
- EMC in Amateur Radio Service, organizer Mr. H. Cichón (Poland); IARU Region sponsored sessions,
- Coupling to Cables and Structures, organizer Prof. P. Degauque (France); URSI Commission E sponsored session
- Regulations and Standards in EMC, organizer Mr. G. Goldberg (Switzerland)
- Terrestrial EM Noise, organizer Prof. M. Hayakawa (Japan); URSI Commission E sponsored session
- Lightning and LEMP, organizer Prof. M. Ianoz (Switzerland);
- Noise, Fluctuations and Chaos, organizer Prof. H. Kikuchi (Japan); URSI Commission E sponsored session
- EMC in Science Services - Activities of the ITU Radiocommunication Study Group 7, organizer Mr. H.G. Kimball (USA); ITU-RR sponsored session
- EMC in Science Services - Interference Effects in Radio astronomy, organizer Dr. T.A. Th. Spoelstra (The Netherlands); ESF - CRAF sponsored session
- EMC in Wire Communications, organizer Prof. G. Varju (Hungary); ITU-T SG5 sponsored session
- Alternatives to Open Area Test Sites, organizer Mr.

P.F. Wilson (Switzerland);
- Biological Effects of Electromagnetic Waves, organizer Prof. T. Yoshino (Japan); URSI Commission K sponsored session
- Seismogenic EM Emissions for Earthquake and Volcanic - Eruptions Prediction, organizer Prof. Yoshino (Japan); URSI Commission E sponsored session.

The titles of the other sessions were
- Antennas and Propagation - EMC Aspects
- EMC in Power Engineering
- EMC in Printed Circuit Boards
- EMC Measurements and Instrumentation
- EMC Prediction Analysis and Modelling
- EMI Sources and Coupling Paths to Victim
- EMI Reduction Techniques, Regulation and Standards in EMC
- Spectrum Management, Sharing and Monitoring.

The "Open Forum on Standardization in EMC" evoked a great interest. It was organized by Mr. M.C. Vrolijk (The Netherlands) and key speakers were : Mr. G. Goldberg (chairman of IEC ACEC), Mr. R. Denoble (president of CENELEC) and Mr. Ch. J. Corbett (ETSI).

The same interest evoked a round table discussion on "Spectrum Management : Resolving Future Spectrum Requirements". It was co-organized and co-chaired by Mr. Th. Boe (Norway) and R.J. Mayher (USA); the key speakers were : Mr. M. Goddard (UK), Mr. R.D. Parlow (USA), Mr. W. Sega (Poland), and Mr. R.G. Struzak (Poland).

Two workshops accompanied the Symposium :
- Overview of Pulse Disturbances, organized by Rohde & Schwarz (Austria),
- The emissions and Immunity Testing in EMCO - GTEM Cell, organized by EMCO EUROPE (Germany).

Young Scientists Program was organized with the financial support of URSI. Support was offered to three young scientists, and two key speakers were partially supported. The organizers contacted also the International Science Foundation (Washington, USA) which offered financial support to scientists from the former Soviet Union. Three scientists attented the symposium with this help.

A technical exhibition was held during the Symposium with the participation of 10 companies.

There was also a literature exhibition including publications of international organizations (URSI, ITU-R, ITU-T, ETSI, EBU, CENELEC and IEC (CISPR, and TC77)), and some books from Prentice-Hall (UK).

Both exhibitions were well received and well-attended.

A computer room was available to all participants to enable software presentation and in depth discussions, as well as E-mail through Internet Network

A Joint Meeting of the Symposium Council, the Scientific Program Committee, and the Organizing Committee, together with Session Chairmen was held on the last day. It was co-chaired by Prof. R. Struzak vice chairman of the Symposium Council, and Prof. F.L. Stumpers, chairman of the Scientific Program Committee. The present Symposium and future improvements were discussed.

Generally, the current event was positively evaluated and it was stressed that the broad range of the Symposium topics resulting from the accepted EMC definition should be continued. It was agreed that due to such strategy fruitful new ideas are often born, and duplication of efforts can be avoided thanks to contacts and discussions among specialists involved in various fields of EMC.

It was also emphasized that a mixing of theoretical and engineering topics is very fruitful and should be retained. The positive influence of the interaction between those involved in theory and those involved in the engineering practice cannot be overestimated.

Copies of the Symposium Proceedings are available from:
EMC Symposium
Box 2141
51-645 Wroclaw 12, Poland
fax : +4871 483248
tlx : 712118 ilw pl,

The 13th Wroclaw Symposium on EMC is planned for June 25-28, 1996.

The Organizing Committee

Mathematical Methods in Electromagnetic Theory
MMET'94
7-10 September 1994, Kharkov, Ukraine

The two preceding International Conferences on Mathematical Methods in Electromagnetic Theory (MMET'90 and MMET'91) caused a great interest of the participants, both from inside and outside the Former Soviet Union. This lead us to the conclusion of the necessity of holding the MMET conference on a regular basis.

MMET'94 is the fifth conference in this series, the first two being for domestic attendance only with Russian as working language. This time the Conference is organized by the National URSI Committee of the Ukraine, in cooperation with the URSI Commission B. It was held on September 7-10, 1994, in the Kharkov State University. I am grateful to Prof. L.N. Litvinenko, Vice-President of the Ukrainian NC URSI, Prof. O.A. Tretyakov, Chairman of the Commission B of NC URSI, Prof. V.A. Svich, Rector of the Kharkov State University, and Prof. A.D. Olver, Chairman of the URSI Commission B, and the staff of the ERO USARDSG-UK for their great support and encouragement.

The Conference Program contained 119 papers from 15 countries, including 9 invited papers.
Paper distribution (total: 119)

Ukraine	48	Russia	40
Turkey	7	Japan	6
Belarus	3	USA	3
France	2	Georgia	2
Italy	2	Argentina	1
Germany	1	Greece	1
Israel	1	Poland	1
Spain	1		

The covered topics are :
- High-Frequency Methods
- Scattering and Diffraction
- Transients and Time-Domain Methods
- Gratings and Rough Surfaces
- Regularization Techniques
- Optical Fibers
- Open Waveguides and Resonators
- Numerical Methods
- Inverse and Synthesis Problems
- Remote Sensing
- Antennas and Propagation
- Waveguides and Discontinuities
- Waves in Nonlinear and Exotic Media.

The largest number of papers was presented by Young Scientists. I acknowledge the support of the URSI Commission B to the participation of 9 young scientists from ex-USSR and 3 from other countries. I hope that the Conference will be a good school for them. I wish a success to all the participants of MMET'94 and hope to meet all of you at the next MMET conference.

Eldar I. Veliev, General Chairman

The general purpose of holding the MMET'94 conference is to give a forum of ideas exchange and interaction in field of Electromagnetic Theory, between the ex-USSR and the Western electromagnetics community. The number of ex-soviet scientists able to attend international conferences is still at least two orders of magnitude less than it deserves to be. A conference held in the Ukraine, with English as the only medium of presentation, gives a unique chance to make their work available to world-wide audience.

The proceedings contain the contributions which have been accepted to the Program of MMET'94. They cover all the traditional topics of the URSI Commission B activities, and demonstrate the vitality of Electromagnetics research and researchers.

I would like to express my gratitude to the effort made by the authors preparing their manuscripts in four-page manner.

It was a pleasure to work with the members of TPC and LOC preparing the Conference in the time of political and economical problems in this country.

A success of the meeting is determined by the scientists who have decided to submit the papers to MMET'94. Their participation has helped to form an exciting technical program that makes this conference a major event in Electromagnetic Theory. Thank you all.

Alexander I. Nosich, on behalf of LOC

MMET'94 Committees:

General Chairman
Prof. E. I. Veliev

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- Prof. O.A. Tretyakov, Co-Chairman, Kharkov State University, Ukraine
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Proceedings

The only ex-USSR-based conference in Electromagnetics and Applications with English as working language, held in Kharkov, The Ukraine, on September 7-10, 1994.

Sample papers :
- A hybrid approach : the integral equation method and the physical theory of diffraction, E. Vasiliev and V. Solodukhov
- Ray technique for stationary waves in guided wave structures, M. Hashimoto
- Modeling with integral equations in computational electromagnetics, D. Wilton
- Polarimetric radar backscatter, E. Luneburg
- From functional analysis to the method of fictitious sources in electromagnetic diffraction, R. Petit
- Method of analysis of antennas with nonlinear elements, Y.S. Shifrin and A.I. Luchannov
- Development of time-domain uniform GTD and its modification for analyzing the transient scattering from curved-wedge configurations, P.R. Rousseau and P. Pathak

Price:
535 pages; 50 $ + 10 $ for air mail;

Please, send the orders to the following address :
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Ukrainian Academy of Sciences
Akademika Proskury Ulitsa 12
Kharkov, 310085, The Ukraine

EMC'94 ROMA - International Symposium on Electromagnetic Compatibility
13-16 September 1994, Rome, Italy

The First International Symposium on EMC in Italy took place in the Faculty of Engineering, University of Rome "La Sapienza", September 13-16, 1994. The Symposium was organized by the University of Rome "La Sapienza" and AEI - Associazione Elettrotecnica ed Elettronica Italiana, sponsored by URSI- International Union of Radio Science, CNR - National Research Council, ENEA - Italian Agency for New Technology, Energy and the Environment, Telecom Italia and Italferr-Sis. T.A.V., and cooperated by IEEE North Italy Section and IEEE Central and South Italy Section.

The International Steering Committee (ISC) of EMC'94 ROMA was composed by
M. D'Amore (Chairman), Italy
P. Bernardi (Vice-Chairman), Italy
M. Feliziani (Secretariat), Italy
F.G. Canavero, Italy
J. Catrysse, Belgium
C. Christopoulos, UK
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R. Sato, Japan
V. Scuka, Sweden
F.M. Tesche, USA
P.C.T. van der Laan, The Netherlands.

More than 250 summary papers have been submitted for presentation to EMC'94 ROMA Symposium by authors of 34 different countries. Each summary has been reviewed by two members of the ISC, experts in the subject of the paper and with a different nationality from that of the authors. When the paper evaluation of two referees was in conflict, a third referee was asked to give the final evaluation of the paper. Each main author then received a copy of the Paper Review Forms completed by the referees.

A meeting of the ISC was held in Rome on February 11, 1994, to complete the review process and define the technical programme composed by three-day oral and poster presentations plus one-day workshops. In the final programme 178 technical paper presentations have been

scheduled, 98 presentations in oral sessions including 5 invited papers and 80 presentations in poster sessions. The maximum six-page, double-column papers have been published on the two-volume, 881 pages Symposium Proceedings.

In order to promote a wide participation, only two parallel oral sessions have been scheduled in the technical programme. The oral presentations have been subdivided in 16 oral sessions on the following EMC subjects: Human Exposure to EM Fields; Lightning; Anechoic Chambers & TEM Cells; Cables; Standards & Regulations; EMC Standard Testing; Testing Vs. Modelling; Numerical Modelling; Field-Excited Transmission Lines; EMC Education; Interconnecting & Packaging Structures; PCB's & Chip Design; EMC Automotive; Railway Systems; Power Systems; Shielding.

The final programme has included also an invited opening session "EMC Strategies: Industrial and Research Perspectives" with the participation of F.M. Tesche, M. Kanda, G. Goldberg and B. Audone.

The poster presentations have been scheduled in the afternoon without overlapping with the oral sessions and have been subdivided in the following poster sessions:; Antennas & Communication Systems; Measurement & Instrumentation; EMI in Power Apparatus & Systems; Harmonics & Power Electronics; Biological Interactions; EM Environment; Propagation & Coupling in TLs; Transients; EMC Industrial & Space Applications.

EMC'94 ROMA Secretariat has registered 368 participants from 30 different countries as listed in the following:

Austria	2	Azerbaijan Republic	1
Belgium	7	Brazil	3
Canada	2	Czech Republic	5
Denmark	1	Finland	1
France	24	Germany	32
Greece	4	Hungary	2
Ireland	1	Israel	2
Italy	168	Japan	9
Jordan	1	Kazakhstan	1
Malaysia	1	Mexico	1
Norway	4	Netherlands	6
Poland	17	Romania	4
Russia	11	Spain	7
Sweden	12	Switzerland	7
United Kingdom	17	USA	15

In order to encourage discussion and participation during the sessions, Oral Presentation Best Paper and Poster Presentation Best Paper awards of Italian Lire 500.000 have been established. The best papers have been selected during the symposium by the ISC members and the session chairmen on the basis of content, presentation and discussion of the paper. After a ballot at the end of the symposium, the Oral Presentation Best Paper award was given to F. Maradei, University of Rome "La Sapienza," Italy, for the paper "A Procedure for Numerical Solution of Field-Excited Nonuniform Transmission Lines" and the Poster Presentation Best Paper award was given to D. O. Wendt and J. L. ter Haseborg, Technical University of Hamburg-Hamburg, Germany, for the paper "Radiation Losses Representation in the Transmission Line Theory (TLT)".
On Friday September 16 - the last day of the Symposium - two workshops and a technical visit took place. In the first workshop, the Final Report of the European Project "Electromagnetic Compatibility: Fast Transients in Telecommunication and Power Apparatus and Systems" was presented. The Project was supported by the European Communities in the Science Programme in 1992-1994 and coordinated by M. D'Amore. The speakers at the workshop were researchers of the eight universities participating to the project: University of Rome "La Sapienza", University of Limoges, University of Lille, National Polytechnic of Grenoble, Technical University of Hamburg-Harburg, University of Stuttgart, Federal Polytechnic of Lausanne and Polytechnic of Turin. The aim of the second workshop "Electromagnetic Pollution and Bioelectromagnetic Interactions" chaired by P. Bernardi was to focus the still unsolved problems and present some recent progress in the research areas. The speakers were Q. Balzano, T. Damboldt, R. De Leo, G. D'Inzeo, Om P. Gandhi and P. Vecchia. The laboratories of ENEA and INFN at Frascati were chosen for the technical visit. The Symposium has been accompanied by a technical exhibition related to EMC; 16 exhibitors with 82 personnel staff have been registered.

All the activities related to the symposium have taken place around the antique cloister inside the Faculty building, which is located very close to the Colosseum and the archaeological areas of Rome. Social Programme has included a welcome cocktail at the Campidoglio - the City-Hall of Rome - and a banquet at the Casina Valadier at Pincio. Interesting tours have been also organized to visit some well known, tourist areas of the city (St. Peter and Vatican Museums, Roman Forum, Christian basilicas and catacombs).

The technical programme has been appreciated by the participants if considering the relevant number of attendees at all oral and poster sessions. Particularly the poster sessions have been a success for the friendly atmosphere which has encouraged informal discussions among the participants.

For further information and/or to order the Symposium Proceedings please contact

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Prof. Paolo Bernardi
URSI Representative

11TH INTERNATIONAL ZURICH SYMPOSIUM & TECHNICAL EXHIBITION ON: ELECTROMAGNETIC COMPATIBILITY

7-9 MARCH 1995, ZURICH, SWITZERLAND

Under the auspices of:

Mr. F. Rosenberg, Director-General of the Swiss Telecom PTT, Bern

Sponsor:

IEEE Switzerland Chapter on Electromagnetic Compatibility

Organized by:

Communication Technology Laboratory of the Swiss Federal Institute of Technology Zurich

Co-operating:

Swiss Federal Institute of Technology, Zurich (ETHZ), Swiss Electrotechnical Association (SEV/ASE), IEEE Switzerland section, Swiss Society of Engineers and Architects (SIA), German Association for EMC-Technology (DEMVT), European Broadcasting Union (EBU), Association of Polish Electrical Engineers (SEP), International Telecommunication Union (ITU), IEEE Electromagnetic Compatibility Society, International Union of Radio Science (URSI).

Conference Registration:

To avoid inconvenient queuing it is recommended to register prior to the Symposium. At the conference the registration desks will be open at 8:30 on Monday, March 6 and thereafter daily from 8.00 till 18.00. Admission to the conference is only possible after receipt of the registration fee.

Registration fee:

Speakers, authors, chairmen, committee members	SFr. 320.-
Other participants if payment received before February 1, 1995	SFr. 380.-
After February 1, 1995	SFr. 440.-

The above full registration includes lectures, workshops, record, exhibition catalogue, coffee and cocktail tickets (banquet not included).

Students (lectures, workshops and record only)	SFr. 50.-
One-day ticket (lectures and workshops only)	SFr. 170.-

Symposium record and reprints:

Additional copies of the record may be obtained during the Symposium at SFr. 120.-. Thereafter, copies will be available for SFr. 140.-, including handling and mailing.

Up to 25 reprints of papers from the record may be ordered. Records and reprints from past symposia are also available in limited quantities.

Program Summary

Opening Ceremony

Tuesday, March 7, 9.00 sharp at the "Auditorium Maximum" of the Federal Institute of Technology. Inauguration of the Symposium by Mr. F. Rosenberg, Director-General of the Swiss Telecom PTT. Welcome addresses by Prof. R. Heutter, Vice-President research, ETHZ, P. Tarjanne Secretary General, ITU. Keynote speaker: Dr. P.M. Hopkins, Lockheed. Other prominent personalities will participate.

Sessions:

The technical program of the Symposium features 18 sessions, in which about 120 papers will be presented reflecting the recent results of EMC science and technology. Sessions F, G, H, I, J, K, N, P, Q, R, have been solicited submissions for review by the Program Committee. Their outstanding contribution to the technical program is gratefully acknowledged.

Overview of the sessions:

A: Transient effects
B: EMC applications
C: Power systems
D: Transmission lines
E: Standards
F: Trends in spectrum management
G: Circuit oriented techniques in EMC
H: EMC immunity testing
I: Electromagnetic field hazards
J: EMC education and training
K: Numerical techniques for EMC
L: Immunity
M: Lightning EMP
N: EMC instruments and measurements
O: Shielding and coupling
P: Electronic design under EMC constraints
Q: Alternatives to open area test sites
R: ESD Dynamics: Model / Measurement

Tutorial lectures:

The tutorial lectures on Monday, March 6 will review basic principles in areas fundamental to EMC. The objective of the courses is to provide better understanding of the regular session material.

Chairman:

Prof. Dr. C.R. Paul, Univ. of Kentucky, Lexington, USA

Objective:

The objective of the tutorial presentations is to provide overviews of the basics of certain EMC topics for the purpose of assisting the attendees in their understanding of the material presented in the technical sessions.

T1 Numerical Methods in EMC - an Update
(Monday, March 6, 10.00-12.30)

Lecturer:

Prof. Dr. J. Perini, Syracuse Univ., Syracuse, NY, USA

Topics:

The tutorial will list the techniques discussed in the EMC Zurich'91 tutorial and then will discuss the latest developments in the Method of Moments and Geometric Theory of Diffraction. Most of the tutorial will then concentrate on the Finite Element and Finite Difference Methods in the frequency and time domain implementations

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T2. Principles and Applications of EM Field Coupling to Transmission Lines
(Monday, March 6, 13.30-15.30)

Lecturers:

Dr. F. Tesche, Dallas, TX, USA

W. Blumer, Fed. Inst. of Technology, Zurich, Switzerland

Topics:

A key aspect of EMC analysis is the calculation of EM field interaction with electrical cables. An integral equation solution for such a problem can be simplified to yield the transmission line equations for the current and charge on the line. This tutorial will discuss the development of these Telegrapher equations, illustrate the limits of validity of the analysis, and provide examples of coupling responses. at the end of the talk, a demonstration of the state-of-the-art transmission line coupling code will be presented.

T3: PCB design and EMC
(Monday, March 6, 16.00-18.15)

Lecturers:

Prof. J. Catrysse, Catholic Ind. Univ., Oostende, Belgium

B. Danker, EMC Consultant, Nuenen, Netherlands

Topics:

State of the moment overview concerning typical questions on PCB design under EMC constraints, and the requirements for future lay-out rules and related CAD software (J. Catrysse)

Hands-on" introduction on the basic aspects of PCB design under EMC constraints. Practical examples will be discussed and demonstrations will be shown for the illustration of the theory (B. Danker).

Workshops:

A workshop will be organized which covers the recent developments concerning the EMC Directive of the EU. After introductory lectures by invited speakers, a full hour will be reserved for questions and answers. the purpose of the workshop on Case Studies is to provide a real-time interaction between the attendees and the panel members on how to solve today's complex EMC problems. Bring your problems with you, or better send them in advance to the workshop organizer, for the panel discussion.

Workshop Program Chairman

Prof. Dr. M. Ianoz, Fed. Inst. of Technology, Lausanne, Switzerland

W1: EMC in the Directive of the EU: Recent Developments
(Wednesday, March 8, 10.00-12.30)

Chairman:

G. Goldberg, IEC - ACEC, Geneva, Switzerland

Speakers and Topics:

- J.Y. Boeswillwald, commission of the EU, Dir. III, Brussels, Belgium
  EMC directive and explanatory guidelines for its implementation. EMC requirements in the other directives e.g. for medical equipment, telecommunication terminal equipment, etc... Essential requirements and applications standards. General procedures regarding certification and affixing the CE mark.
- G. Goldberg, IEC - ACEC, Geneva, Switzerland
  Basic, generic and product family/product EMC standards. Emission and immunity standards. Review of product family/product standards and requirements for different categories of equipment: household and similar, various industrial areas, medical field, etc.
- R. De Vre, CENELEC TC 110, Laborelec, Linkebeek, B
  Electricity as a product. CENELEC standard EN 50160. Disturbance levels on the power supply (power quality assessment). Limitation of these disturbances. Immunity requirements for equipment connected to the power supply.
- G. De Clerq, CENELEC CS, Brussels, Belgium
  Conformity assessment and certification with regard to radio interference and EMC. EOTC (European Organization for Testing and Certification). Competent and notified bodies. mutual recognition arrangements between testing laboratories for EMC testing. Procedures for non EU countries. CE labelling.

W2. Case Studies
(Thursday, March 9, 10.30-12.30)

Chairman:

Dr. J.J. Goedbloed, Philips research Labs, Eindhoven, NL

Panel and Topics:

This workshop will be in the form of a panel discussion of solutions to EMC problems. the panel members will be distinguished EMC experts in their field, e.g. grounding, shielding, coupling, EMC circuit design, ESD, lightning protection, and EMC measurement techniques. the panel members will give approaches to the solution of EMC problems that are posed by the audience. the purpose of the workshop is to provide a real-time interaction between the attendees and the panel members with regard to sharing views on how one goes about solving some of today's complex EMC problems. All conference attendees are invited and encouraged to submit questions to the panel concerning EMC problems which they have faced and for which they desire a solution. Questions may be submitted anonymously if desired. The preferred method of submitting these questions is to send them in advance to the workshop chairman:

Dr. J.J. Goedbloed
Philips Research Labs, Building WS
Prof. Holstlaan 4, 5656 AA Eindhoven, Netherlands

This will allow the panel members to better prepare their responses. Alternatively, these questions may be submitted at the time of conference registration. This workshop is being prepared as a service to the attendees.

Open meetings:

URSI Commission E and K as well as the EMC WG of IARU Reg. 1 have co-ordinated their meeting schedules with the Symposium. They welcome observers attending and participating in the discussions.
The purpose of the open meetings of the URSI Commissions E and K and IARU, is to discuss progress in the working groups, and to outline outstanding topics and new lines of research for the future. Prior to the discussions, synopses will be presented.

OE. Open meetings of the URSI Commission E

International Radio Science Union
Commission E: Electromagnetic Noise and Interference
(Monday, March 6, 10.00-13.00)

Organizer:
Prof. Dr. V. Scuka, Uppsala University, Uppsala, Sweden
Chairman Commission E
Commission E WG (Chairmen)

- Spectrum management and utilization (R.D. Parlow)
- Non-Gaussian noise in communication (A.D. Spaulding)
- High power electromagnetics (R.L. Gardner)
- Terrestrial and planetary EM noise (Z. Kawasaki)
- Interaction with and protection of complex electrical systems (C.E. Baum, P. Degauque, M. Ianoz)
- Effects of transients on equipment (V. Scuka, B. Demoulin)
- Extraterrestrial and terrestrial meteorologic-electric environment (H. Kikuchi)

Detailed information will be given in the Definitive Program

OK. Open meetings of the URSI Commission K

International Radio Science Union
Commission K: Electromagnetics in Biology & Medicine
(Monday, March 6, 14.00-17.00)

Organizer:
Prof. P. Bernardi, Universita "La Sapienza", Rome, Italy
Chairman Commission K
Topics:

- Experimental and numerical dosimetry for wireless communication
- Biological effects and mechanism of interaction
- ELF exposure assessment
- Bioelectromagnetic aspects of video display units

Detailed information will be given in the Definitive Program

OR. IARU Open Meeting on EMC Problems Experienced and Caused by Radio Amateurs

International Amateur Radio Union (IARU), Region 1, EMC Working Group
(Thursday, March 9, 18.00-19.00)

Chairman:
C.M. Verholt, OZ8CY
Topics:

- The classification of environments (with regards to EM fields) and the fields generated by radioamateurs
- Conflicts between radioamateurs and the current emission standards e.g. EN55022
- Conflicts between radioamateurs and the current immunity standards e.g. EN55020 and EN50082-1
- How to operate under the new legislation in Europe
- The role of radioamateurs in the field of standardization

Technical excursions

Excursions Chairman:
Dr. H. Kramer, Fed. Inst. of Technology, Zurich, Switzerland
Parallel visits are planned on Friday, March 10:

E1: Swiss Federal Office of Metrology, Wabern near the Swiss capital Bern. Visit to the Swiss centre of precise measurements and calibration. Lunch included, Friday, March 10, 8.30-16.00

E2: Cerberus, Volketswil. Visit of a modern production site for sensors. Lunch provided, Friday, March 10, 9.00-15.30

Bus departure from the Symposium building, underground passage at 8.30 resp. 9.00 am. Since the number of places is limited, confirm your advance registration a the information desk until Wednesday, march 8, 12.00!

Technical exhibition:

Exhibition Chairman:
H.A. Kunz, Schaffner Elektronik, Luterbach, Switzerland
The exhibition area, located adjoining the session rooms, will be open daily (March 7-9) from 9.30 till 18.00 except on Thursday, when it closes at 16.30. An exhibition catalogue will be made available. Access to the exhibition is free.
For information concerning the exhibition contact the exhibition chairman:
H.A. Kunz
Exhibition Chairman EMC Zurich'95
c/o/ Schaffner Elektronik AG
CH-4708 Luterbach
Switzerland
Phone: + 41 65 41 11 81
Fax: + 41 65 42 14 04
Telex: 93 44 91 CH

For further information, please contact

EMC Zurich'95
ETH Zentrum-IKT
CH-8092 Zurich, Switzerland
Phone: + 41 1 632 27 88 Fax:" + 41 1 262 09 43
e-mail: gmeyer@nari.ikt.ethz.ch

URSI International Symposium on Electromagnetic Theory
23-26 May 1995, St. Petersburg, Russia

Venue for Symposium

The symposium will be held in the House of Friendship. This is a historic building in downtown St. Petersburg which has been beautifully restored internally. It has a large room seating 350 together with up to five other rooms capable of holding between 150 and 50 each. The rooms are close together with adequate circulation space. Posters can be displayed on a balcony or in one of the rooms. The building is next door to the St. Petersburg Mathematical Institute whose facilities can also be used. Limited restaurant and snack bar/coffee shop are in the House of Friendship. There are also many restaurants of all prices in the close vicinity.

Hotel Accommodation

It is planned to offer three grades of accommodation with block bookings. These will be publicised in the Advance Programme and for which pre-payment may be required in order to negotiate a discount. The cheapest hotel will be easily affordable by those who want to travel cheaply and who prefer simpler accommodation.

Social Programme

The organising Committee is planning to arrange a social event on each of the evenings of the Symposium. There will be a Get-together party in the House of Friendship followed by opera or ballet or concert on the first day. On the second evening it is planned to have a boat excursion on the river Neva and the canals in St. Petersburg. A Symposium Banquet will be held on the third evening.

Technical Programme

The technical programme will be decided by the Technical Programme Committee at a meeting in October. The programme will include about six invited speakers and also Special Sessions devoted to important topics.

Schedule of technical deadlines

The schedule of technical deadlines is as follows :

15-09-1994	Final date for submission of Synopses
21-10-1994	Technical Programme Meeting in London
08-11-1994	Authors notified of acceptances & requests for full paper
01-12-1994	Advance programme mailed
01-03-1995	Pre-registration for at least one author
01-04-1995	Final date for receipt of full paper
23-05-1995	Start of the Symposium

Young Scientist Awards

Commission B will be supporting a number of Young Scientists so that they can attend the St. Petersburg Symposium. Please encourage anyone you know who meets the following three criteria to submit a Synopsis by 15 September, indicating that they wish to be considered for an Award. Although open to anyone to apply,, the URSI Young Scientist Awards are particularly intended to support scientists and engineers from countries which do not have the resources to send people to conferences.

The criteria used for selection will be

(a) under age 36 at the date of the Symposium
(b) the TPC must judge that the synopsis will form an excellent paper
(c) there is a recommendation letter from a Supervisor.

Publicity for Symposium

An extensive mailing has been done, including all those who were on the Sydney mailing. In some countries an extensive distribution of the Call for Papers has been done. The Symposium is being advertised at Conferences and Symposia. A notice has appeared in the June issue of the IEEE Antenna and Propagation Society Magazine.

Tourism and Culture

St. Petersburg is a city ready for foreign visitors. There are a large number of cultural activities, sites to visit and good museums. Pre-eminent is the Hermitage Museum, or Winter Palace, which has one of the largest and most outstanding art collections in the world. There are many other places to visit, including the Peter and Paul Fortress which contains the Cathedral with the tombs of the Russian Tsars. The area surrounding St. Petersburg has many beautiful Pales to see.

All hotels and many restaurants accept credit cards. Currency exchange facilities are widely available. Although Russians talk about an increase in crime, it is well below the level in many Western cities and normal personal security arrangements apply.

Excerpt from Commission B Newsletter, July 1994
Prof. David Olver
Chair URSI Commission B

Book Reviews

Dyadic Green Functions in Electromagnetic Theory (second edition)
Chen-To Tai

IEEE Press Series on Electromagnetic Waves, New York 1994, ISBN 0-7803-0449-7

Hardcover 360pp, list price $ 59.95.

The first edition of professor Tai's book, "Dyadic Green's functions (*) in Electromagnetic Theory", in 1971 by Intext Education Publishers launched 'a monograph series in electrical engineering'. I haven't met another book of that series but, nevertheless, the Green dyadic book has been worth a series and has been well cited over the years. The revised and augmented second edition has come to life through the book production machinery of the IEEE.
The content of the book is as follows:

Chapter 1. General theorems and formulas. Basics on coordinate systems, dyadic algebra, integral transforms and saddle-point integration are given in readable form. Most important mathematical formulas are collected in appendix A at the end of the book.
Chapter 2. Scalar Green functions. The Green function is a field from a normalized point source and the concept is introduced through one-dimensional problems and interpreted in terms of transmission lines. Different boundary conditions give different Green functions. This is an easy-reader for the newcomer in the field and gives a delightful start for a course on the book. At the end of the chapter, two and three-dimensional free-space scalar Green functions are defined very concisely.

Chapter 3. Electromagnetic theory. Basic electromagnetic concepts, Maxwell equations, boundary conditions, potential functions and far-field approximations are reviewed in this chapter. Although most of the equations are given in time domain, the rest of the book considers problems in the frequency domain (except a small section in the last chapter).

Chapter 4. Dyadic Green functions. The dyadic Green function is introduced by writing the Maxwell equations in dyadic form and finding the dyadic fields radiated by a normalized dyadic source. Only electric currents are considered as a source giving rise to two dyadic Green functions: one corresponding to the electric field and the other one corresponding to the magnetic field. Since magnetic currents are quite often used as an equivalent source in solving electromagnetic problems, two other Green dyadics could have been defined in the book as has been done by many authors in the literature. The rest of the chapter discusses functional properties of the Green dyadics. Because the medium is assumed everywhere isotropic, the reciprocity condition induces certain symmetry. The singularity of the free-space Green dyadic is considered at the end of the chapter only by referring to the literature.

In the following seven chapters Green dyadics corresponding to certain boundary conditions are considered. If the boundaries follow coordinate surfaces of such coordinate systems in which the Helmholtz equation is separable, the corresponding Green dyadic can be expressed in terms of eigenfunction expansions. The following chapters constitute an encyclopaedia of such solutions. Properties of some eigenfunctions are found in Appendix B.

Chapter 5. Rectangular waveguides. Problems confined in rectangular conducting tubes are handled through Cartesian eigenfunction expansions. The expressions grow quite exensive when the tube has two dielectrics. The singularity of the Green dyadic is discussed thoroughly in this case.

Chapter 6. Cylindrical waveguides. Corresponding interior solutions for circular tubes and coaxial cables are handled through cylindrical eigenfunctions.

Chapter 7. Circular cylinder in free space. Exterior problems are handled through the same eigenfunctions with Hankel functions replacing Bessel functions in the radiation region. The dielectric cylinder or conducting cylinder with dielectric coating give complicated Green dyadics.

Chapter 8. Perfectly conducting elliptical cylinder. Elliptic cylinders are considered in terms of elliptical cylinder wave functions, which must be found from other sources because the Appendix B does not give details.

Chapter 9. Perfectly conducting wedge and half sheet. This chapter is an oasis in the admittedly dull-looking desert of eigenfunction solutions. Based on original research, the

(*) For the second edition of his "Classical Electrodynamics" (Wiley 1975), J.D. Jackson changed from 'Maxwell's equations' to 'the Maxwell equations' and from 'a Green's function' to 'a Green function' (in accord to 'a Bessel function'). It is interesting to note that the present author has changed 'Green's functions' but not 'Maxwell's equations' for his second edition.

three-dimensional Green dyadic for the wedge is derived with numerous examples on its application. Fields from a magnetic dipole are obtained by modifying the electric-source Green dyadic. After discussing radiation from slots in a half sheet, the asymptotic solutions for plane wave diffraction from a half sheet are obtained from the expansions in different regions of geometrical optics.

Chapter 10. Spheres and perfectly conducting cones. These problems rely on spherical eigenfunctions and the problems handled include exterior and interior problems of conducting and dielectric spheres as well as the conducting cone.

Chapter 11. Planar stratified media. Piecewise homogeneous media with plane parallel interfaces and boundaries are treated through Sommerfeld integrals. The problems handled include the interface of two media (air and ground), dielectric slab in air and on a perfectly conducting or magnetically conducting plane.

Chapter 12. Inhomogeneous media and moving medium. This final chapter considers two nonoverlapping topics and could actually have been split in two chapters. The first part involves more general plane or spherically stratified media. For some examples like the Maxwell and Luneburg lens media, the eigenfunctions can be expressed in terms of hypergeometric functions. In the second part, an isotropic medium in uniform motion is interpreted as a nonmoving bi-anisotropic medium with more general constitutive equations. The Green dyadic can be solved in both unbounded and certain bounded problems with moving matter through an affine transformation. Some misprints not present in the equations of the first edition caught my eye on page 271.

In conclusion, Tai's book contains an admirable amount of solutions readily applicable to real-world problems. Even if most of the material was originally prepared by the author in the 1950's when there were no computers around, the second edition has not lost its value. It has lost, however, the nice Chinese color painting decorating the beginning of the first edition.

Reviewed by
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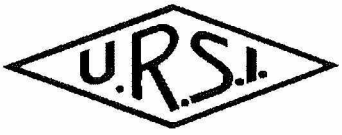


News from ITU

The new leadership of the International Telecommunication Union that will take duty of January 1 1995 was elected by the Plenipotentiary Conference held in Kyoto.

Secretary-General:
Pekka Tarjannne (Finland)
(re-elected)

Deputy Secretary-General:
Henry Chasla (Kenya)

Director Radiocommunication Bureau:
Robert Jones (Canada)

Director Telecommunication Standardisation Bureau:
Theador Irmer
(re-elected)

Director Telecommunication Development Bureau:
Ahmed Laouyane (Tunisia)

International Geophysical Calendar 1995

EXPLANATIONS

This Calendar continues the series begun for the IGY years 1957-1958, and is issued annually to recommend dates for solar and geophysical observations which cannot be carried out continuously. Thus, the amount of observational data in existence tends to be larger on Calendar days. The recommendations on data reduction and especially the flow of data to **World Data Centres (WDCs)** in many instances emphasize Calendar days. The Calendar is prepared by the **International Ursigram and World Days Service (IUWDS)** with the advice of spokesmen for the various scientific disciplines.

The **Solar Eclipses** are :

a) ***29 April 1995*** (annular) crosses northern Peru, southern Colombia and northern Brazil. Maximum annularity 6 min 37 s in Peru with sun alt. 70 degrees. Path of annularity 195 miles across. Partial phases as far north as Mixico City, most of Florida, and all S. America except s. tip. Moon's diameter = 95% of sun.

b) ***24 October 1995*** (total) crosses Iran, Afghanistan, Pakistan, India, Bangladesh, Myanmar, Thailand, Cambodia, Vietnam. Max. duration 2 min 10 s in ocean north of Borneo. Most favourable weather region is northwestern India. Path of totality crosses s. of Agra and includes Varanasi and Calcutta, totality only 1 min there, and lengthens towards the east though weather forecast worsens. Totality path only 78 km wide. (Description by Dr. Jay Pasachoff.)

Meteor Showers (selected by R. Hawkes, Canada) include important visual showers and also unusual showers observable mainly by radio and radar techniques. These can be studied for their own geophysical effects or may be "geophysical noise" to other experiments. The dates are given in Note 1 under the Calendar.

Definitions :

Time	=	Universial Time (**UT**);
Regular Geophysical Days (**RGD**)	=	each Wednesday;
Regular World Days (**RWD**)	=	Tuesday, Wednesday and Thursday near the middle of the month (see calendar);
Priority Regular World Days (**PRWD**)	=	the Wednesday **RWD**;
Quarterly World Days (**QWD**)	=	**PRWD** in the **WGI**;
World Geophysical Intervals (**WGI**)	=	14 consecutive days each season (see calendar);
ALERTS	=	occurence of unusual solar or geophysical conditions, broadcast once daily soon after 0400 UT;
STRATWARM	=	stratospheric warmings;
Retrospective World Intervals (**RWI**)	=	intervals selected by MONSEE for study.

For more detailed information of the definitions, please see one of the following, or contact H. Coffey (address below): Solar-Geophysical Data, November issue; URSI Information Bulletin; COSPAR Information Bulletin; IAGA News; IUGG Chronicle; WMO Bulletin; IAU Information Bulletin; Journal of the Radio Research Laboratories (Japan), Geomagnetism and Aeronomy (Russia); Journal of Atmospheric and Terrestrial Physics (U.K.); EOS Magazine (AGU/USA).

Priority recommended Programmes for measurements not made continuously (in addition to unusual **ALERT** periods):
Aurora and Airglow - Observation periods are New Moon periods, especially the 7 day intervals on the calendar ;
Atmospheric Electricity - Observation periods are the **RGD** each Wednesday, beginning on 4 January 1995 at 0000 UT, 11 January at 0600 UT, 18 January at 1200 UT, 25 January at 1800 UT, etc. Minimum programme is **PRWDs**.
Geomagnetic Phenomena - At minimum, need observation periods and data reduction on **RWDs** and during **MAGSTORM Alerts**.

Ionospheric Phenomena - Quarter-hourly ionograms; more frequently on **RWDs**, particularly at high latitude sites; f-plots on **RWDs**; hourly ionograms to **WDCs** on **QWDs**; continuous observations on solar eclipse in the eclipse zones. See **Airglow and Aurora**.
Incoherent Scatter - Observations on Incoherent Scatter Coordinated Days, and intensive series on **WGIs** or Airglow and Aurora Periods. **Special programmes**: Dr. J. Holt, M.I.T. Haystack Observatory, Route 40, Westford, MA 01886 USA, URSI Working Group G.5. Phone (617) 981-5625, e-mail address AMES: "jmh@chaos. haystack.edu".
Ionospheric Drifts - During weeks with **RWDs**.
Travelling Ionosphere Disturbances - special periods, probably **PRWD** or **RWDs**.
Ionospheric Absorption - Half-hourly observations on **RWDs**; continuous on solar eclipse days for stations in eclipse zone and conjugate area. Daily measurements during Absorption Winter Anomaly at temperate latitude stations (October-March Northern Hemisphere; April-September Southern Hemisphere).

Backscatter and Forward scatter - RWDs at least.
Mesospheric D region electron densities - RGD around noon.
ELF Noise Measurements of earth-ionosphere cavity resonances - WGIs.

All programmes - Appropriate intensive observations during unusual meteor activity.
Meteorology - Especially on **RGDs**. On **WGIs** and **STRATWARM** Alert Intervals, please monitor on Mondays and Fridays, as well as on Wednesdays.

Solar Phenomena - Solar eclipse days, **RWDs** and during **PROTON/FLARE ALERTS**.

FLARES22 (FLAre RESearch at the maximum of solar cyccle 22) - observations of basic physical processes of transient solar activity and its coupling with the solar-terrestrial environment,

INTERNATIONAL GEOPHYSICAL CALENDAR 1995

	S	M	T	W	T	F	S
JANUARY	1	2	3*	4*	5	6	7
	8	9	(10)	(11)	(12)	13	14
	15	16	17	18	19	20	21
	22	23	24	25	26	27	28
	29	30	31	1+	2+	3+	4+
FEBRUARY	5	6	7	8	9	10	11
	12	13	(14)	(15)	(16)	17	18
	19	20	21	22*	23*	24	25
	26	27	28+	1+	2+	3	4
MARCH	5	6	7	8	9	10	11
	12	13	14	15	16	17	18
	19	20	(21)	(22)*	(23)*	24	25
	26	27	28+	29+	30	31	1
APRIL	2	3	4	5	6	7	8
	9	10	11	12	13	14	15
	16	17	(18)	(19)*	(20)*	21	22
	23	24	25	26	27	28	[29]
	30	1+	2+	3+	4+	5+	6
MAY	7	8	9	10	11	12	13
	14	15	16	17	18	19	20
	21	22	(23)	(24)*	(25)*	26	27
	28	29	30	31	1	2	3
JUNE	4	5	6	7	8	9	10
	11	12	13	14	15	16	17
	18	19	(20)+	(21)*+	(22)*	23	24
	25	26	27	28	29	30	

	S	M	T	W	T	F	S
							1
JULY	2	3	4	5	6	7	8
	9	10	11	12	13	14	15
	16	17	(18)	(19)*	(20)*	21	22
	23	24	25	26	27	28	29
AUGUS	30	31	1	2	3	4	5
	6	7	8	9	10	11	12
	13	14	15	16	17	18	19
	20	21	(22)+	(23)*+	(24)*+	25	26
SEPTEM	27	28	29	30	31	1	2
	3	4	5	6	7	8	9
	10	11	12	13	14	15	16
	17	18	(19)	(20)*	(21)*	22	23
OCTOB	24	25	26	27+	28+	29	30
	1	2	3	4	5	6	7
	8	9	10	11	12	13	14
	15	16	(17)	(18)*	(19)*	20	21
	22	23+	[24]+	25+	26+	27+	28
NOVEM	29	30	31	1	2	3	4
	5	6	7	8	9	10	11
	12	13	14	15	16	17	18
	19	20	(21)+	(22)*+	(23)*	24	25
DECEM	26	27	28	29	30	1	2
	3	4	5	6	7	8	9
	10	11	12	13	14	15	16
	17	18	(19)	(20)*	(21)*	22	23
1996	24	25	26	27	28	29	30
JANUA	31	1	2	3	4	5	6
	7	8	9	10	11	12	13
	14	15	(16)	(17)*	(18)*	19	20
	21	22+	23+	24+	25	26	27
	28	29	30	31			

	S	M	T	W	T	F	S

(10) Regular World Day (RWD)

(11) Priority Regular World Day (PRWD)

15 Quarterly World Day (QWD) also a PRWD and RWD

[4] Regular Geophysical Day (RGD)

[13 14] World Geophysical Interval (WGI)

23+ Incoherent Scatter Coordinated Observation Day

[29] Day of Solar Eclipse

[26 27] Airglow and Aurora Period

3* Dark Moon Geophysical Day (DMGD)

including times of the various solar **ALERTS**. Coordinate satellite and ground-based observations. Contact Dr. M. Machado, Department of Physics, University of Alabama, Huntsville, AL 35899, USA. Phone (1-205) 895-6676, Fax (1-205) 895-6790, SPAN SSL::MACHADO.

SOLTIP (SOlar connection with Transient Interplanetary Processes). 1990-1995 observations and analyses of solar-generated phenomena propagating through heliosphere, including times following the various solar **ALERTS**. Includes Interplanetary Scintillation observations of radio galaxies and telemetry signals to/from interplanetary spacecraft; Also coordination of spacecraft IMP8, ICE, Giotto, Sakigake, Voyager 1/2, Pioneer 10/11, Ulysses, Relict, Wind, SOHO, Galileo, and ACE. Contact Dr. M. Dryer, NOAA R/E/SE, 325 Broadway, Boulder, CO 80303, USA. Phone (1-303) 497-3978, Fax (1-303) 497-3645, SPAN E-mail address SELVAX::MDRYER.

Space Research, Interplanetary Phenomena, Cosmic Rays, Aeronomy - QWDs, RWDs, and **Airglow & Aurora** Periods.

The **International Ursigram and World Days Service (IUWDS)** is a permanent scientific service of the International Union of Radio Science (URSI), with the participation of the International Astronomical Union (IAU) and the International Union of Geodesy and Geophysics (IUGG). IUWDS adheres to the Federation of Astronomical and Geophysical Data Analysis Services (FAGS) of the International Council of Scientific Unions (ICSU). The IUWDS coordinates the international aspects of the world days programme and rapid data interchange.

This Calendar for 1995 has been drawn up by H.E. Coffey, of the IUWDS Steering Committee, in association with spokesmen for the various scientific disciplines in SCOSTEP, IAGA and URSI and other ICSU organizations. Similar Calendars are issued annually beginning with the IGY, 1957-58, and are published in various widely available scientific publications.

Published for the International Council of Scientific Unions and with financial assistance of UNESCO.

Additional copies are available upon request from the following persons: the IUWDS Chairman : Dr. R. Thompson, IPS Radio and Space Services, Department of Administrative Services, P.O. Box 5606, West Chatswood, NSW 2057, Australia, Fax (61) 2-414 8331, E-mail richard@ipso.ips.oz.au, or the IUWDS Secretary for World Days : Miss H.E. Coffey, WDC-A for Solar-Terrestrial Physics, NOAA E/GC2, 325 Broadway, Boulder, Colorado 80303, USA, Fax (1-303) 497-6513, E-mail hcoffey@ngdc.noaa.gov.

Notes on other dates and programs of interest:

1. Days with significant meteor shower activity are: Northern Hemisphere 3-5 Jan; 21-23 Apr.; 3-5 May; 6-11, 27-29 Jun; 10-15 Aug; 21-23 Oct; 17-19 Nov; 13-15, 22-23 Dec 1995; 3-5 Jan 1996. Southern Hemisphere 3-5 May; 6-11, 27-29 Jun; 28-31 Jul; 21-23 Oct; 17-19 Nov; 13-15 Dec 1995.

2. GAW (Global Atmosphere Watch) — early warning system for changes in greenhouse gases, ozone layer, and long range transport of pollutants (See Explanations).

3. SOLTIP (Solar connection with Transient Interplanetary Processes). Observing Program 1990-1997: solar-generated phenomena and their propagation throughout the heliosphere. (See Explanations)

4. FLARES22 (FLAre RESearch at solar cycle 22 max). Observing Program 1990-1997: basic physical processes of transient solar activity and its coupling with solar-terrestrial environment (See Explanations)

5. Day intervals that IMP 8 satellite is in the solar wind (begin and end days are generally partial days): 26 Dec 1994-1 Jan 1995; 7-14 Jan; 20-26 Jan; 1-8 Feb; 14-21 Feb; 26 Feb-6 Mar; 11-18 Mar; 23-31 Mar; 4-12 Apr; 16-25 Apr; 28 Apr-7 May; 11-20 May; 24 May-1 Jun; 5-14 Jun; 18-26 Jun; 1-8 Jul; 13-20 Jul; 26 Jul-1 Aug; 7-14 Aug; 20-26 Aug; 1-8 Sep; 14-21 Sep; 26 Sep-3 Oct; 9-16 Oct; 22-28 Oct; 4-10 Nov; 16-22 Nov; 29 Nov-5 Dec; 11-18 Dec; 24-30 Dec 1995. Note that there will not necessarily be total IMP 8 data monitoring covergae during these intervals. (Information kindly provided by the WDC-A for Rockets and Satellites, NASA GSFC, Greenbelt, MD 20771 USA).

6. + Incoherent Scatter Coordinated Observations Days (see Explanations) starting at 1600 UT on the first day of the intervals indicated, and ending at 1600 UT on the last day of the intervals: 23-27 Jan 1995 JOULE; 1-4 Feb JOULE; 28 Feb-2 Mar GISMOS; 28-29 Mar DATABASE; 1-5 May CADITS/MLTCS; 20-21 Jun DATABASE; 22-24 Aug GISMOS; 27-28 Sep SUNDIAL; 23-27 Oct CADITS/MLTCS; 21-22 Nov 1995 GISMOS; 22-24 Jan 1996 GISMOS/FAST

where

CADITS = Coupling and Dynamics of the Ionosphere-Thermosphere System;
DATABASE = Incoherent Scatter Database;
FAST = Fast Auroral Snapshot (with FAST satellite);
GISMOS = Global Ionospheric Simultaneous Measurements of Substorms;
JOULE = Joule Heating;
MLTCS = Mesosphere, Lower-Thermosphere Coupling Study;
SUNDIAL = Coordinated study of the ionsphere/magnetosphere;

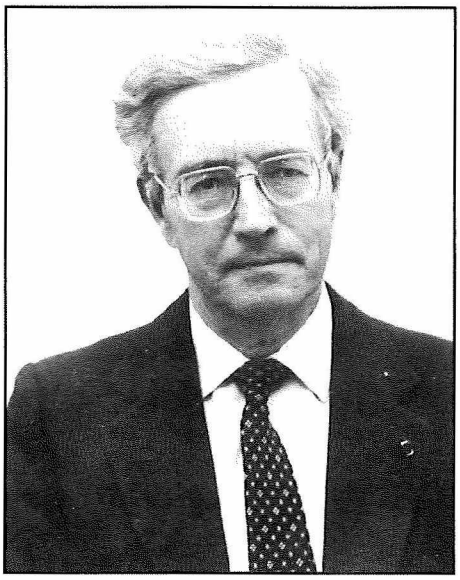
Operational Edition, September 1994

News from the URSI Community

AWARDS PRESENTED TO URSI COLLEAGUES

IEEE Heinrich Hertz Medal presented to Prof. Dr. Ir. Jean Van Bladel

Professor Jean Van Bladel has recently been selected to receive the IEEE Heinrich Hertz Medal for 1994. He is cited "For Major Contributions in fundamental Electromagnetic Theory and Applications to Electrical Engineering". Currently he is Professor Emeritus of Electromagnetism and Acoustics at the University of Ghent in Belgium. He has a remarkable career. 40 years ago, he was Head of the Radar Department at N.V. Philips in Belgium, which was followed by faculty appointments at the Universities of Washington in St. Louis and Wisconsin in Madison. Then in 1964 he returned to Ghent to become Full Professor and Director of the Laboratory of Electromagnetism and Acoustics. In addition to his duties there, he served as Dean of the Faculty of Applied Sciences from 1976 to 1978. Following his "retirement", he accepted the position of Secretary General of the International Union of Radio Science for the period 1979 to 1993. Next year (1995), he is scheduled to become the President of the Royal Academy of Sciences of Belgium.



During his whole career, in spite of other duties, Jean Van Bladel has produced a steady stream of fundamental contributions in electromagnetics which have turned out to have far reaching significance in telecommunications, radar systems, microwave engineering, and astronomy. He has published six major books and many journal articles. His landmark book "Electromagnetic Fields" stands out as a masterpiece of erudition and clarity which covers theoretical principles accompanied by numerous important applications drawn for many sources. The text "Relativity and Engineering" is unique in that it puts the subject into a clear and understandable form without compromising the mathematical foundations. Jean Van Bladel's most recent book "Singular Electromagnetic Fields" deals with a subject that he has made many original and profound contributions to. Specifically, he has clarified and laid the basis of how electromagnetic fields interact with bodies which have sharp edges or abrupt changes in profile. These basic analytical studies have had a major influence on the efficient development of numerical methods in dealing with very practical problems such as predicting the radar return from complex structures such as modern jet aircraft

The 1994 von Kármán Medal presented to Dr. Ing. H.J. Albrecht

Extracted from "AGARD HIGHLIGHTS 94/2"

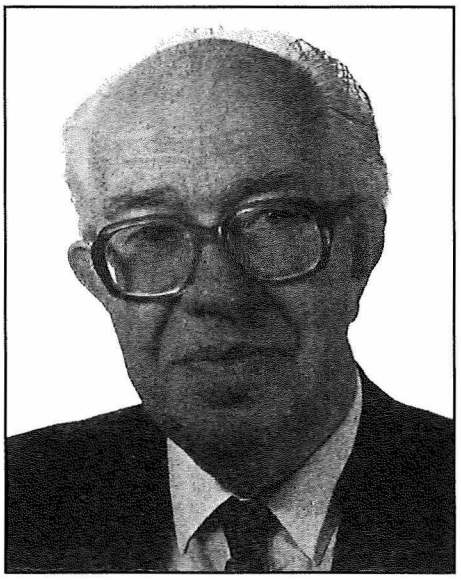
The von Kármán Medal for 1994 was awarded to Dr. Ing. H.J. Albrecht of Germany, a former Chairman of the Electromagnetic Wave panel and a former Vice-President of URSI. This Award was instituted in 1972 in memory of Dr. von Kármán, the founder of AGARD. It is awarded annually to recognise outstanding contributions to Aerospace Science and Technology and to the enhancement of progress in scientific and technological cooperation among the NATO nations carried out in conjunction with AGARD activities.

The medal will be presented to Dr. Albrecht in London. The text of the citation follows.

CITATION

Dr. Albrecht has been author or co-author of over 100 publications in the open literature. Although the emphasis

has changed from time to time, wave propagation and telecommunications, the characteristics of propagation media, the aerospace environment and their relationships to various systems areas have been his major fields of research interest. His early papers were concerned with electronic instrumentation, guidance and control of research missiles, and telecommunications paths between Australia and Europe, including initial and advanced work on the chordal-hop concept of long-distance propagation. Since then, he has included other areas such as earth-surface characteristics and artificial modification of propagation media, as well as navigation, space systems and spacelab projects.



Dr. Albrecht has been active in AGARD for almost 30 years. His first paper at an AGARD symposium (on satellite communications) was in 1965. He became a member of the Guidance and Control Panel (GCP) in 1967 and the Electromagnetic Wave Propagation Panel (EPP) in 1969, and was EPP Chairman from 1977-1979. Today, he is a member of the Sensor and Propagation Panel (SPP). He has presented eighteen papers at AGARD Symposia, chaired or co-chaired seven Symposia, was Director of a Lecture Series on Electromagnetic Propagation Problems in the Tactical Environment, Director of an Aerospace Applications Study on Communications Devices with Reduced Susceptibility to Jamming, Intercept and Location Determination, and Chairman of the Working Group on Near-Water Propagation Effects and Modern System Adaption. He has also been active in other areas of NATO. For instance, he was the Chairman of a Defence Research Group study group on Electronic Warfare in Communications.

BOOKS PUBLISHED BY URSI CORRESPONDENTS

Beltrami Fields in Chiral Media

Dr. Akhlesh Lakhtakia

World Scientific 199
ISBN 981-02-1403-0 (530 pp.)

Chapter 1: BELTRAMI FIELDS AND THE MAXWELL POSTULATES
Introduction to Beltrami Fields; Maxwell Postulates in Free Space; Beltrami Fields in Free Space; Biisotropic Media; Problems; References

Chapter 2: BELTRAMI FIELD THEORY
Dyadic Green Functions; Properties of Dyadic Green Functions for Beltrami Fields; Some Theorems and Concepts; Beltrami Fields in the Source Region; Customary Representations for Beltrami Fields; Appendix: Selected Vector - Dyadic Formulae: Appendix: Functions of Dirac, Heaviside and Kronecker; Problems; References

Chapter 3: CHIRAL MATERIALS
Chirality: Natural and Artificial; Frequency-Domain Constitutive Relations; Problems; References

Chapter 4: FIELD THEORY FOR CHIRAL MEDIA - I
Field Equations; Some Ancillary Topics; Beltrami Fields; Problems; References

Chapter 5: FIELD THEORY FOR CHIRAL MEDIA - II
Dyadic Green Functions; Some Theorems for Radiation and Scattering; Potentials; Problems; References

Chapter 6: RADIATION IN CHIRAL MEDIA
Simple Sources and Concepts; Not-So-Simple Sources; Integral Equations; Cerenkov Radiation; Problems; References

Chapter 7: PLANE BOUNDARIES
Achiral-Chiral Interfaces; A Pot-Pourri of Interface Problems; Plane-Stratified Chiral Media; Unidirectionally Inhomogeneous Chiral Media; Periodically Corrugated Achiral-Chiral Interfaces; Problems; References

Chapter 8: BOUNDED CHIRAL REGIONS
Chiral Cylinders; Chiral Spheres; Chiral Composites; Homogeneous Chiral Scatterers; Inhomogeneous Chiral Scatterers; Problems; References

Chapter 9: SCATTERING INSIDE A CHIRAL MEDIUM
Scatterer In A Chiral Medium; Extended Boundary Condition Method; Inhomogeneous Bianisotropic Scatterers; Bianisotropic-in-Chiral Composites; Problems; References

NEWS FROM URSI MEMBER COMMITTEES

China (Beijing)

URSI Commission F : Third International Conference on Millimeter Wave and Far-Infrared Science and Technology (ICMWFST '94)

22-26 August 1994, Guangzhou, China

The third International Conference on Millimeter Wave and Far-Infrared Science and Technology (ICMWFST '94) was held in Guangzhou, China on August 22-26, 1994. The conference was organized by the Chinese Institute of Electronics (CIE). It was also sponsored by Georgia Institute of Technology in cooperation with IEEE Electron Devices Society and IEEE Microwave Theory and Techniques Society, and it was supported by National Sciences Foundation of China.

Professor M. Van Ortenbarg from Humboldt University of Berlin, Germany, is the general chairman of the ICMWFST '94, with both Dr. H.C. Hu from Beijing Vacuum Electronic Research Institute, China and Professor R.W. McMillon from Georgia Institute of Technology, U.S.A. as co-chairman.

ICMWFST '94 is one conference out of a series, which discusses the problems of millimeter wave and far-infrared. The previous two conferences were held in Beijing in 1990 and 1992. The conference program covers the whole spectrum of Millimeter wave and far-infrared, atmospheric effects, devices and systems. The sessions of ICMWFST '94 included the following :

Atmospheric effects
- Antennas
- Spectroscopy
- Materials, Apparatus, Measurements
- Radiometry, Astronomy
- Vacuum sources
- Waveguides
- Lasers
- Electromagnetic Computations
- Applications and Systems
- Solid-State Sources

The following reports complemented in the plenary session:
- Recent status in the field of microwaves and millimeter wave vacuum microelectronic devices
- High field submillimeter magneto-spectroscopy
- The atmospheric refractivity of near millimeter wave in China region
- Reflector antenna simulations by complex source-dual series approach
- Infrared and MM wave Magneto-spectroscopy of semiconductors in pulsed high magnetic field in the megagauss range
- Wide band millimeter wave radar and high resolution imaging
- Millimeter wave linear-beam tubes
- Miniature optically pumped far-infrared laser

More than 80 scientists attended ICMWFST '94, coming from U.S.A., Canada, United Kingdom, France, Germany, Italy, Brazil, Japan, Lithuania, Russia, Switzerland, Ukraine and China. More than 50% of the attendees were young scientists. Their reports had a high quality and they actively took part in the discussions at the meeting.

Dr. Da-Zhang Hu
URSI Commission F, China CEI (Beijing)

Egypt

Academy of Scientific Research and Technology & National Radio Science Committee 12th National Radio Science Conference (NRSC'95)

21-23 March 1995, Alexandria, Egypt

This is to announce the 12th National Radio Science Conference, NRSC'95, to be held in Alexandria. The Faculty of Engineering, Alexandria University (F.E.A.U.) will host the conference over the period 21-23 March 1995. The conference will provide a valuable opportunity to exchange and update information and stimulate discussions on current and future activities in the fields of the committee. The Working language will be English.

The technical program will consist of invited papers covered by all U.R.S.I. commissions.

Sponsors

Academy of Scientific Research and Technology; Ministry of International Cooperation; Alexandria University; Arab Maritime Transport Academy; Military Technical College; Air Defence College; IEEE Egypt Section.

Invited papers

Invited papers will be solicited from leading experts in the listed topics. Papers are expected to review in a tutorial manner the state of the art and developments in the field.

Papers

Prospective authors are invited to submit 4 copies of the complete manuscript of a maximum of 8 pages (typed single space) to :

NRSC'95
Academy of Scientific Research and Technology,
101, Kasr El-Eini St., Cairo, Egypt.

The papers should be original and not published elsewhere.

Location

The Faculty of Engineering, Alexandria University, where the NRSC'95 is to be held, is located in Horya Street, Alexandria.
Tel. (203) 597550/5975556
Fax : (203) 5971853
Telex : 54467 UNIVY UN

Registration fees

Registration fees cover a copy of the proceedings. Papers should not exceed 8 pages. Fees are due on submission of camera-ready mats at the following rates :
Egyptians : L.E. 150.
Others : $ 200.

Conference Chairman
Prof. Dr. Ibrahim Salem (N.R.S.C.)
Conference Vice-Chairman
Prof. Dr. Said E. El-Khamy (F.E.A.U.)

For further information, please contact:
Dr. I. Salem
Academy of Scientific Research and Technology
Dept. of Scientific Societies & International Unions
101 Kasr El-Eini St.,
Cairo,
Egypt.

Finland

XX National Radio Science meeting in Sodankylä
27-28 October 1994, Sodankylä, Finland

Since 1986, the Finnish URSI Committee has been organising national radio science meetings on an annual basis. These "Radiotieteen päivät" have not represented all of URSI each year but there has been certain emphasis on different commissions and their fields. Especially, the research interests of the institution that is hosting the meeting have been reflected in the choice of the topics.

The twentieth National Radio Science meeting was held 27-28 October 1994. The location of the meeting was Sodankylä in Northern Finland, and it was hosted by the Geophysical Observatory. Dr. Tauno Turunen, director of the observatory, served as the chairman of the meeting. The programme of this two-day meeting contained sessions on studies of the ionosphere and magnetosphere, remote sensing, electromagnetic metrology, and satellite and rocket experiments. During the meeting, 21 talks were given.

The participants of the radio science meeting represented URSI commissions A, E, F, G, and H. Among the themes discussed at the meeting, one may mention pulsating auroras, ionospheric tomography, heating experiments and artificial periodic irregularities. Furthermore, novel signal processing methods are being studied intensively with a look into the future of the new EISCAT radar at Svalbard, located inside the auroral oval. The lower atmosphere was also of interest in the two talks that concentrated on the passive remote sensing of the stratospheric ozone by radiometer. Another interesting topic is the mysterious ionospheric radio signal generation, as short-wave broadcasts can be received at VLF range. This effect and the man-sky interference in general were discussed in other, more philosophically-oriented talks. The technological aspects and applications of radio science were touched in presentations on GPS (Global Positioning System) and GSM (General System of Mobile Communications). These acronyms, not to be mixed, refer, respectively, to a satellite positioning and navigation system, and to the digital mobile telephone network which also possesses the capabilities to data transmission.

In addition to the formal presentations, we could enjoy other presentations, like a magnificent slide show of colourful auroras by Dr. Jyrki Manninen. Naturally, the programme also included a visit to the EISCAT receiving station, since the observatory is one part of this ionospheric radar research complex.

Ari Sihvola,
Secretary of the Finnish member committee

COMMISSION B

Excerpt from Commission B Newsletter, July 1994

Dear Commissions B Members

The first year after a General Assembly is usually a period of low activity and this year is no exception. The last General Assembly took place almost a year ago and the next Commission B event takes place in May 1995. Thus we are in an intermediate period - absorbing the decisions of the General Assembly and planning the St. Petersburg Electromagnetic Theory Symposium. This Newsletter contains items to report which come from General Assembly decisions and more information on the Petersburg Symposium. The General Assembly saw the introduction of Individual Membership which is a major change for URSI. Those of you who were at Kyoto should have received your membership card. Those of you who were prevented can join for a modest fee which covers the period up to the next General Assembly.

For me the most important activity at the moment is organising the technical side of the St. Petersburg Symposium. The deadline for the submission of abstracts or synopses is fast approaching. They should be sent to me by 15 September. Please publicise the deadline as widely as possible and encourage your colleagues to submit a paper. The Symposium is the main Commission B event and has usually done an excellent job in making our Commission one of the most active in URSI. Normally the Commission Chair is the nominal Chairman of the Symposium and most of the work is done by the Local organising Committee. This time the problems of interacting with Russia mean that we have opted for the cautious approach of setting up the technical programme side of the Symposium in London. I visited St. Petersburg in April and had extensive discussions with the Local Organising Committee. Their dedication and hard work is impressive and they are going to do everything possible to make the Symposium an outstanding success. St. Petersburg is a beautiful and historic city and should make an excellent host city for our Symposium. Russia is making huge strides in adapting from a command economy to a market driven economy in a short period of time. Inevitably there are difficulties to be overcome. One of the most significant is the generally poor communications to and from Russia. We have grown used to fast communications and need to be patient with the unpredictable delays which occur. However goodwill makes up for any problems and the Commission B community has a lot of goodwill.

Yours sincerely

David Olver.

Time Domain Metrology

There is an InterCommission Working Group on Time Domain Metrology, Chaired by Dr .Tapan Sarkar (Syracuse University, U.S.A. Fax :+1 (315) 4432583), which wants to hear from anyone with an interest in the subject. Three topics have identified as of particular importance : (i) Transient Radar (both classical and subsurface) and signal analysis. This will involve Commissions and signal analysis. This will involve Commissions A, B, C and E.. (ii) Waveform characterization on printed circuits. (iii) Time domain measurement system calibration.

Commission B Electronic Discussion Group ?

There are a large number of interactive discussion groups on the INTERNET. It has been suggested that it would be a good idea to create one for Commission B technical discussions. If you are interested, please let the Chair know (by e-mail!).

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Note : An alphabetical index of names, with addresses and page references, is given on pages 52-63.

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