

Commission B

Fields and Waves

Triennial Activity Report 2002 – 2005 (draft)

Introduction

The officers of Commission B during the triennium 2002 - 2005 have been Prof. Makoto Ando, Japan, Chair, and Prof. Lot Shafai, Canada, Vice-Chair. Immediate Past Chair has been Prof. Staffan Ström. The Chair, Vice-Chair and Immediate Past Chair have formed " the Commission B Executive Committee ", in which important Commission B matters have been discussed. In addition, for election of the next Commission vice-chair, "the Commission B Search Committee(CBSC)" formed by the current Chair, two immediate Past Chairs. makes sure that enough candidates are being nominated. One more important organization "the Commission B Technical Advisory Board (B-TAB)" established in 2002 has worked actively for the technical program in 2004 Commission B EMT-Symposium in Pisa and 2005 General Assembly in New Delhi. To fulfil its role in URSI properly, Commission B relies on the dedicated and enthusiastic support of a large number of Commission B colleagues as described below in this report and its enclosures.

The 2004 International Symposium on Electromagnetic Theory (2004 EMTS) Organization

The 2004 URSI International Symposium on Electromagnetic Theory (EMT-S) was held in Pisa, Italy, May 23-27, 2004. It is hosted by the Italian Member Committee of URSI and is organized by a Local Organizing Committee (LOC) at the University of Pisa, in collaboration with the Italian Electromagnetic Society (SIEm).

This triennial event is one of the major activities of URSI Commission B and is the 18th in the long history since the 1st in Toronto 1953. The most recent past Symposia in this series were held in Victoria, Canada (2001) and Thessaloniki, Greece (1998). The preparation of the 2004 EMT-S in Pisa was initiated upon the decision in the business meeting at the 2002 URSI General assembly. Thanks to the intensive collaboration from the Italian national committee of URSI and LOC chaired by Prof. Giuliano Manara and the Technical Program Committee (TPC), consisting of 40 members from 16 countries, we completed preparations for a very attractive and rich symposium. Two-times submission (Abstract and then final paper) is changed to one-time submission (Paper in 3-pages camera-ready format) from 2004 EMTS.

Symposium Important Date

1st Nov. 2003 Deadline for receipt of YSA papers and applications
 15th Nov. 2003 Deadline for receipt of papers in the 3-pages camera-ready format
 15th Jan. 2004 Notification of acceptance to authors and YSA applicants
 15th Mar. 2004 Deadline for pre-registration (Presenting author must pre-register)
 23rd-27th May 2004 Symposium

Technical Program

The scope of the Symposium covers all areas of electromagnetic theory and its applications. One of the key features of the Symposium was a series of plenary sessions held every morning entitled: "Perspectives into the History and Development of Electromagnetics --Past Present and Future", which has always been a special characteristic of EMT-S. A total of 26 topics convened by 50 authorities worldwide as well as 37 regular ones were prepared in the call for papers. As a result, we have received 464 submissions and selected 421 papers. We have put together a rich set of sessions, that is, 62 oral sessions with 6 papers, 4 plenary sessions and 1 poster session. These include progress in traditional topics such as electromagnetic theory, guided waves, scattering and diffraction and the latest topics such as metamaterials, ultra wide band signals and practical aspects of ground penetrating radars, etc. Following special topics were prepared.

- Artificial Magnetic, Soft and Hard Surfaces and other Complex Surfaces
- Ground penetrating radars: EM modeling, antennas, imaging and inversion
- Homogenization of electromagnetic material parameters
- Hybrid techniques for large problems
- Metamaterials
- Radiation and Leakage effects in open planar structures
- RF aspects of MIMO antenna systems
- Space Solar Power Systems (Inter Commission WG in URSI)
- The role of electromagnetism in micro- and nanotechnologies
- Time-reversal methods
- UWB radio systems

In the Commission B business meeting in 2001 EMTS, it was noted that 221 attendance and 215 presented papers in 28 Sessions in 2001 EMTS were lower than those(470 submission and 290 presented) of the previous 1999 EMTS in Thessaloniki, Greece. This situation gave Commission B reason to re-consider its activities, in particular its conference activities; Commission B Technical Advisory Board (B-TAB) was established in this framework. The statistics in 2004 EMT-S were almost equal or larger than those for 1999 EMTS, which were through the efforts of LOC, TPC and B-TAB. The report on the 2004 EMTS by Giuliano Manara will contains more details.

Young Scientist Award

Commission B Young Scientist Award were prepared for supporting young scientists under 36 years old to attend the 2004 EMTS. Award recipients will receive free Symposium registration and financial support to defray the cost of modest board and lodging during the period of the Symposium. Limited funds will be available to assist in payment of part of the cost of round trip travel of reward recipients from developing countries. As before, Commission B spends essentially all of its grant from URSI on Young Scientist Awards at the EMTSs. Thanks to the efforts by LOC, total of 26 Young Scientist were Awarded. The total cost for these awards were about 27000 EURO and is jointly covered by the LOC(2/3) and Commission B(1/3). With an interesting scientific program arranged by TPC, with an excellent conference organization and with support from the Italian national committee and LOC, 2004 Commission B EMTS resulted in great success.

Special Section of 2004 PISA EMT-S in Radio Science published in Fall 2005

As on several previous occasions, *Radio Science* has kindly agreed to publish a 'Special Section' containing selected papers based on presentations at the 2004 EMTS. Prof. Akira Ishimaru, Univ. of Washington, has again agreed to serve as Co-Editor for this Special Section, together with Prof. Makoto Ando, the Commission B Chair. It is expected to appear in a *Radio Science* issue around November-December issue of 2005.

This special section of *Radio Science* is comprised of 18 (tentative) full-length papers selected from 391 papers presented at the meeting. (For 2001, about 25 papers were accepted and appeared in the Nov.-Dec. issue of *Radio Science*.) Papers considered for inclusion in this special section were recommended by session chairs or technical program committee members. From these recommendations, the final selection of papers was made by the Special Section Editors, and authors were then invited to submit manuscripts. In keeping with the usual *Radio Science* policy, all papers were reviewed before the final decisions were made for publication. We wish to express our appreciation to the local organizing committee, the technical program committee and the session chairs for their advice and recommendations. We also thank the reviewers for their time and efforts and the authors for their timely work which contributed greatly to the success of the Symposium and of this special section of *Radio Science*.

The venues for the symposia and special sections of *Radio Science* which contain selected papers are the following:

- 1953 Montreal, Quebec, Canada (microwave optics)
- 1956 Ann Arbor, Michigan
- 1959 Toronto, Ontario, Canada
- 1962 Copenhagen, Denmark (electromagnetic theory and antennas)
- 1965 Delft, The Netherlands
- 1968 Stresa, Italy
- 1971 Tbilisi, USSR
- 1974 London, England
- 1977 Stanford, California
- 1980 Munich, Germany (*Radio Science*, 16(6), 1981)
- 1983 Santiago de Compostella, Spain (*Radio Science*, 19(5), 1984)
- 1986 Budapest, Hungary (*Radio Science*, 22(6) 1987)
- 1989 Stockholm, Sweden (*Radio Science*, 26(1-2) 1991)
- 1992 Sydney, Australia (*Radio Science*, 28(5-6) 1993)
- 1995 St. Petersburg, Russia (*Radio Science*, 31(6) 1996)
- 1998 Thessaloniki, Greece (*Radio Science*, 35(2) 2000)
- 2001 Victoria, Canada (*Radio Science*, 38(2) 2003)
- 2004 Pisa, Italy (*Radio Science*, 40(6) 2005)

Business meeting at the 2004 EMTS.

Attendance : Prof. Makoto Ando, Commission B, Chair, Prof. Lotfollah Shafai, Commission B, Vice-Chair, About 50 members of Commission B

Schedule:

- Business meeting I: 18:00-19:00, 24 May 2004
- Business meeting II: 18:00-19:00, 26 May 2004
- Closing ceremony: 18:20-18:45, 27 May 2004

The Commission B Chair, Makoto Ando opens the meeting at 18:00 p.m. on Monday 24 May 2004 and welcomes all members who are interested in and supporting Commission B activities.

Request for Proposals of Venue for the 2010 EMTS

The procedure of request for proposal of Venue 2010 EMTS was announced which had been suggested by the e-mail to national representatives. A formal request for proposals concerning the venue for the 2010 EMTS will be sent out during the fall of 2004. The recently established Comm. B procedure for handling the choice of the venue will be followed. Thus, a small group (2-3 people) will be formed to go through the proposals and then to select two of them which will then be voted upon by the Comm. B representatives. The winner will be determined by a simple majority of the votes received. The request for venue proposals will contain a list of aspects that the proposers should address. The vote is expected to take place in late 2004 or early 2005 (Commission B Business meeting in 2005 GA, at the latest).

Proposals and vote for new Comm. B vice-chair for 2005-2008

The procedure for Proposals and vote for new Comm. B vice-chair for 2005-2008 was explained by Makoto Ando. At the next URSI GA in New Delhi, India, October 2005, Comm. B will make the final vote concerning the new vice-chair for 2005-2008. The URSI requirements are that all Comm. B representatives shall have an opportunity to nominate candidates and that Comm. B shall present (at least) two names and the order of preference between them. Each Comm. B representative has one vote.

Comm. B takes a two-step procedure. In the first round all the nominated candidates participate and each Comm. B representative votes for two candidates. Each representative's first choice will receive 2 points and their second choice will receive 1 point. The two (or possibly three) candidates who get the largest number of points will advance to the second round of voting. In the second round, the representatives similarly give two points to their first choice and 1 point to their second choice.

Comm. B wants to encourage that a sufficient number of candidates are nominated and, therefore, the meeting recommended that a Comm. B Search Committee (CBSC) consisting of three Comm. B last chairs should be formed with the task of making sure that enough candidates are nominated. Past chairs Chalmers Butler and Staffan Strom will be invited to form CBSC with the current chair Makoto Ando.

The request for nominations will be sent out during the fall of 2004 and the second round of voting should take place early in 2005. Formally the votes are counted at the GA and the Comm. B representatives then have a possibility to change their votes concerning the second round at the GA if they wish to do so.

Preparations for the 2007 EMTS in Alexandria, Egypt

Said .E. El-Khami, chair of the Local Organising Committee reported the progress of the preparations for the 2007 EMTS in Alexandria, Egypt. He also mentioned that Comm. B scientists of Egyptian origin who now work abroad could form an international advisory group with the goal of providing the LOC in Alexandria with support concerning different aspects of the symposium preparations. Several suggestions for local organization of the symposium were provided from the floor based upon the experiences in Pisa.

Comments on PISA EMT-S and the future of the EMTS

Several new attempts were introduced in Pisa. / Technical Program (One-time 3-page submission, Plenary sessions, 6 room parallel, Posters with short presentation, Time tables, CD publication) / Lunch-every day / Local organization (Concert in domo) etc. Comments about the Pisa EMT-Symposium as well as future symposia were requested and discussed freely.

/A large number of submissions (>450) and registrations (400) were announced. Low no-show rate are emphasized.(20 Oral, 10 Poster -final)

/Number of parallel rooms may be too many for EMT- Symp., some suggestions to mitigate this problem were (1) to limit the presentations per registration to less than 2 or 3, (2) to reduce the time for the oral presentation (in two categories; 10minutes + 20 minutes), (3) to increase the symposium period.

/Hard-copy digest, CD and Final program

The hard-copy digest may be replaced completely by CDs in the near future. Instead, abstracts in a few lines for each paper in the Final program would be useful and informative.

/Lunch every day in the venue included in the registration turned out to be very effective both in enhancing communications between attendees and punctual operation of technical program.

/ Registration fee: in addition to the current two categories of "Regular" and "Student", a new one "Retired" may be prepared. This received substantial support from the floor.

/ Commission B appreciates the B-TAB members' hard work. B-TAB supported the Pisa TPC and worked very well and is requested to continue long-term planning for EMT-S and GA as well.

/ Venue selection: assessing the registration fee more than 5 or 6 years before the events may be too early due to the rapid changing of the political situation and the harmonization with the location of General assembly which is finalized only three years before. This should be studied by the Commission Chair and Vice-chair.

Preparations for the 2005 GA in New Delhi.

Makoto Ando reported the latest results of the discussions in the Coordinating Committee meeting in Gent on 14-16 May. It included the "GA Preliminary Schedule" and "Scientific Session Timetable ". In the 2002 GA, text only abstracts were submitted for review and the final version of the manuscript with a maximum of 4 pages plus a 100 word abstract was requested for each accepted paper. In the 2005 GA, 4-page manuscripts are submitted once for both review and the proceedings.*(This was not adopted in 2005 GA. Only the abstracts are used for the review and full papers are requested after acceptance.)*

Commission B will have 11 oral sessions (10 papers x 5 + 7 papers x 5 + 4 papers x 1 =89 oral presentations) and 1 tutorial session(60 minutes = 2 x 30 minutes or 1 x 60minutes). For general lectures, three lectures were selected. "Metamaterials and plasmonic structures" was in the fourth position and finally it is included in the Program.

The status of topics were reported by Lot Shafai, Commission B Vice Chair.

Commission B sessions for GA 2005 (as on 25/06/2004)

Commission B related Oral Sessions

5 x 10 papers (L), 5 x 7 papers (M), 1 x 4 papers (S)

24 AM

B[01] Electromagnetic theory (I, C, P / 10)Poster-25PM

DB[2] CAD techniques for accelerated design of electronic and electromagnetic structures

EB EM modeling for EMC

24 PM1

B-Tutorial (Total 1hour = 60 min)

BT Advances in Computational Models for the Design of Planar and Compact Antennas

24 PM2

B[08]: Educational issues in Electromagnetic Theory and Applications (I / 4) Poster-25PM

25 AM

BCD Metamaterials, plasmonic structures and their applications (I, C, P / 10) Poster-25PM

25 PM

B[07]: Guided waves, radiation and interference in open structures (I,C, P / 7) Poster-25PM

JB[1] Progress in mm/sub-mm telescopes and receivers

HX[1] Solar Power Satellite

26 AM

B[03] Inverse scattering and imaging (I, C, P / 10) Poster-27PM

26 PM

U2 GENERAL LECTURE 2 - Metamaterials and Plasmonic Phenomena

BCF: Propagation models, MAXWELLIAN approach to smart antennas (I,C, P / 7) Poster-25PM

JB[2] Mm/sub-mm techniques and science (I, C, P)

27 AM

B[02] Scattering and diffraction (I, C, P / 10) Poster-27PM

27 PM

B[05]: Numerical, asymptotic and hybrid methods (I,C,P / 7) Poster-27PM

KB: Modeling of biological systems

28 AM

B[04]: Antennas and arrays (I,C, P / 10) Poster-27PM

CBA Measurement of wireless channels (I, C / 7-10 / L or M)

28 PM

BC: Antennas for wireless systems and mobile 1(I,C,P / 7) Poster-27PM

29 AM

B[06] Transient fields and ultra wide band radio systems (I, C, P / 7) Poster-27PM

CB: Antennas for wireless systems and mobile 2 (I,C,P / 7)

DB[1] Near-field characterization for optics and microwaves

Commission B Poster Sessions: Prof. Ahmed Kishk

25 PM BP

- General
 - Non linear inverse scattering
 - Ground penetrating radars: EM modeling, antennas, imaging and inversion
 - Artificial and complex materials and surfaces for antenna
 - RF aspects of smart antenna and MIMO antenna systems
 - (Joint B&K) Interaction of EM waves with biological tissues
 - (Joint BF) Random media and rough surfaces
 - Multiphysics evaluation of RF systems and components (combined thermal, RF and mechanical modeling)
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General Lecture

1. Solar power satellite
2. Metamaterials and Plasmonic Phenomena
3. Impacts of Extreme Solar Disturbances on the Earth's Near-Space Environment

Letters to the Commission B representatives

During the triennium the Chair has communicated with the Commission B official members through a series of e-mail.

Sponsorship for conferences within the Commission B area

Consistent with the practice of past years, Commission B has sponsored meetings held by other organisations on topics which fall within the purview of the terms of reference for Commission B. However, consistent with the policy established some years ago, Commission B only gives Mode A support (as mentioned earlier, Commission B spends its grant on Young Scientist Awards). Some 20 conferences, listed below have received Mode A sponsorship.

| details meeting | mode |
|---|------|
| Getting the Most out of the Radio Spectrum, London, U.K., 24–25 October 2002 | A |
| JINA 2002, Nice, France, 12–14 November 2002 | A |
| 2003 IEEE Int. Symp. On Electromagnetic Compatibility, Istanbul, Turkey, 11–16 May 2003 | A |
| ISMOT 2003 – 9th Int. Symp. On Microwave and Optical Technology, Ostrava, Czech Republic, 11–15 August 2003 | A |
| ICEAA03, Torino, Italy, 8–12 September 2003 | A |
| 11th MICROCOLL, Budapest, Hungary, 10–11 September 2003 | A |
| Telecom 2003 & JFMMA, Marrakech, Morocco, 15–17 October 2003 | A |
| APMC 2003, Seoul, Korea, 4–7 November 2003 | A |
| WARS04 (Workshop on Applications of Radio Science) conference 2004, Hobart, Tasmania, Australia, 18–20 February 2004 | A |
| 2004 Int. Symp. On Electromagnetic Theory (Commission B Open Symposium), Pisa, Italy, 23–27 May 2004 | B |
| MSMW'04, Fifth Int. Kharkov Symposium on Physics and Eng of Microwaves, Mm and Busmm Waves, Kharkov, Ukraine, 21–26 June 2004 | A |
| ISAP'04, 2004 Int. Symp. on Antennas and Propagation, Sendai, Japan, 17–21 August 2004 | A |
| Bianisotropics '04, Gent, Belgium, 22–24 September 2004 | A |
| JINA–04, Nice, France, 8–10 November 2004 | A |
| ISAP05, Int. Symp. On Antennas and Propagation, Seoul, Korea, 3–5 August 2005 | A |
| 4th European Workshop on Conformal Antennas, 23–24 May 2005, Stockholm, Sweden | A |
| ISMOT 2005 – 10th International Symposium on Microwave and Optical Technology, Fukuoka, Japan, 22–25 August 2005 | A |
| ICEAA'05, International Conference on Electromagnetics in Advanced Applications, Torino, Italy, 12–16 September 2005 | A |
| ANTEM 2005, Antenna Technology and Applied Electromagnetics, Saint Malo, France, 15–17 June 2005 | A |

Conclusion

It is my great pleasure to thank all those colleagues who have participated in the activities of Commission B and who have given so generously of their time and expertise. Without your contributions there would hardly be a Commission B. I would also like to express my great appreciation of the help that the URSI Secretariat and particularly Inge Heleu has always provided. That has facilitated my task enormously. Thank you all !

Makoto Ando, Chair, Commission B, 2002 - 2005.