



NEWSLETTER

ISSUE NO. 155

FALL 1992

(ISSN 0164-7644)

ROBERT D. GOLDBLUM, *Editor*

THE PRESIDENT'S MEMORIAL AWARD CALL FOR NOMINATIONS

This EMCS Award links the Society's past, present and future. The EMCS President, after advice and consent from the BoD, announces whether the award will be made for the year and charges the Awards Committee to select the scholarship recipient. The award involves a maximum of four people: a deceased eminent member of the society, his/or her surviving spouse or representative, the EMCS President and a graduate student. At the option of the President, in some years, the award may also be made in general remembrance of the society's deceased pioneers.

At the Annual EMC Symposium Awards banquet, the EMCS President and the deceased eminent member's spouse or representative, if available, will jointly (or singly) make the scholarship award in memory and honor of the deceased eminent member. The President would also give the spouse or representative a memento in remembrance of the occasion and in honor of the deceased member's contribution to the EMCS community.

Scholarship candidates must be

current student or active IEEE members.

Scholarship Awards, administered by the EMC Society, will be a certificate and a scholarship. The scholarship amount will be \$1000. A second award of \$1000 may be made twelve months later providing that the candidate is still a student, that he/she requests the money, that Foundation reserves exceed \$20,000, and that the Awards Committee determines that the selection factors are still being met. In addition, the Student and the surviving spouse

will each be allocated reasonable expenses, not to exceed \$1000 each, to attend the Symposium.

Funds for Foundation scholarship awards will be private (tax deductible) donations from the IEEE Foundation. Supporting costs for travel, etc, will come from the EMCS awards budget.

Scholarship nominations may be forwarded to the President of the EMC Society by any member of the Society.

Continued on page 27

RESULTS OF THE BOARD OF DIRECTORS ELECTION BALLOT

A ballot for the election of six members to the IEEE Electromagnetic Compatibility Society Board of Directors was issued on July 31, 1992. The ballots returned have been counted, and the following candidates have been elected for a three-year term beginning January 1, 1993:

Patricia L. Coles
H. R. (Bob) Hofmann

Daniel D. Hoolihan
Warren A. Kesselman
Andrew S. Podgorski
David M. Staggs

Good luck to the newly elected members of the Board of Directors and thank you to all candidates for their willingness to serve and for permitting their names to be included on the ballot.

NEWSLETTER STAFF

EDITOR

Robert D. Goldblum
R & B Enterprises
20 Clipper Road
West Conshohocken, PA 19428
TEL: (215) 825-1960 • FAX: (215) 825-1684

ASSOCIATE EDITORS

ABSTRACTS

William H. McGinnis
Southwest Research Institute
P.O. Drawer 28510
San Antonio, TX 78284

BOOK REVIEWS

Reinaldo Perez
Jet Propulsion Laboratory
M/S 301-460
4800 Oak Grove Drive
Pasadena, CA 91109

J. L. Norman Violette
Violette Engineering Corp.
120 East Broad St., Ste. B
Falls Church, VA 22046

CHAPTER CHATTER

Todd Hubing
University of Missouri - Rolla
219 Electrical Engineering Building
Rolla, MO 65401

DIVISION IV DIRECTOR'S REPORT

Martin Schneider
46 Line Road
Holmdel, NJ 07733

EMC CERTIFICATION & ACCREDITATION

Russel V. Carstensen, P.E.
Naval Air Systems Command
AIR-5162, Room 902
Washington, DC 20361

EMC PERSONALITY PROFILE

William G. Duff
Atlantic Research Corp.
Professional Services Group
Defense Systems Division, Suite 300
5501 Blacklick Road
Springfield, VA 22151

EMC STANDARDS ACTIVITIES

Herbert Mertel
EMACO, Inc.
P.O. Box 300752
Escondido, CA 92030

EMCS BOD ACTIVITIES

Donald N. Heirman
143 Jumping Brook Rd.
Lincroft, NJ 07738-1442

EMCS EDUCATION COMMITTEE

Kimball Williams
EATON Corporation
26201 Northwestern Highway
P.O. Box 766
Southfield, MI 48037

INTER-SOCIETY ACTIVITIES

Joseph E. Butler
Chomerics, Inc.
77 Dragon Ct.
Woburn, MA 01888

PRACTICAL PAPERS, ARTICLES & APPLICATION NOTES

Edwin L. Bronaugh
The Electro-Mechanics Company
P.O. Box 1546
Austin, TX 78767

PCs for EMC

Edmund K. Miller
Group MEE-3, MS J580
Los Alamos National Laboratory
P.O. Box 1663
Los Alamos, NM 87545

PHOTOGRAPHER

Dick Ford
Naval Research Laboratory
Code 5330
Washington, D.C. 20375-5000

POINT AND COUNTERPOINT

Anthony G. Zimbalatti
294 Crowell St.
Hempstead, NY 11550

PRODUCT SAFETY

John McBain
Hewlett Packard
19447 Pruneridge Ave.
Cupertino, CA 95014

IEEE NEWSLETTER PUBLICATION SCHEDULE

PUBLICATION DATES

February
May
August
November

EDITORIAL DEADLINES

December 15
March 15
June 15
September 15

Editorial contributions for the February 93 issue should be received by December 15.

BACK ISSUES OF THE EMC NEWSLETTERS ON MICROFICHE

We still have a few sets of the microfiche copies of the back issues of the IEEE EMC Society Newsletters from the present to 1955 when it was called "Quasies and Peaks." The price is \$25.00 postpaid. If you would like to have one of these sets you can order it from: Dr. Chester L. Smith, EMC Society Historian, 2 Jonathan Lane, Bedford, MA 01730.

IEEE ELECTROMAGNETIC COMPATIBILITY SOCIETY NEWSLETTER is published quarterly by the EMC Society of the Institute of Electrical and Electronic Engineers, Inc., 345 East 47th Street, New York, NY 10017. One dollar (\$1.00) per member per year (included in the Society fee) for each member of the EMC Society. Second-class postage paid at New York, NY and additional mailing offices.



TODD HUBING
ASSOCIATE EDITOR

Dr. Todd Hubing has been appointed as Chapter Chatter Associate Editor to replace Charlie Anderson, who is retiring from the position. Congratulations to Todd, and many thanks for his willingness to serve.

Todd has a BSEE degree from the Massachusetts Institute of Technology, an MSEE degree from Purdue University, and a Ph.D. from North Carolina State University. From 1982-1989, he was employed in the Electromagnetic Compatibility Laboratory at IBM in Research Triangle Park, N.C. He is currently an Assistant Professor at the University of Missouri-Rolla where he teaches courses in electromagnetics, antenna theory, and electromagnetic compatibility. His primary research focus has been the application of computer modeling techniques to sources of electromagnetic interference.

Todd is currently the Vice-Chairman of TC-4 (EMI control) and is the Guest Editor for a special issue of the EMC Transactions, which will appear early next year. This subject of the special issue is EMC Applications of Numerical Modeling Techniques.

He lives with his wife Nancy (who is also a electrical engineering professor) and their two children, Lindsey (11) and Garrett (8). His hobbies include basketball, soccer, and reading mysteries with his children. Four additional items that belong on this list, according to his wife, are tool collecting, planning his next computer upgrade, organizing things, and reorganizing things.

If you have any comments or suggestions for the Chapter Chatter column, give him a call. He can be reached at (314) 341-6069.

CHAPTER CHATTER

After more than 20 years of distinguished service as the Associate Editor for this column, Charlie Anderson is handing over the reins. His concise and informal writing style have made his columns a highlight of this newsletter since 1971. He is still active in IEEE and continues to contribute to this column as the spokesman for the Washington/Northern Virginia chapter.

Although I've been receiving this newsletter for the past ten years, I was surprised to learn the number of active chapters of the EMC Society. Located in Rolla, Missouri, I am 60 miles from the nearest mall, 115 miles from the nearest major airport, and about 350 miles from the nearest IEEE EMC chapter. I occasionally make it to the mall and the airport,

but so far I have not yet attended an EMC chapter meeting. Chapter meetings aren't reported in the Rolla Daily News, so I rely on the EMC Newsletter to keep myself informed. Lately however, few chapters have been reporting their activities on a regular basis. We need to rectify this situation. What has your chapter been up to?

My goal for the next issue is to report the activities of every active EMC chapter. Please send meeting reports, names of speakers, topics, new business, old business, etc. What did people discuss in the halls after the meeting? Inquiring minds want to know!

Usually, it is the chapter secretary that sends in material for this column, but anyone with something to contribute can get in touch with me at any time. I can be reached by phone (314-341-6069), FAX (314-341-4532), internet (thubing@ee.umsr.edu) or mail (University of Missouri-Rolla, Rolla, MO 65401).

Continued on page 18

THANK YOU AND FAREWELL

After 21 years of devotion and service to the IEEE and EMC Society Newsletter, Charlie Anderson has resigned as Associate Editor for Chapter Chatter. We wish him the best of luck and continued success in his future endeavors.



KIMBALL WILLIAMS
ASSOCIATE EDITOR

The following are excerpts from the August 18, 1992 minutes of the IEEE EMCS Education Committee.

Clayton Paul introduced members to a new publication titled "EMC EDUCATION MANUAL" and reviewed the developments which led up to this work. The manual opens with a statement of intent, which is "...to aid in the establishment of a course in EMC at a university in an EE program." The manual contains a detailed suggested course outline (University EMC Course Packet), the EMC Experiments and Demonstrations (EMC Experiments Manual) and Revision 3 of the EMC Bibliography, dated July 17.

Dick Ford observed that at this time, we have achieved the experiments manual's primary intent, i.e., to provide experiments suitable for duplication with only low tech equipment available. He moved that we expand the equipment requirements so that more 'hi tech' equipment could be used in future experiments. The manual could then be divided into Volume 1 for low tech equipment and Volume 2 for 'hi tech' equipment.

Jim Muccioli and others suggested

that we make the experiments in the current volume of the experiments manual the subject of a session or a booth at the 1993 symposium. In accordance with a suggestion from Magdy Iskander, Dick Ford will make plans to videotape the sessions, or exhibits, so that they could be included in future computer based education materials.

Magsood Mohd volunteered to correlate the current experiments list with the NARTE list of technologies to see in what areas we need to look for additional representative experiments and to also begin planning for a series of tutorial sessions, dealing with EMC fundamentals, that may be presented at each forthcoming symposium.

A subcommittee was formed of the following people to coordinate and staff this work.

Andy Drozd, Chairman
Pat Coles, Angel
Dick Ford
Magsood Mohd
Jim Muccioli
Bob Nelson
Clayton Paul
Don Weiner
Kimball Williams

SCHOLARSHIP

Pat Coles announced that the BoD has voted a President's Memorial Award which grants a scholarship of up to \$2,000 to a worthy graduate student or undergraduate studying in an EMC related technical field. Publicizing the program is a priority. Kimball Williams will contact the editors of the student magazine 'Potentials' to arrange to publish details of the scholarship to the IEEE student branches.

EMC PRESENTATIONS

John Mass presented an overview of his work to provide two EMC presentation outlines. One is directed to engineering students and another is suitable for general audiences.

John said that it remained for his subcommittee to flesh out the outline so that local lecturers could use it to make presentations to local groups without needing to call upon the distinguished lecturers. He also asked for feedback from members of the committee that would help his subcommittee in their work.

OFFICERS

At the Anaheim Symposium, Chairman Paul announced that after serving as chairman of the Education Committee for three years, he was stepping down from the position effective immediately. Upon approval of the BoD at their Thursday August 20, 1992 meeting, the officers taking up the leadership of the committee are:

Kimball Williams	Chairman
James Muccioli	Vice-Chairman
Robert Nelson	Secretary

A personal note:

It has been my privilege to serve as secretary to the committee under Clayton Paul for the past few years. This time has been both educational and encouraging. The committee has made significant strides under Clayton's guidance, and it remains for the new executive committee to continue the work that he has begun. Clayton has assured me that he intends to remain active on the committee. With his help, and with the excellent support already shown by our members, we will be able to move forward.



JOSEPH BUTLER
ASSOCIATE EDITOR

SAE AEROSPACE STANDARDS ACTIVITY SAE AE-4 ELECTROMAGNETIC COMPATIBILITY

Herb Mertel (SAE AE-4 Representative to the Representative Advisory Committee (RAC)) reports as follows:

- ARP 958 on antenna calibration was completed by the committee. It was submitted to the Aerospace Council for approval.
- SAE AE-4R report on certification of aircraft electrical and electronic systems to HIRF was balloted by committee. The advisory circular has been sent to FAA. A user's guide is still in process.
- Section 22 of DO-160C on lightning transient susceptibility of aircraft has been completed and was submitted to RTCA by SAE AE-4L.
- The updating of SAE AE-4 documents that are more than five years old is continuing.

ELECTRICAL OVERSTRESS/ ELECTROSTATIC DISCHARGE (EOS/ESD) ASSOCIATION

T. J. (Bill) Ritenour (EOS/ESD Association RAC Representative) reports as follows:
The EOS/ESD Association is having its biggest ever symposium on September 16-19, 1992 and the

keynote speaker is the EMC Society's own Henry Ott who will speak on what this decade holds in store for ESD effects mitigation. There will be 16 tutorial sessions prior to the symposium as well as 6 interactive evening workshops during the symposium. Over 100 booths have been sponsored where exhibitors will show their products.

In addition, the EOS/ESD Association's version of the Cannes Film Festival will reconvene. The association's version has 24 hour a day continuous screening of literally dozens of ESD training and awareness films and video tapes. The screening will last the full three days of the symposium.

RADIO TECHNICAL COMMISSION FOR AERONAUTICS (RTCA)

Subcommittee 135, chaired by Dave Walen of Boeing, continues to meet in an attempt to effect changes to RTCA DO-160C Part 20, radiated susceptibility requirements for commercial avionics. These changes to the specification are to reflect the results of SAE AE-4R work in the area of HIRF certification for commercial aircraft.

NATIONAL ASSOCIATION OF RADIO AND TELECOMMUNICATION ENGINEERS (NARTE)

John Luchini of the Charles Stark Draper Laboratory, Cambridge, Massachusetts was approved as the RAC representative to the National Association of Radio and Telecommunications Engineers (NARTE).

IEEE TECHNOLOGY POLICY COUNCIL COMMITTEE ON MAN AND RADIATION (COMAR)

Dan Hoolihan (COMAR RAC Representative) reports:

The IEEE has released one draft and four final entity position statements as follows:

- "Human Exposure to Radio Frequency Fields from Portable and Mobile Telephones and Other Communications Devices"- Draft.
- "Human Exposure to RF Emissions from Cellular Radio Base Station Antennas."
- "Human Exposure to Radio Frequency Fields from Police Radars."
- "Health Aspects of Exposure to Electric and Magnetic Fields from RF Sealers and Dielectric Heaters."
- "The Safety of Electromagnetic Pulse Simulators."

AEROSPACE R&D

Len Carlson (Aerospace R&D RAC Representative) reports:
The committee reviewed three draft statements and one white paper as follows: (1) statement on U.S. civil space goals; (2) statement on the cost of civil space activities; (3) statement on Moon-Mars mission and (4) a financial/institutional strategy for U.S. solar system exploration and settlement.

Four goals were defined for U.S. civil space: (a) open up space to general public, i.e., less government; (b) focus spending on more diverse interests, i.e., conduct basic research and space exploration to encourage more rapid U.S. economic growth and international competitiveness; (c) space should be explored to minimize the hazards of physical destruction, improve communications among people and improve overall health; (d) exploration and settlement of the solar system using commercial revenues and other nations' funding.



DON HEIRMAN
ASSOCIATE EDITOR

The third EMCS Board of Directors meeting for 1992 was held on two days, August 17 and August 20 at the Anaheim Marriott Hotel, the venue for our 1992 annual symposium. The meeting was called to order at 8 A.M. by President Bob Hofmann. Board members present included Pat Coles, Gene Cory, Janet O'Neil, Ed Bronaugh, Henry Ott, Dan Hoolihan, Al Mills, Herb Mertel, John Adams, Don Clark, Bob Goldblum, Don Weber, Walt McKerchar, Yasu Akas, Joe Butler, Bob Hofmann, Warren Kesselman, Don Heirman, Bruce Gjertson, Hugh Denny, Dave Staggs, and Dick Ford. No Board members were absent. Guests included Ferdy Mayer, Professor Sato, Moto Kanda, Bill Johnson, Len Carlson, Kimball Williams, Clayton Paul, Wilf Lauber, Jim Muccioli, Yashio Kami, and Haoki Amano.

This report will highlight the meeting's activity. Secretary Janet O'Neil's minutes from the 11 May BoD meeting were approved as was Treasurer Dick Ford's financial report, which showed a current net worth of just under a half million dollars.

Director Dan Hoolihan (Member Services) introduced chairs reporting to him. Pat Coles (Awards/Membership) reported that there were 3807 active members as of 30 June. Thirty-two received awards in Anaheim. The President's Memorial Scholarship went to Thomas Jerse, PhD candidate at the University of Kentucky. This award includes a certificate and a \$1000 scholarship.

Dave Staggs (Chapter Coordinator) announced that the Northwest Florida section EMC Chapter has been approved. Eight other new chapter inquiries have been received from as far away as India. Dave also indicated the Chapter Chairmen's Handbook was handed out at the Chapter Chairmen's luncheon on August 20 at the symposium. For copies, call Dave on (512) 343-3751. John Adams (Distinguished Lecturer) reported that there will be four lecturers available for 1992-1993 chapter meeting sessions.

Director Walt McKerchar (Professional Services) presented his report. The highlight was Bill Gjertson's (Public Relations) showing of our second EMCS video which is geared for presentation to the general public. It is accompanied by a pamphlet "Electromagnetic Interference...A Global Engineering Challenge." The tape can be purchased for \$15.00 (includes shipping and handling) from Don Weber on (206) 244-0952. Herb Mertel (Transnational Committee) reported that our Society membership booth will be exhibited in Edinburgh, Scotland at their EMC Conference in September 1992 and in Zurich, Switzerland in March 1993. Al Mills (PACE) indicated that jobs, competitiveness, and industrial partnerships are the three main topics at the 1992 PACE Conference and Workshop held in September 1992.

Just before adjourning on 17 August there were a few miscellaneous reports presented. Len Carlson presented the TAB report and noted that TAB's budget must now be balanced. Mr. Yoshino gave a brief report on the 1994 Sendai symposium in Japan. Joe Butler (RAC Chairman) indicated that John Luchini is the EMCS RAC representative for NARTE. Vice President Warren Kesselman reviewed his proposal for a long range plan for the Board and the Society.

On August 20 at 6 P.M. the BoD reconvened and Director Gene Cory (Communications Services) introduced several reports and chairmen reporting to him. Chester Smith (History) received Board approval for \$1500 to microfilm EMC conference/symposia records. Bob Goldblum (Newsletter Editor) has five potential candidates to replace Charles Anderson as Chapter Chatter associate editor. [Todd Hubing was subsequently chosen.] Dr. Kanda (Transactions Editor) said that the special Transactions on High Power Microwaves is on schedule for an August 1993 release. He is also trying to get more associate editors from outside the U.S. If you have an interest, call Moto on (303) 497-5320. Gene then reviewed symposia activity. Terry Cantine (1992) gave an update as to Anaheim happenings. The workshops on Monday continue to be well attended. More details will follow in the next issue of the Newsletter. The call for papers for Dallas was sent with a deadline of November 15 for full six-page papers. Their preliminary budget was approved, as was an advance of \$3000.00. For 1994, the Board approved a \$5000.00 advance. The Board then approved the EMCS to be a cooperating organization for the 1997 International EMC Symposium in Beijing, China. Finally, the Board moved and approved that all EMCS sponsored symposia (Region 1-6) must target a surplus 15% of their projected income.

Director Don Heirman (Technical Services) first presented the EMCS Standards Committee report. Of particular note is that four Project Authorization Requests (PARs) were approved by the IEEE Standards Board in June. This shows the high level of standards activity in our Society. Dr. Clayton Paul (Education) has stepped down as chairman and Kimball Williams is his successor. The Board expressed its deep appreciation for Clayton's service to the Society over the past



**RUSSELL V.
CARSTENSEN, PE, NCE
ASSOCIATE EDITOR**

EMC PERSONNEL CERTIFICATION AND LABORATORY ACCREDITATION PROGRESS REPORT

I ran across two articles that gave me cause to ponder. The first was in *Program Manager*, published by the Defense Systems Management College. *Program Manager* is the DSMC journal for transmission of information on policies, trends, events and current thinking affecting program management and defense systems acquisition. In the May-June issue, Dr. Julius Hein, P.E., the Director of DSMC Central Region, St. Louis Mo. wrote an article titled "Certification in Your Career Path."

In his article, Dr. Hein stated that "...the traditional pendulum of change in the US is swinging again. What is the target this time? Simply stated, the answer is: CERTIFICATION."

Dr. Hein went on to state that "...a profession is a career or occupation in which qualification to work is obtained by a combination of education and work experience. Usually there is an agency such as a university or a professional association to confer certification." He further stated that "...the Department of Defense supports the certification of acquisition personnel by publishing DoD 5000.52M which covers the Career Development program for acquisition approved in November 1991 for implementation

by Donald Yockey, Under Secretary of Defense for Acquisition."

My initial impression was that I had found in Dr. Hein yet another individual with similar insight into the problem of competency demonstration in a derivative field. I am still convinced that I have, but to a different perspective. Dr. Hein appears to be oriented to the problem of career path development for a defense acquisition core, but the issue is the same as in the EMC community.

The second article was on page 11 of the March 26 edition of *Washington Technology*. Titled "Electronic Standards Are Still In Limbo," the article, by Andrew Jenks, described the problems the European community is having in imposing a common identifier on electronic equipment. The mark, known as the CE Mark of Conformity, is similar to the UL mark in the US. At issue is the question of which bodies will be given authority to certify electronic products for sale across all of Europe. The article goes on to state that "...compliance with EMC requirements will also be tougher and will include immunity specifications requiring a product to function under the influence of outside electrical noise."

The reason these articles give me a cause to ponder is that they both deal with a difficult problem, that of an unknowledgeable buyer trying to make a marketplace determination of adequacy without sufficient insight. Both articles point to the use of an objective third party for assistance in making that determination.

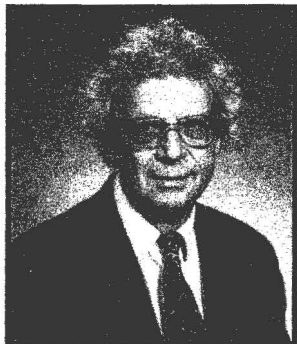
EMC is a derivative field and involves principles and practices outside the fundamental body of knowledge taught at the baccalaureate degree level. The difficulty for the buyer of services is in determining the standing or credentials of individual practitioners with respect to the

specialized body of EMC knowledge.

For example, given two people, both with degrees in electrical engineering, the buyer may assume both to be competent in EMC. They both would have encountered Maxwell's equations from which EMC engineering is derived. However, if neither has had specific exposure to the physics of coupling path control or the detective work that source-victim problem characterization requires, their ability to identify and resolve EMC problems will be greatly impaired. That is not to say that either practitioner could not do the job eventually, only that getting it done will take much longer than necessary. To the buyer of their services, the delay is directly translatable into increased costs and potential loss of market share. In the defense business, it could mean loss of tactical advantage with potentially far worse consequences.

The National Association of Radio and Telecommunications Engineers (NARTE), a nonprofit professional association, certifies EMC engineers and technicians to a defined standard for education, work experience, peer endorsement and examination. The totality of these provides the consumer with an objective third party assessment of competency. There are more than 1009 EMC engineers and 334 technicians currently certified by NARTE. The list of certified practitioners includes members from both private practice and public service.

The National Institute of Standards and Technology (NIST) accredits EMC laboratories through the National Voluntary Laboratory Accreditation Program (NVLAP). Under the NVLAP program, EMC test laboratories receive an on-site visit by a team of specially trained assessors. The assessor team examines the candidate laboratory's



MARTIN SCHNEIDER
DIVISION IV
DIRECTOR

ACTIVITIES OF THE NEW TECHNOLOGY DIRECTIONS COMMITTEE

Since the beginning of this year Dick Ford and I have been serving on the TAB New Technology Directions Committee, whose mission is to identify emerging technologies and distribute information on significant technical advances to our members. Our committee meets every two months at the IEEE Service Center in Piscataway, New Jersey, where we benefit from the active participation of IEEE staff members and have immediate access to existing technical data bases and other relevant information. Our team has been action oriented, which means that we have been focusing our efforts on finding and promoting fields with the strongest prospects for steady economic growth. These technical fields are compiled in our new document entitled *Portfolio of Emerging Technologies* which has been made available to the *IEEE Spectrum* and a number of IEEE magazines and newsletters. Our publication was reviewed by the IEEE 2002 Task Force of the Transnational Committee whose members were impressed by the quality and content of the document. They recommended distributing it to all IEEE Sections worldwide. If you wish to receive your own copy please give a call to Dick Ford on (202) 767-3440 or dispatch a note to my internet e-mail address: m.schneider@ieee.org or mvs@hoh-1.at.com.

BENEFITS FROM INTERACTIONS WITH OTHER IEEE SOCIETIES

In the last annual report of our Divisions, a proposal was made to enhance the communication between Societies by encouraging visits of officers to each other's administrative meetings. More specifically, it was suggested that the Vice President of a Society attend the Board meeting of another Society to establish contacts and learn from the experiences of other groups. Peter Staecker, VP of MTT-S, volunteered to serve as the pioneer of this program by attending the June 1992 Board meeting of the Electron Devices Society at MIT in Boston. In his written report he listed a number of successful ED-S activities which could be readily adopted by the Societies in Division IV. For example, a periodic examination of new technical developments will facilitate the inclusion of emerging technologies in the IEEE key document which describes the field of interest of each Society. Peter was also impressed by an excellent summary prepared by Ranuka Tindal on statistics related to the publication of the IEEE Transactions on Electron Devices. He recommends that we get a copy of the summary and use it as a model for presenting EMC Transactions data to our Board members. He also suggests publishing relevant parts of it in the EMC Society Newsletter for the benefit of our members. He concludes the report by saying: "I only stayed three hours, but the time was well spent. I advise all members and officers to attend an occasional Board meeting of other Societies when they have the chance."

A NEW CONCEPT FOR CREATING IEEE STANDARDS

The importance of creating and maintaining standards was already emphasized in the Division IV report of the summer 1992 issue of the EMC Society Newsletter, and can be

summarized as follows:

- Standards create employment
- They enable manufacturers to enter the business without fear of making incompatible products
- The field of standards is not boring (compare the work of great French chefs and their recipes)
- The key factor in the development of a standard is to reach a consensus on how to create useful products and services which are affordable

Since the publication of the last report, the IEEE Standards Department and the International Electrotechnical Commission (IEC) have shown a strong interest in facilitating the introduction of global standards through new mechanisms which are simpler than the lengthy and traditional consensus procedure. I participated in discussions with Andrew Salem and Judy Gorman, Staff Directors at the IEEE Standards Department, on how to establish a new route that will enable us to reach new standards. In concurrence with the General Policy Committee of the IEC, we propose to publish a series of documents which are midway between a technical paper and a standard. The documents would be similar to existing application notes widely used by successful engineers and might be called *IEC/IEEE Emerging Technical Practices and Procedures*. They would serve as source documents which could later evolve into new standards.

Our team is looking for pioneers who will help us in implementing this proposal. If you have material for an application note get in touch with the EMC Standards Chief Donald Heirman (908) 741-7723 or give a call to Judy Gorman, IEEE Standards Department in Piscataway, New Jersey. Phone (908) 562-3820.



D.R. MARTIN GREEN

Martin Green was commissioned into the British Army as a serving officer from the Royal Military Academy Sandhurst, U.K. in 1968. He subsequently graduated from London University with a degree in Electrical Engineering in 1970.

After graduation Martin completed a one-year postgraduate electronics engineering course. This involved, among other projects, designing an automatic automobile positioning system for station keeping of cars on freeways. Martin commented, *"It was a very good concept which worked beautifully until demonstrated in front of army generals, when it always failed. I know of a lot of other equipment that does the same."* After a period of service in Germany and the U.K., he was appointed to a logistic role in surface-to-air guided weapons in the UK Ministry of Defense.

In 1978 he retired from the Army, having attained the rank of Major, and joined the Raychem Corporation as Technical Services Manager in the European Wire and Cable Division. In this position, he became Raychem's European EMC expert, which involved advising military and commercial customers on their EMC/EMI requirements. It quickly developed into a general advisory role covering all aspects of EMC, including testing finished systems and faultfinding. After a number of job changes within Raychem,

including managing a development laboratory, product management and international marketing, he was appointed as the International Sales Support Manager with particular emphasis on EMC/EMI products. This involved extensive travel worldwide, including to the U.S. He was actively involved in the cabling systems for the Ticonderoga Class cruisers and his involvement with "optimized" shielded cables resulted in the development of a new range of lightweight, low fire hazard, marine cables for the U.S. Navy.

In 1987 he left Raychem to establish his own EMC engineering and consulting company. *"It was the right move at the time. EMC was just beginning to become big news in Europe with the proposed EC Directive on EMC and EC 92."* The company, Interference Technology International Ltd., has become Europe's largest EMC training company. It has also concentrated on consulting and engineering services, and now employs over 22 full-time and contract staff. The company's main activity is project engineering and it serves as the sole EMC engineering contractor to the Channel Tunnel project. They continue to perform military work and have substantial contracts in EMP work in the U.K. and Europe in general. *"We do not turn down a challenge and the Channel Tunnel is a very interesting project,"* commented Martin.

October 1991 saw his move into the U.S. market, with the establishment of Technology International, Inc. in Richmond, Virginia. As President of the company, Martin's direct aim is to support U.S. industry in complying with all the European regulatory requirements. The company has been established to serve as the U.S. arm of Interference



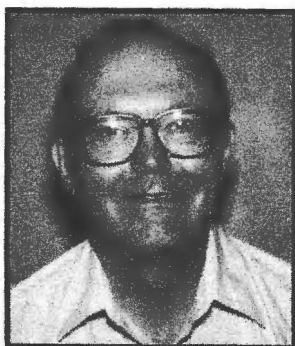
WILLIAM G. DUFF
ASSOCIATE EDITOR

Technology International, and also pursues ISO 9000 consulting opportunities in addition to its EMC specialty.

These functions coincide with the appointment of the U.K. company as a "Competent Body" for product approval. *"There is a feeling in the U.S. that fortress Europe is here and all products have to be tested and certified in Europe,"* Martin said. *"This is wrong and Technology International is here to demonstrate that. I want to ensure that we work in the United States for the good of U.S. industry."*

In his professional activities, he has presented many papers at international seminars and written articles for European and U.S. magazines. He is currently Deputy Chairman of the U.K. and R. I. Chapter of the IEEE EMC Society. He is also a fully qualified Chartered Engineer.

Living outside Oxford, England, he has a few ties with the city, not the least of which is that both his eldest son and his wife attend the University. His other son has recently left school prior to attending a university, while his daughter has four more years to complete. He finds time to be Chairman of the local charity for disabled veterans and if activities permit, he intends to train for his hot air balloon pilot's license later this year.



EDMUND K. MILLER
ASSOCIATE EDITOR

AVAILABLE SOFTWARE

A new approach to evaluating the fields of the physical-optics (PO) current approximation is described here. The technique is an elegant extension of previous work on PO and leads to accuracy comparable to other approaches while providing a time, or operation-count savings, of a factor of 30 to 100, depending on the application.

THE QUADRATIC SURFACE-PATCH (QSP) CODE

The contact for QSP, from whom the following information was obtained, is Mr. Glenn D. Crabtree, GE Aircraft Engines, General Electric Company, 1 Neumann Way, Cincinnati, OH 45215, phone 513-243-5281, FAX 513-243-8475. The code is available to qualified requestors. Further information can be obtained from Mr. Crabtree. His description, with some interjections from me, follows below.

"In many cases, electromagnetic scattering from electrically large surfaces can be adequately modeled by assuming PO currents on the illuminated surface, and performing the appropriate surface integration. A closed form solution for the integral of these currents on an arbitrary doubly-curved surface does not exist.¹ Techniques for overcoming this limitation have primarily involved simplification of the surface to integrable forms

(triangular facets), or the use of computationally intensive numerical techniques (e.g. Gauss quadrature).

A new technique² for evaluating these integrals in a very efficient manner has been developed. This technique uses a quadratic amplitude and phase expansion of the PO surface currents in terms of a nine-point quadratic surface patch element. The true PO currents are approximated by a biquadratic interpolant through these nine points, with each point contributing a single term to the expansion. Each of the nine terms can be integrated in closed form. The approximation error is then directly attributable to the accuracy to which the nine-point expansion approximates the exact PO surface current.

The benefits of this type of integration of PO currents are numerous. First, the parametric interpolative weighting of these nine functions forces the boundary currents to match precisely the phase of the actual PO surface currents (i.e., the approximation is exact at the patch boundaries). Since each of the nine-point functions spans the entire domain of the parametric quadratic surface elements, no phase mismatch exists between surface elements. Secondly, it has been demonstrated numerically that this interpolative approximation of the PO currents provides excellent results. This was anticipated in that each of the nine functions (as well as their linear combination) is smooth and continuous throughout the domain of the entire surface element. Therefore, there is little spurious scattering due to the expansion function approximation of the exact PO currents.

This technique has been implemented for RCS backscatter calculations in a computer code called the Quadratic Surface Patch (QSP) code. The QSP code has

demonstrated extremely efficient and accurate evaluation of PO integrals for a variety of complex CAD (Computer-Aided Design) geometries.

A 100λ -radius sphere was analyzed with quadratic elements (patches) and flat elements (facets) as a demonstration case. The sphere is an excellent test case for PO codes in that the exact solution is available, and the RCS is aspect-angle independent. The computed variation with aspect angle thus characterizes the "facetization noise" of the surface-approximation technique. Results for the sphere were computed as a function of the average surface area of the approximating facet and quadratic elements. The elements were arranged on the sphere along latitude and longitude lines. Patterns were run for 181 elevation (pole-to-pole) aspects around the sphere and the maximum error was computed by comparison with the geometrical optics value of approximately $44.9715 \text{ dB}\lambda^2$.

The error for each technique is plotted as a function of element area in Figure 1. (Note: In order to obtain a more reproducible copy, I have replotted the curves Glenn supplied to me. While there are slight differences in the details, the overall behavior is maintained). It is clear from the plot that the convergence of the quadratic technique is far superior to the flat-facet technique. Quadratic surface elements as large as $1,000\lambda^2$ produced errors of only 2.89 dB compared to the flat-facet solutions which require surface elements much less than $10\lambda^2$ to produce the same error. The third curve of Figure 1 shows the error that results from reducing the integration error essentially to zero by increasing the number of integrand samples used to evaluate the backscatter field. This result shows the residual error that comes

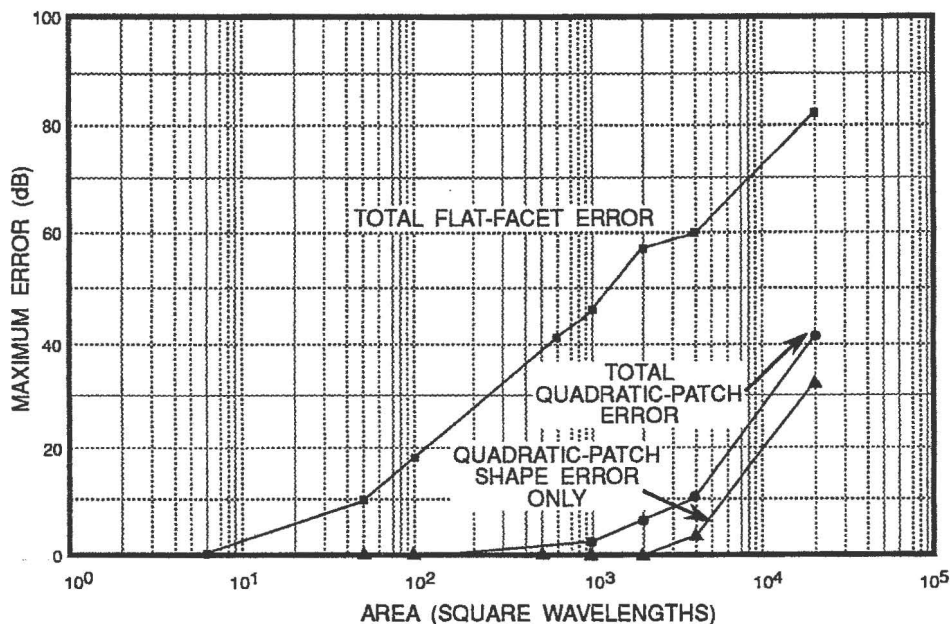


FIGURE 1. Maximum error in backscatter RCS of a 100λ -radius sphere as a function of the elemental area for conventional physical-optics approach using flat facets and a new technique based on quadratic surface patches.

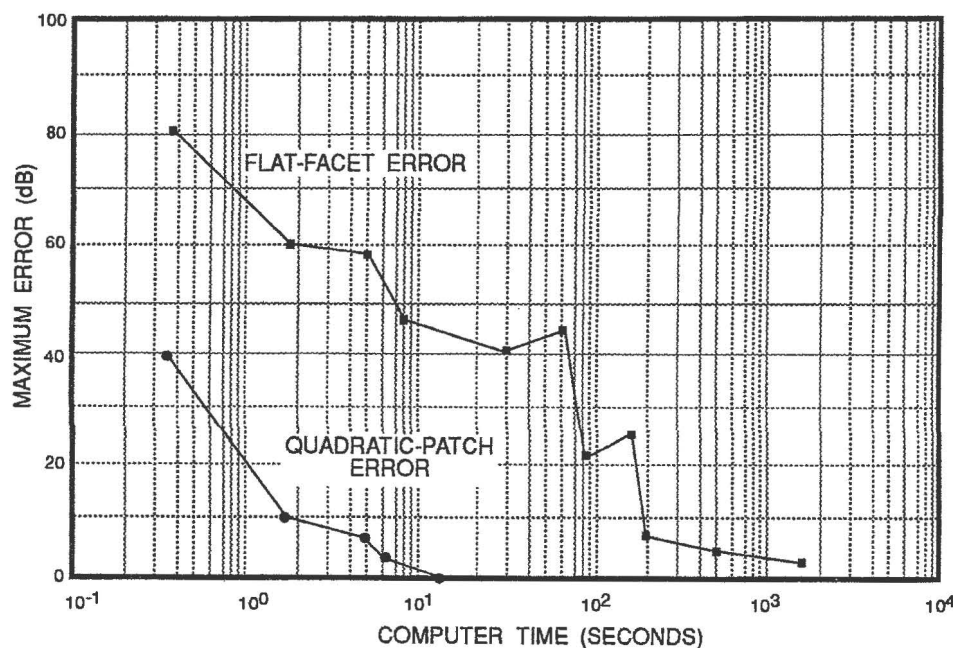


FIGURE 2. Maximum error in backscatter RCS of a 100λ -radius sphere as a function of the computer time.

from a quadratic approximation to the spherical surface. The difference between this curve and the other QSP result of Figure 1 is thus caused by the integration error in the former.

Numerical results have shown that computation of a quadratic surface element requires approximately 25% more CPU time than a single flat facet. However, many fewer quadratic surface elements are required to provide accuracy

comparable to that obtainable using flat facets. Data showing maximum error as a function of CPU time for the 100λ sphere is shown in Figure 2. This data shows the rapid convergence of the quadratic PO solution with increasing CPU as compared with the slow convergence of the flat facets.

Research in this area is continuing. The theory has recently been successfully extended to 16-point cubic surface elements. This work will be published at a later date."

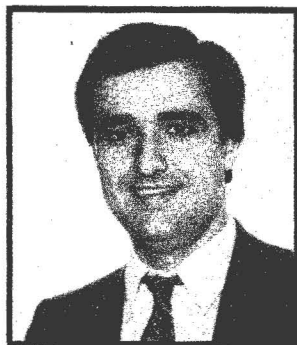
REFERENCES

1. Stamnes, Jakob J., *Waves in Focal Region*, IOP Publishing Limited, Techno House, Bristol, England, 1986, p.63
2. Crabtree, Glenn D., "A Numerical Quadrature Technique for Physical Optics Scattering Analysis," *IEEE Trans. Magnetics*, Vol. 27, No. 5, September 1991.

EMC CERTIFICATION & ACCREDITATION . . .
Continued from page 7

facility, standing procedures, practices, personnel credentials, documentation and equipment calibration to assure conformance to program standards. The assessor's report is reviewed as one part of the accreditation process. Currently there are 12 laboratories accredited by NIST-NVLAP.

The process works. Both certification of EMC technical personnel and accreditation of EMC test laboratories level the playing field for each. Having an expression of competency from an objective third party imposing a defined standard of measure simplifies the decision process for the buyer. Certification and accreditation have proven to enhance the quality of available workforces and test laboratories. Certification and accreditation also assure a continuing pipeline of skilled practitioners in times of decreasing budgets.



REINALDO PEREZ
ASSOCIATE EDITOR

**COMPUTATIONAL
ELECTROMAGNETICS:
Frequency Domain Method of
Moments**

by

**Edmund K. Miller, Louis Medgyesi-
Mitschang, and Edward H. Newman**
(Editors)

IEEE Press, Ed. 1992, 528 pp.
\$69.95

Computational Electromagnetic Methods (CEMs) is an area that has progressed considerably within the last 25 years due to the significant advances in hardware and software capabilities that have become available not only to the dedicated researcher but to any engineer in the field. Among all the methods in computational electromagnetics that are presently used today, the Method of Moments (MoM) stands out as the most widely used CEM in most analyses of microwave circuits, antennas and antenna networks, remote sensing, magnetics, and electromagnetic compatibility (EMC). This fact is simply evident by the number of papers on the MoM that appear in many engineering and science journals. In the last three years this editor has seen a "flurry" of books in CEMs, including the MoM. This development is a clear indication that CEMs have matured enough so as to migrate from journals into textbooks. Furthermore, the increased use of CEMs for analyzing certain types of

EMC problems is a good indication of the transformation that EMC is experiencing from a discipline, which mostly relies on testing, to one where theoretical analysis is of increasing importance.

Among several existing books in the MoM, the book reviewed here is characterized by a compilation of 57 journal papers whose authors rank in the "who's who" of MoM history, from the 1950s to the present. The papers were chosen by the editors of the book as being representative of the evolutionary process of the MoM as a computational electromagnetic technique. The readers are advised, however, that because most journal papers are not of a tutorial nature, the usefulness of this book is more relevant to those already familiar with the MoM. If you are a novice in the field this editor advises you to consider the references at the end of this review before you can take advantage of this book.

The book is divided into seven parts. The first six parts are devoted to different theoretical aspects of the MoM, while the last part of the book deals with the numerical techniques. Part I contains nine papers dedicated to the basic theory of the MoM. Among the most important papers are: a) "Reaction Concept in Electromagnetic Theory," by Rumsey, which describes certain types of integral equations used in MoM. Richmond used the reaction concept in his piecewise reaction formulation, b) "Origin and Development of the MoM for Field Computation," by Harrington (the "father" of the MoM), which illustrates the mathematical foundations of this technique, and c) "Effective Methods for Solving Integral and Integral-Differential Equation," by Wilton and Butler, which is a very well organized tutorial on the solution of integral-differential equations.

Part II contains seven papers whose

emphasis is on the proper modeling of two-dimensional and three-dimensional surface currents in the MoM. A paper by Newman and Pozar, "Electromagnetic Modeling of Composite & Surface Geometries" describes the modeling of closed/open surfaces and attached wires using wire-grid modeling. The paper by Rao, Wilton & Glisson, "Electromagnetic Scattering by Surfaces of Arbitrary Shape" uses triangular patches for representing surface current distributions. Part III contain seven papers dedicated to the modeling of MoM problems using wire structures. The first three papers by Mei, Yeh and Mai, and Gee form the theoretical foundations of the use of electric field integral equations for thin wire structures. These papers constitute the theoretical background for a widely used MoM code called Numerical Electromagnetic Code (NEC). This section also includes Richmond's paper, "Radiation and Scattering by Thin-wire Structures in the Complex Frequency Domain" which is on the usage of piecewise sinusoidal reaction formulation for radiation and scattering by thin wires. Part IV explores the modeling of penetrable three-dimensional bodies. This section begins with an introduction of the volume-current approach, approximate treatment using the impedance boundary conditions, and various approaches for homogeneous and inhomogeneous bodies.

Part V treats the aperture problem in the MoM by a variety of methods. Apertures can increase the scattering of otherwise smooth surfaces. Aperture problems can be formulated in terms of equivalent surface currents on the conducting surface which separates the two regions. However, since the aperture area is usually much smaller than the conducting surface, it is more efficient to employ the MoM to solve for the equivalent surface current on the aperture. Two papers by Butler et al., "Electromagnetic Excitation of

Continued on page 19

FINAL REPORT ON EMC SOCIETY ACTIVITIES FOR 1991

During 1991 the Electromagnetic Compatibility Society, under the Presidency of Mr. Edwin L. Bronaugh, took several important steps.

UNDER THE COMMUNICATIONS DIRECTOR, THE LATE DR. ROBERT J. HAISLMAIER

The EMC Society established an archive of both national and international EMC symposium records of both IEEE and other organizations. Included in this archive are microfiche copies of the EMC Society Newsletter and other publications which contain useful or historical information which are not usually archived. The documents are available to EMC Society members worldwide and will provide them with practical technical information not available from any other archive. A coordinator was appointed to maintain coordination with the IEEE Press, to sponsor books relating to EMC topics. Much was done towards establishing a master book of EMCS policies established in the past by various boards of directors.

UNDER THE TECHNICAL ACTIVITIES DIRECTOR, MR. DONALD N. HEIRMAN

The EMC Society Standards Committee brought up to date all of the IEEE standards dating back to the 1950s for which it is responsible, and embarked on several new standards projects. One important standard which was published in 1991 was IEEE STD-299-1991, which will be used by the US military to replace MIL-STD-285. The EMCS Standards committee sponsored four recipients of the IEEE Standards Board *Standards Medallion*, which was awarded during the 1991 EMC Symposium.

- The Education Committee developed a curriculum for an

undergraduate course in EMC, an EMC Experiments Manual, and the EMC Bibliography, sponsored a student attending the EMC Symposium, and managed the Distinguished Lecturers Program.

- The Technical Advisory Committee reviewed 1991 Symposium paper abstracts, chaired sessions, held workshops, and completed a five-year plan.
- The Representative Advisory Committee appointed/reappointed a full staff of representatives and prepared EMC-appropriate reports of the various committees' activities.

UNDER THE MEMBER SERVICES DIRECTOR, MR. DANIEL D. HOOLIHAN

A new chapter was established in the United Kingdom and Republic of Ireland, and other chapters are under development in Germany, Buenaventura, California, and Portland, Oregon. Additional chapters are under consideration. The EMC Society is trying to establish a joint IEEE EMC Society-SEE CEM (France) chapter, and joint IEEE EMC Society-IREE (Australia) chapter; other joint chapters between the IEEE EMC Society and the country's own professional technical society for electronics/electrical engineers, i.e., the country's equivalent of the IEEE, are under consideration.

UNDER THE PROFESSIONAL SERVICES DIRECTOR, MR. WALTER MCKERCHAR

The EMC Society is carrying on the aggressive public relations program started last year, continuing to reach out for new members and to educate the general public.

EMCS BoD ACTIVITIES . . . Continued from page 6

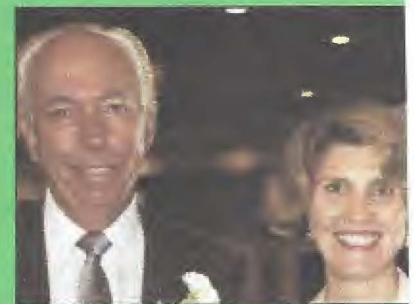
three years. Clayton marked the close of his business by indicating that his major projects have been completed. These projects include the undergraduate EMC course outline for use in EE curricula, a list of EMC experiments/demonstrations and an extensive EMC bibliography. We wish Clayton well and thanks again.

Next Joe Butler (RAC) presented reports on our EMCS liaison with the SAE/AE-4, TAB Aerospace R&D Committee, Electrical Overstress/ESD Association, COMAR, IEC/CISPR and NARTE. For the many details, call Joe on (617) 935-4850 x267. Wilf Lauber (TAC) reviewed the results of the TAC meeting on August 18 at the symposium. Henning Harmuth (TC-7 Chairman) and Russ Carstensen (TC-1 Chairman) both resigned and have been replaced by Akhlesh Lakhatakia and Gene Lockhart, respectively. He then noted that the TAC has been asked to become more involved with the symposium technical program. He listed over a dozen proposals. For a copy of these ideas, call Wilf on (613) 998-2377. Wilf has also sent a copy of these ideas to each TC chairman for their review.

Under new business, President Hofmann discussed several topics. An ad hoc committee to address the EMCS participation in the IEEE's Engineering Skills Assessment Program was established. Dick Ford was nominated and the Board approved his position as the EMCS representative for the IEEE's activity on electronic access to the IEEE's data base. Also, the Board approved free membership for the EMCS at all EMC symposia recognized by the Society. This is equivalent to a \$10 free membership to IEEE members.

The meeting adjourned at 9 P.M. The next meeting was scheduled for 10-11 November 1992 at the Atlanta Marriott Marquis Hotel in Atlanta. This hotel is the venue for the 1995 EMC Symposium.

DISTINGUISHED EMC ANAHEIM



SOCIETY MEMBERS AT THE SYMPOSIUM



Photos: Dick Ford

IEEE PUBLICATIONS PRODUCTS COUNCIL MEETING

CHESTER L. SMITH
DIVISION IV REPRESENTATIVE

Thursday, 16 July 1992

ATTENDANCE: While there were more than a dozen people in and out during the day there were only four with votes. Besides the Chairman, Dr. Smits, Computing (Div. V), and Electromagnetics and Radiation (Div. IV), were represented. Vehicular Technology (Div. X) was represented by Dr. Jan Brown. She was wearing two hats, Div. IX which has a vote, and also Chair of the Book Broker Committee which does not. All in all it was a good meeting and we were a very approving group.

NON-MEMBER PRICING: Most of the day was taken up with the issue of how the IEEE should price its publications to non-members of the Institute. A study has been completed that demonstrated that the IEEE technical publications are priced not only well below similar commercial publications but also below those of other professional or technical organizations. The pricing strategy can be summed up by this: "Prices should maximize income for the IEEE, but still remain below the 'market.'" The IEEE charter describes the Institute, among other things, as "not for profit." However, it is not "for loss" either. A staff member reported that libraries, our principal non-member customers, do not subscribe on the basis of price, but rather on the basis of their internal staff requirements.

THE ALL PUBLICATIONS

PACKAGE (APP) price was raised by some 18% for 1992. This was driven by some substantial increases in published material by several societies. 1993 price changes will be closer to 12 and 13%. Some information on the anticipated price increases of the "competition" indicate that theirs will be 20 to 30% shading to the high side. As usual, IEEE's APP will remain a "bargain"

for libraries and other non-member users.

Member prices for IEEE publications are set by the sponsoring societies within guidelines set by the Technical Activities Board (TAB). Exceptions are reviewed by this council with a recommendation furnished to TAB.

THE APPLICATIONS BOOK

SERIES (NEW VENTURE): The plan is for the councils to invite the appropriate societies to sponsor a series of "workshops" on applications of electro-technology. Application papers would be solicited from qualified authors. The proceedings would then be edited and issued in book form. The authors and editors are to receive a royalty for this work. An initial set of five books has been suggested. The topics have not been selected nor has the royalty formula been settled.

Motivation for this venture arises in response to the somewhat piratical, but perhaps legal, practice of some commercial publishers. These organizations have been known to send representatives to IEEE symposia and other meetings to sign up presenters as authors if their material appears to be marketable. Perhaps there is nothing overtly illegal in this so long as they do not directly use the IEEE material. However, it is certainly annoying and may, indeed, be impacting IEEE revenues. If it can be proven that the IEEE is being financially damaged, the lawyers might see it differently.

OOP/POP PRICING: The Open Order Plan (OOP) and the Publications Order Plan (POP) pricing structure will be somewhat different next year. Two major changes in the pipeline are: (1) the old formula based on the square root of the number of pages used to reimburse the societies will be scrapped in favor of one that uses the

least squares linear regression formula and (2) the publishing of extra large issues of the Transactions will be discouraged. If a publication is deemed excessive in terms of page count by the Periodicals Council (TAB PC) that issue will be assigned a lower page count for purposes of Society reimbursement.

CD ROMS: The University Microfilms, Inc. (UMI) CD ROM is "out." This product is said to contain all journals, Transactions, technical letters and magazines of both the IEEE and IEE as well as a number of conference records of "major" (?) conferences from 1988 on. The price set by UMI is totally out of sight for the individual and many of the non-member libraries as well. The technical material on the CD ROM is copyrighted by the Institutes (IEEE and IEE), but the licenses to use UMI's software with it costs \$28,000 per CD ROM. APP subscribers get a "break," they can get the license for "only" \$21,000! The comment was made that "we need public domain software to get around theses 'obscene' licensing fees." UMI has an exclusive marketing agreement with IEEE and IEE good for worldwide sales of the CD ROMs until at least the end of 1995. It will be interesting to see how this problem will be resolved sometime during the next millennium.

TAB REORGANIZATION: The Council system has been in effect for about three years now, so it is time to reorganize. The TAB Councils will be retained with some cosmetic changes in their titles. The divisional representatives will be scrapped and a system of ad hoc committee chairs will replace them. These committees can be created and dismissed as varying projects or needs come and go. The chairs would report to the council chair and thence to TAB. Council chairs are ex officio voting members of TAB.

POLICE RADAR SOURCE OF CONTROVERSY

There is no scientific basis that exposure to police radar causes cancer, say U.S. members of the world's largest technical society.

Noting recent media coverage about the safety of exposure to radio-frequency fields from police radar guns, the United States Activities unit of The Institute of Electrical and Electronics Engineers, Inc. (IEEE) issued a statement in June that concluded such devices pose no health threat.

"Measurements and analysis of microwave exposures near properly operating police radar units have shown that even maximal exposure levels are well below recommended safety limits," the IEEE-USA said.

Introduced in the late 1940s as an offshoot of World War II technology, police radar has become a routine means of traffic control. More than 75,000 units are currently used in the United States. Recent media reports, however, have alleged a link to cataracts or cancers in law enforcement officers who work with the devices. As a result of these charges, Connecticut banned the use of radar guns.

The IEEE-USA statement notes that police radars are low power devices compared with other existing radio-frequency systems such as alarm systems and automatic door openers. Most of the police units, which operate with a continuous wave signal, have an output range of 10 to 25 milliwatts. By comparison, cellular handheld radio-telephones operate at hundreds of milliwatts.

To protect human beings from harmful exposure to radio-frequency electromagnetic fields, guidelines for safe limits of exposure to microwaves have been published by the IEEE and the American National Standards Institute. Measured by these and other world standards, police radar units are safe, even when operating at maximum exposure levels, IEEE-USA concluded.

Nevertheless, at an August Senate hearing on the perceived health effects of traffic radar guns on law enforcement officers, a representative of the Standards Board of The Institute of Electrical and Electronics Engineers, Inc. (IEEE) called for "continuing research on biomedical effects across the entire frequency spectrum."

The IEEE's L. John Rankine, former chairman of the American National Standards Institute (ANSI) said, "The scientific and medical communities should determine the research priorities, and government should enlist the support of the National Academy of Engineering and National Academy of Science in ensuring that high quality research is carried out."

Mr. Rankine described IEEE's C95.1 standard, which establishes levels for human tolerance to electric and magnetic fields over a wide range of frequencies. Noting that C95.1 was a revision of an earlier ANSI standard, he emphasized that "up to 125 scientists, engineers and researchers (are) involved in (its) development, maintenance and updating."

Rankine characterized the standard as "currently the best" from a medical, scientific and engineering standpoint. He added that the C95.1 standard "is a living document that changes as new findings become available." IEEE standards are routinely reviewed every five years or whenever new information is available.

In response to a question from Senator Joseph I. Lieberman (D-Conn.) on industry involvement in the development of standards, Rankin stated that C95.1 was produced through an open consensus process including researchers, academicians, policy-makers, journalists and the public — with fewer than 10 percent of the participants from industry. In addition, according to Rankine, the IEEE performs neither a certifying nor monitoring role with its standards — all of which depend on voluntary compliance.

Besides the IEEE, representatives from police groups, government and industry provided testimony to the Senate Subcommittee on Consumer and Environmental Affairs.



On behalf of the Boeing Company, Past President of the EMC Society Len Carlson presents a check to Director of Professional Services, Walt McKerchar. Boeing sponsored the printing of a brochure which will accompany the new 14-minute informational video produced by the EMC Society. The video is geared for presentation to the general public. You too could assist with sponsoring Society activities and receive due publicity. Call Walt and ask how at 1-800-354-3634.

CONSTITUTION AND BYLAWS REVISIONS

The IEEE Electromagnetic Compatibility (EMC) Society Board of Directors approved revisions to the Society's Constitution and Bylaws during their Dallas meeting held February 10-11, 1992. In accordance with the Society's Constitution, Article XI, Amendments, the proposed revisions must be published in the EMC Society Newsletter and become effective 30 days following their publication, unless ten percent of the Society's members object. The proposed revisions are as follows:

PROPOSED CONSTITUTION REVISION, ARTICLE V - ADMINISTRATION

Section 2. The Board of Directors shall annually elect one of its Directors-at-Large as President, and another as Vice-President whose terms shall be for one year and they may be reelected for no more than one additional year. A Secretary, Treasurer and Technical Directors shall also be elected or reelected annually for one year terms. The Secretary, Treasurer and Technical Directors need not be Directors-at-Large. [After the words "Directors-at-Large" add "or its Executive Directors."]

PROPOSED BYLAWS REVISION 5.0 ELECTION OF OFFICERS AND BOARD OF DIRECTORS:

At the first meeting following the election of the incoming Directors-at Large, the Board of Directors comprised of the newly elected members and all current Directors-at-Large and Executive Directors shall nominate and elect from among the Directors-at-Large and the Executive Directors, a President and Vice President and, from the Society membership, a Secretary, Treasurer and four Technical Directors who will occupy those respective offices for the succeeding year. Election shall be by secret ballot and when a quorum is not present, by mail balloting. The first meeting shall

be prior to 1 January if at all possible. [After the words "among the Directors-at-Large" add "and the Executive Directors." In the last sentence, delete the words "if at all possible."]

These revisions give the Board of Directors the option of nominating and electing officers from either the Directors-at-Large or from the Executive Directors, if the election is held prior to January 1st. Thus, even if an Executive Director's term of office as an elected Director-at-Large expires on December 31st, the Board of Directors, if it so desires, can nominate and elect an Executive Director to the office of Vice-President or President if the election is held prior to January 1st. Technically, an Executive Director whose term of office expires is a Director-at-Large prior to January 1st.

Within the EMC Society, it has become customary for the Society President to serve for two one-year terms (two elections). Generally, the other officers serve the same two one-year terms. Thus, the other officers have at least two years of valuable experience and are good candidates for Vice-President or President. However, if the Officer's terms as a Director-at-Large expires on December 31st, it is not explicitly clear in the Constitution and Bylaws that he is eligible to be nominated and elected as Vice-President or President. The proposed revisions explicitly give the Board the option of electing an Executive Director whose term of office as a Director-at-Large expires on December 31st.

If a Society member in good standing has comments or objects to these proposed revisions, please forward a letter (include membership number) within 30 days after receipt of the EMC Society Newsletter. Mail to: Donald E. Clark, Constitution and Bylaws Committee, EEE Lab/ERB/252, Georgia Tech Research Institute, Atlanta, GA 30332-0800.

CHAPTER CHATTER . . . Continued from page 3

SEATTLE

The Seattle Chapter held a meeting on September 17th at the Fluke Park Auditorium in Everett. The speaker was Gary Soulsby, engineer in charge of the FCC Fields Operations Bureau Seattle Field Office. He spoke on "Upcoming FCC Regulations and Other Items of Interest." The items of greatest interest to the 23 people attending (judging from the number of questions directed to the speaker) were accounts of illegal transmitters and how they were tracked down by the FCC.

On October 20th, the Seattle section of the IEEE held Milwaukee Night. Chapters from six different IEEE societies held meetings at the Washington State Convention Center. Walt McKerchar was the speaker for the EMC Society chapter meeting.

WASHINGTON/NORTHERN VIRGINIA

The Chapter's first meeting of the '92/'93 season was held on September 24th. The speaker was George Hagn (Senior Advisor - SRI's Arlington Virginia facility). His talk was devoted to some relatively recent developments in MF and HF directional receiving antennas. Impetus for the investigations came originally from the Voice of America's desire to improve the ability of listeners in Soviet-bloc countries to receive broadcasts through jamming. Currently, Cuba and mainland China seem to be the principal areas in which some of the techniques are being used. Several different schemes involving combinations of loops, a loop with a whip antenna coupled to it, and two whip antennas were described. George demonstrated desired-signal enhancement and interfering-signal reduction with various geometries. One, which can be quite easily put together, consisted of two small ferrite-rod loops spaced about 20 cm or so apart, interconnected by a short

CHAPTER CHATTER . . . Continued

transmission line, with a third coil wound around the case of a battery-operated receiver. The loop/line/coil combination was tuned by a variable capacitor in series with the line. Nulling and signal-enhancement demonstrations were truly impressive. There were over thirty attendees, including representatives of DOD, EIA, FCC and many of the DC area consultant/industrial organizations.

TWIN CITIES

Dan Hoolihan reports that the Twin Cities chapter held a meeting at the University of Minnesota for the first time. The meeting was held on September 29th. Free pizza and pop were offered to encourage student participation. Twenty-two people

attended including seven EE students and one professor. Two technical papers were presented; one by Larry Lacoursiere on "Shielding Enhancement of the Torpedo MK50" and the other by Daryle Gerke on "E-Field Levels Around a Typical Amateur Radio Station."

CENTRAL NEW ENGLAND

A meeting was held on October 13th. Chet Smith of Mitre Corporation spoke on "Domestic EMC Standards for Appliances."

SANTA CLARA VALLEY

John Howard reports that there was a generous turnout for the meeting held October 13th. Franz Gisin led a tour of the new ROLM Electromagnetic Compatibility test facility. The facility was designed

from the ground up to streamline the entire testing process. Innovative changes range from "multi-purpose" test stations and work flow patterns that minimize the number of moves a product must make during the testing process, to electronic data bases where previous test results can be viewed and compared to new test results on a real time basis.

TEL-AVIV, ISRAEL

By the time you read this, the 1992 Regional Symposium on Electromagnetic Compatibility in Tel-Aviv will be concluded. Congratulations are due to the many members of the Tel-Aviv Chapter, who worked so hard and did such an outstanding job of organizing this symposium.

BOOK REVIEW . . . Continued from page 12

a Wire Through an Aperture Perforated Conducting Screen" and "Electromagnetic Penetration Through Apertures in Conducting Surface," use a pair of coupled integral equations for the equivalent magnetic currents in the aperture and the equivalent electric currents on the conducting surface. A paper by Rahmat-Sammii describes the development of an integral equation for an EMP penetration through an aperture.

A major trend in CEM is in the use of "hybrid techniques" for solving different kinds of propagation problems as part of the overall problem. Part VI of the book outlines a series of examples where hybrid methods have been used. Most of the problems analyzed use a combination of MoM and geometric theory of diffraction (GTD) for scattering from nearby edges. Alternate Green's functions go beyond the ones commonly used for infinite media by incorporating a special Green's function that satisfies the field boundary conditions over special surfaces, such as infinite

plane, circular cylinder, or sphere. In all cases the objective is to reduce the number of unknowns in the solution of the MoM model. Problems discussed in this section include a monopole attached to a sphere, use of MoM with GTD in various ways, and the problem of infinite interface that arises when modeling antennas near the earth's surface.

It is obvious that because of the complex topology of EMC problems, hybrid methods become very attractive to the EMC engineer. For example, a typical EMI problem consisting of coupling between two antennas in the presence of a metallic structure (e.g., two antennas on a ship) can be evaluated with a MoM/GTD hybrid method. It is this editor's opinion that Part VI is the most important contribution of this book to EMC. The last section of this book (Part VII) addresses diverse aspects of computational techniques in the MoM, where such techniques include: a) numerical integration methods, b) proper use of testing and basis functions, and c) matrix evaluations such as banded-matrix precondition and iterative methods.

The book can be recommended as a reference for those with a background in MoM and general knowledge in CEMs. For tutorial purposes the readers are advised to consider first the following reference materials.

"Field Computation by Moment Methods," R. F. Harrington, New York, MacMillan, 1968. This is the book that started it all. Written by the "father" of the MoM it is the most quoted MoM book of all times.

"Antenna Theory and Design," W. L. Stutzman, and G. Thiele, John Wiley & Sons, 1981. A popular and widely used book in antenna theory. It has a chapter devoted exclusively to the MoM with several examples.

"Computer Techniques in Electromagnetics," R. Mittra, ed. Pergamon Press, New York, 1973. A general book in CEMs but it has several chapters devoted to MoM techniques.

"Generalized Moment Methods in Electromagnetics," J. H. H. Wang, JW&S, New York, 1991. For the serious minded MoM enthusiast.

IEEE USA ACTIVITIES BOARD ISSUES POSITION STATEMENTS

HEALTH ASPECTS OF EXPOSURE TO ELECTRIC & MAGNETIC FIELDS FROM RF SEALERS & DIELECTRIC HEATERS

Radio-frequency (RF) dielectric heaters are used in industry for a variety of heating applications. For many of those in operation, leakage of electric and magnetic fields in excess of all existing RF safety guidelines has been measured, causing concern about the safety of such devices. IEEE-USA and COMAR recommend that RF sealer manufacturers install adequate shielding on their equipment; that the nature of RFEM fields and induced body currents be documented; that RF owners perform periodic monitoring to determine whether an exposure problem exists, and that appropriate health and safety agencies call attention to this occupational exposure and require adequate monitoring of RFEM devices.

HUMAN EXPOSURE TO RF EMISSIONS FROM CELLULAR RADIO BASE STATION ANTENNAS

IEEE-USA recognizes the public's safety concern for microwave exposure from cellular communications base stations. Prolonged exposure at or below the published recommended levels is considered safe for human health and the general population, based on present knowledge. However, COMAR recommends that in circumstances where workers could be exposed to fields greater than the standards specify, access can and should be restricted.

THE SAFETY OF ELECTROMAGNETIC PULSE SIMULATORS

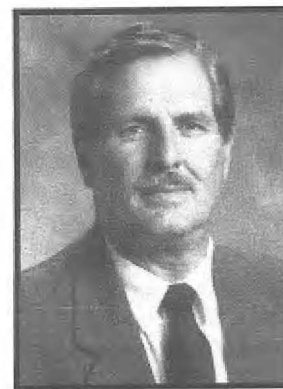
Members of IEEE-USA's COMAR and experts in engineering and biological issues associated with EMP fields have evaluated the engineering, physics, and biomedical literature on EM fields. Based on an analysis of all available information, COMAR found it highly unlikely that any detrimental effects on human health or the environment will result from chronic exposures to EMP simulator fields. IEEE-USA believes that conforming with established exposure limits will adequately protect workers at EMP simulator sites, the surrounding communities, and the environment.

EMCABS

Following are abstracts of papers from previous EMC Symposia, other conferences, meetings and publications.

EMCAB COMMITTEE

Mike Crawford, NBS
Bob Hunter, Texas Instruments
R. M. Showers, Univ. of Pennsylvania
Yoshio Kami, Univ. of Electro-Communications
Daniel Keneally, Rome Air Development Ctr.
Sha Fei, EMC Research Section, N. Jiatong Univ., Beijing, China
Ferdy Mayer, L.E.A.D., Maisons, Alfort, France
Diethard Hansen, Euro EMC Service, Switzerland



WILLIAM H. MCGINNIS
ASSOCIATE EDITOR

"HOW CAN I GET A COPY OF AN ABSTRACTED ARTICLE?"

Engineering College/University Libraries, Public Libraries, Company or Corporate Libraries, National Technical Information Services (NTIS), or the Defense Technical Information Center (DTIC) are all possible sources for copies of abstracted articles or papers. If the library you visit does not own the source document, the librarian can probably request the material or a copy from another library through interlibrary loan or, for a small fee, order it from NTIS or DTIC. Recently, it became clear that EMCABs were more timely than publications which were being listed in data files. Therefore, additional information will be included, when available, to assist in obtaining desired articles or papers. Examples are: IEEE, SAE, ISBN, and Library of Congress identification numbers.

Also, the steering staff of the Japan Technical Group and the EMC-J Tokyo chapter have offered to act as a central point for requests of papers abstracted here. Most of the papers will be available in Japanese only. The steering staff will assist in routing your request to the author(s) but will not do translating of the papers. The contact person is Prof. Yoshio Kami, the University of Electro-Communications, 1-5-1, Chofugaoka, Chofu-Shi, Tokyo 182, Japan. Abstracts of papers from EMC-J will be clearly identified.

Some of the Chinese papers are not available in English. Associate Professor Sha Fei, EMC Research Section, Northern Jiatong University has offered his time and assistance in routing requests for papers to the appropriate author(s). He is not furnishing a translation service.

As the EMC Society becomes more international, we will be adding additional worldwide abstractors who will be reviewing articles and papers in many languages. We will continue to set up these informal cooperation networks to assist requesters in getting the information or contacting the author(s). The library at Southwest Research Institute, 6220 Culebra Road, San Antonio, Texas, 78228-0510 has agreed to catalog, shelf, and have available for interlibrary loans proceedings from symposia and meetings which are donated to the library. Any such donations can be sent to me at the above address and I will review them for suitable articles and then forward them to the SWRI library. We are particularly interested in symposium proceedings which have not been available for review in the past. Neither the abstractors nor myself have a budget for acquiring proceedings; we rely on those we receive through attendance at symposia and from various subscriptions. Thank you for any assistance you can give in expanding the EMCS knowledge base.

EMCABS: 01-11-92

A SMALL WIDEBAND ANTENNA PRINTED ON THE SAME LiNbO₃ SUBSTRATE AS THE INTEGRATED OPTICAL MODULAR

N. Kuwabara and T. Ideguchi (1), and R. Kobayashi (2)
(1) NTT Telecommunication Networks Laboratories and (2) Univ. of Electrocommunications, Tokyo, Japan
1992 Joint Symposia (IEEE-APS, URSI, Nuclear EMP Meeting) IEEE CAT #92CH3178-1, ISBN:0-7803-0730-5 (Softbound) or Library of Congress #90-640397
July 18-25, 1992, Volume Two, pp. 725-728

Abstract: A 9.5 mm long dipole antenna is printed on the LiNbO₃ substrate, where a Mac-Zehnder interferometer has been formed from an optical waveguide. The antenna's sensitivity and frequency characteristics are analyzed from the equivalent circuit, and these closely agree with measured results. The sensitivity is almost flat from 100 Hz to 2.5 GHz.

Index Terms: Antennas, measurements, wideband probes

A MAGNETIC CURRENT LOOP ARRAY IN A PARABOLIC REFLECTOR

Edward K.N. Yung and Wilson W.S. Lee
Dept. of Electronic Engineering, City Polytechnic of Hong Kong, Hong Kong
1992 Joint Symposia (IEEE-APS, URSI, Nuclear EMP Meeting) IEEE CAT #92CH3178-1, ISBN:0-7803-0730-5 (Softbound) or Library of Congress #90-640397
July 18-25, 1992, Volume Four, pp. 1832-1835

Abstract: Due to the efficiency in radiating or receiving electromagnetic waves, a horn antenna is used extensively as a feed of a paraboloidal reflector antenna. For the best results, the horn antenna, as well as the active components, such as low noise amplifier and down converter, must be precisely positioned at the focal point of the reflector with little room for error. Strong mechanical support is therefore necessary. The active components should be perfectly shielded to prevent external electromagnetic interference but there is no room for them to be hidden. To eliminate the blockage caused by mechanical support, a self-supported magnetic current loop array operating at 9 GHz has been designed as a feed of a reflector antenna. In the present arrangement, the feed is a circular waveguide protruding into the paraboloidal reflector through the center.

Index terms: Antennas, current loop feed

EMCABS: 02-11-92

ANALYSIS OF THE IMPULSE RADIATING ANTENNA

Everett G. Farr
1992 Joint Symposia (IEEE-APS, URSI, Nuclear EMP Meeting) IEEE CAT #92CH3178-1, ISBN:0-7803-0730-5 (Softbound) or Library of Congress #90-640397
July 18-25, 1992, Volume Three, pp. 1232-1235

Abstract: There has recently been interest in radiating broadband pulses of electromagnetic energy. One of the problems with such a system, however, has been finding a suitable antenna. This is due not only to the very wide bandwidth of interest, but also the necessity of preserving the shape of the pulse into the far field. One candidate for such an antenna is the Impulse Radiating Antenna (IRA). The purpose of this report is to analyze the properties of the IRA, and to provide a basis of comparison to other candidate antennas.

Index Terms: Wideband antenna, linear pulse

EMCABS: 05-11-92

OPTIMIZATION OF A RESISTIVITY LOADED CONICAL ANTENNA FOR PULSE RADIATION

James G. Maloney and Glenn S. Smith
School of Electrical Engineering, Georgia Institute of Technology, Atlanta, Georgia
1992 Joint Symposia (IEEE-APS, URSI, Nuclear EMP Meeting) IEEE CAT #92CH3178-1, ISBN:0-7803-0730-5 (Softbound) or Library of Congress #90-640397
July 18-25, 1992, Volume Four, pp. 1968-1971

Abstract: Antennas that are used to radiate short, broad bandwidth pulses often have internal reflections. The radiated waveform is then composed of several elements, each of which can be associated with an internal reflection. The reflections can be eliminated and the shape of the radiated waveform improved by including resistive loading in the antenna structure. An example is the simple monopole antenna, for which some time ago Wu and King proposed a tapered resistive loading that eliminates the reflection from the open end. In this paper, we investigate the use of resistive loading to improve the performance of a conical antenna.

Index terms: Antennas, broadband monopoles

EMCABS: 03-11-92

PYRAMIDAL HORN GAIN CALCULATION WITH IMPROVED ACCURACY

Michael J. Maybell, Raytheon Electromagnetic Sys. Div., Goleta, CA
1992 Joint Symposia (IEEE-APS, URSI, Nuclear EMP Meeting) IEEE CAT #92CH3178-1, ISBN:0-7803-0730-5 (Softbound) or Library of Congress #90-640397
July 18-25, 1992, Volume Four, pp. 1816-1819

Abstract: The classical method for calculating gain of a pyramidal horn was published 40 years ago. The effect of the horn flares in the principal E- and H-planes was accounted for by introduction of a quadratic phase error in the dominant mode aperture field. The on-axis directivity of the pyramidal horn is calculated as the product of three terms. The first term is the directivity of a uniform dominant mode rectangular waveguide without flares. The second and third terms are the gain reduction due to the flares in the principal E- and H-planes. The path length error that gives rise to the quadratic error was approximated by the first two terms of a binomial series expansion of the exact expression. This approximation was substituted into the formula for the aperture electric field and used to calculate this pyramidal horn gain. The approximation leads to a closed-form solution for the on-axis far-field gain reduction factors in terms of Fresnel integrals. In this paper, direct calculation of the gain reduction factors is presented with no path length error approximation.

Index terms: Antennas, pyramidal horn, analysis

EMCABS: 06-11-92

EXTRACTION OF THE TRUE RADIATION OF A MICROWAVE ANTENNA FROM MEASUREMENTS IN A NOISY ENVIRONMENT

A.A. Saleeb (1), A.D. Olver (2), and M.G.T. El-Kholy (1)
(1) Faculty of Electronic Engineering, Menouf, Egypt, and (2) Q. Mary & Westfield College, London
1992 Joint Symposia (IEEE-APS, URSI, Nuclear EMP Meeting) IEEE CAT #92CH3178-1, ISBN:0-7803-0730-5 (Softbound) or Library of Congress #90-640397
July 18-25, 1992, Volume Four, pp. 2052-2055

Abstract: Low-cost antenna test ranges suffer from relatively high reflections in the quiet zone. These reflections introduce errors in the measurements. In this paper a simple technique is proposed to extract the true radiation pattern of an antenna, measured in such a range. The technique depends upon sampling the electric field in the test area, and recording the radiation pattern of the test antenna. Then a signal processing technique using FFT is applied to extract the true radiation pattern.

Index terms: Measurements, antennas, noisy environment



Chairman
Ed Vance
SRI International
817-478-5653
817-561-2585 FAX

Vice Chairman
Kurt Fischer
Int. Compliance Corp.
817-491-3696
817-491-3699 FAX

Treasurer
Scott Sullivan
Hewlett Packard
214-699-6442
214-699-4337 FAX

Secretary
Joe Stanfield
Southwest Elec. Inds.
214-690-9881
214-669-8847 FAX

Technical Program
Richard Schulz
EMC Consultant
214-492-0137

Technical Papers
Frederick Tesche
Consultant
214-380-1896
214-380-9121 FAX

Exhibits
Joe Stanfield
Southwest Elec. Inds.
214-690-9881
214-669-8847 FAX

Arrangements
Steve Bloom
AT&T Bell Labs.
214-284-8134
214-284-8282 FAX

Publications
Steve Mullenix
Chomerics
214-960-7236
214-490-6136 FAX

Registration
Al Markwardt
Consultant
214-235-0996

Publicity
Glen Watkins
EMCO
512-835-4684
512-835-4729 FAX

Hospitality
Gladys Vance
817-478-5653
817-561-2585 FAX

Correspondence
1911 East Jeter Road
Argyle, Texas 76226-9401

THE 1993 IEEE INTERNATIONAL SYMPOSIUM ON ELECTROMAGNETIC COMPATIBILITY

AUGUST 9-13 ★ THE GRAND KEMPINSKI HOTEL ★ DALLAS, TEXAS

EMC
SOCIETY

1993 IEEE International Symposium on Electromagnetic Compatibility To Be Held In Dallas

Dallas, Texas, September 1, 1992 -- The IEEE EMC Society's 1993 International Symposium on Electromagnetic Compatibility will be held on August 9-13 in Dallas, Texas, at the Grand Kempinski Hotel. The theme of the symposium, "On The Frontier Of Change", refers to the dynamic changes which are reshaping the EMC community and this region's historic significance for development and growth.

A call for original and unpublished technical papers concerned with EMC topics has been issued. Authors should submit abstracts and summaries for six-page papers by November 15, 1992, and two-page papers by January 1, 1993. Submit to:

Dr. Frederick Tesche
c/o '93 EMC Symposium
International Compliance Corporation
1911 E. Jeter Road
Argyle, Texas 76226-9401
817-491-3696 voice
817-491-3699 fax

Manufacturers and service providers to the EMC community are also invited to exhibit. Exhibit information can be obtained from:

Joe Stanfield
c/o '93 EMC Symposium
International Compliance Corporation
1911 E. Jeter Road
Argyle, Texas 76226-9401
817-491-3696 voice
817-491-3699 fax





**The Institute of Electrical and Electronics
Engineers, Inc.
United States Activities**

Announces the 21st Annual Competition for
1993-1994
IEEE-USA Congressional Fellowships

PROGRAM: Electrical and Electronics Engineers and Allied Scientists are competitively selected to serve a one-year term on the personal staff of individual Senators or Representatives or on the professional staff of Congressional Committees. The program includes an orientation session with other Science-Engineering Fellows, sponsored by the American Association for the Advancement of Science (AAAS).

PURPOSE: To make practical contributions to more effective use of scientific and technical knowledge in government, to educate the scientific communities regarding the public policy process, and to broaden the perspective of both the scientific and governmental communities regarding the value of such science-government interaction.

CRITERIA: Fellows shall be selected based on technical competence, on ability to serve in a public environment, and on evidence of service to the Institute and the profession. Specifically *excluded* as selection criteria are age, sex, creed, race, ethnic background, and partisan political affiliations. However, the Fellow must be a U.S. citizen at the time of selection and must have been in the IEEE at Member grade or higher for at least four years. Additional criteria may be established by the selection committee.

AWARDS: IEEE-USA plans to award at least two Congressional Fellowships for the 1993-1994 term. Additional funding sources may permit expansion of awards.

APPLICATION: Further information and application forms can be obtained by calling W. Thomas Suttle (202) 785-0017 at the IEEE-USA Office in Washington, D.C. or by writing:

**Secretary, Congressional Fellows Program
The Institute of Electrical and Electronics Engineers, Inc.
1828 L Street, N.W.
Washington, D.C. 20036**

Applications must be postmarked no later than March 31, 1993 to be eligible for consideration.



IEEE EMC SOCIETY QUESTIONNAIRE RESULTS-1992 SYMPOSIUM

At its November 9, 1992 meeting, the EMC Society Board of Directors will review the results of the member survey distributed during the August 1992 Anaheim, California Symposium. Since the Board wants to share the results of the survey with the Society members, the summary to be presented to the Board is reproduced below. Your comments are welcomed. Please send them to: Bob Hofmann, Room 2B-220, AT&T - Bell Labs, 2000 North Naperville Road, Naperville, Illinois, 60566.

The following is a summary of the responses received from the survey distributed at the 1992 symposium. Many of the responses listed were given several times, and only those that were different were listed separately. Those responses that appeared multiple times have an (M) following the response. Responses to the salary section of the summary are being tabulated separately and will be presented in a future newsletter.

1. Are you an IEEE member?

- a. Y-89%, N-11%
- An EMC Society member?
- a. Y-86%, N-14%

2. If you have a "local" EMC Society Chapter, do you attend the meetings?

- a. Most responses indicated attendance at some chapter meetings except for those with no chapter within driving distance or personal time availability conflicts. Commercialism at chapter meetings was cited as a negative.
- a. Both technical and social interactions are useful. (M)

How could Chapter meetings be improved?

- a. Have local presentations of papers given during the symposium. (M)
- a. Improve the technical content of the meetings. (M)
- a. Give more advance publicity to the meetings. (M)
- a. Using more non-local and distinguished lecturers. (M)
- a. Meetings are just great as is. (M)
- a. Develop some type of a chapter project.

3. If you do not have a "local" EMC Society chapter, would you be interested in helping to form a chapter?

- a. We did obtain names of some interested individuals.

4. Do you read the quarterly newsletter?

- a. All-52%, Most-27%, Some-15%, None-6%

What do you find interesting in the newsletter?

- a. EMCABS and Book reviews (M)
- a. Everything/General (M)
- a. Summaries of Board of Directors meetings
- a. People information/personality profiles (M)
- a. Chapter Chatter (M)
- a. Late-breaking technology and news (M)
- a. Standards activities (M)

What do you look for in the newsletter?

- a. Late-breaking technical news (M)
- a. Suggest EMC newsletter editor look at AP newsletter
- a. People news with pictures (M)
- a. International developments news (M)
- a. Practical ideas (M)
- a. Point and counterpoint

What could the newsletter editors do

to encourage feedback from readers?

- a. Write editorials on, and encourage feedback on controversial subjects. (M)
- a. Put in the "postpaid" form. (M)
- a. Offer a prize for the best response to a given topic.
- a. Have a "comments" page. (M)
- a. Use the newsletter to conduct reader surveys.
- a. Publish more "opinion" pieces.

5. Do you read the EMC Society Transactions?

- a. All-14%, Most-25%, Some-56%, None-5%

What kinds of articles do you read in the Transactions?

- a. Articles that have practical applications (M)
- a. Those that actually relate to EMC (M)
- a. Test and measurement methods (M)
- a. Basic tutorials
- a. Modeling
- a. Shielding, lightning, gasketing, EMP
- a. Both theoretical and practical articles
- a. Articles relating to military aspects of EMC

What kinds of articles would you like to see in the Transactions?

- a. More applications oriented articles (M)
- a. Results and discussion of studies that get incorporated into national and international standards (M)
- a. Presentations that compare actual and theoretical concepts (M)
- a. Discussions of new measurement techniques, pros and cons (M)
- a. Papers relating to EMC; too many don't relate to EMC (M)
- a. More tutorials (M)

- a. Biological effects
 - a. More articles on immunity
 - a. Papers dealing with incorporation of EMC into product design
 - a. Spacecraft EMC articles
 - a. Annual index
 - a. Information on calibration techniques and procedures
 - a. Information on debugging procedures, how to isolate noise sources
6. How can the EMC Society help you in your career?
- a. Provide job forum/postings in newsletter (M)
 - a. Keep members informed of new technical developments quickly (M)
 - a. Provide salary survey updates (Ed Note - We do this annually)
 - a. Don't allow technical papers at symposia to be commercial sales pitches
 - a. Provide more tutorials/workshops at symposium (M)
 - a. Present viewpoints of key industry decision-makers on EMC issues
 - a. Provide miscellaneous and timely information like EMC TEST AND DESIGN does
 - a. Publicize the importance of EMC to non-EMC trained engineering managers
 - a. Stop trying to sell insurance
 - a. More military emphasis
7. What issues/actions/policies should the EMC Society Board of Directors be addressing on behalf of the Society members?
- a. Reduce symposium fees (M)
 - a. Continue to promote EMC at academic institutions as a cross-discipline subject
 - a. Address issues like federal regulations, EC recognition of US tests
 - a. Address job security, pensions, retirement planning, retraining
 - a. Speakers' breakfasts at symposium too early
 - a. Work to bring about world-wide consolidated standards
 - a. Provide more workshops on standards, have standards meetings as regular sessions during the symposium instead of at night or outside the symposium
 - a. Promote certification programs
 - a. Emphasize theoretical/practical knowledge
 - a. Address Affirmative Action within the IEEE and the EMC Society
8. Secret opinions/ideas/gripes/suggestions about EMC activities you want to tell us. Replies are anonymous, but will go to the Board for consideration.
- a. Too many invited sessions at the Anaheim symposium (M)
 - a. Workshop notes should be part of the symposium record so attendees could determine if they wanted to go to the workshops
 - a. Get serious about investigating biological effects
 - a. Some people seem to be involved in EMC Society to further their careers rather than improving EMC
 - a. Try to partition technical sessions to minimize conflicts of similar interests
 - a. Better balanced BoD geographically
 - a. Be open to and encourage new ideas, procedures
 - a. Make sure symposia technical sessions do not become sales pitches. Too many at Anaheim turned out to be thinly disguised advertisements
 - a. Work at integrating newer and younger people into the society,
- break down the old-boys club syndrome. How about time limits for Society Directors? Some of you have been there for 20 years
9. Do you like the 1992 Symposium format with Monday and Friday workshops?
- a. Y-90%, N-10%
 - a. Include workshop fees in registration, make handouts for all attendees (M)
 - a. Only have one day of workshops - five days overall too long
10. Do you like skipping the Tuesday plenary session for additional technical sessions?
- a. Y-40%, N-60%
 - a. Only have plenary sessions if an outstanding EMC speaker.(M)
 - a. This (Anaheim-1992) was first worthwhile speaker in many years (M)
 - a. Don't waste time by introducing the BoD (Ed note - This may be the only time the members get to see the Board)

OOPS!

We neglected to identify BoD member Don Weber in the photo on page 8 of our last issue (#154). Don was second from the left.

1992 IEEE ADMINISTRATIVE MEETINGS CALENDAR

The following calendar is compiled by the IEEE Technical Activities Department for its volunteers, and is composed of information received on Society administrative meetings as well as other IEEE Boards and Committees. It does not purport to be a complete set of information. Most meetings are open only to Board/Committee members. Any appropriate meeting information you would like to appear in the Administrative Meetings Calendar should be sent to the Technical Activities Department, IEEE, 445 Hoes Lane - P.O. Box 1331, Piscataway, NJ 08855-1331 or may be faxed to (908)562-1571, Attn: Society Support Services Director.

December 2-4	TAB Meetings	Arizona Biltmore Phoenix, AZ	Georgina Crane (908) 562-3920
December 5	IEEE Executive Committee	Arizona Biltmore Phoenix, AZ	Mercy Kowalczyk (212) 705-7757
December 6-7	IEEE Board of Directors	Arizona Biltmore Phoenix, AZ	Mercy Kowalczyk (212) 705-7757
March 4-5, 1993	IEEE Investment Committee	Ritz Carlton Naples, FL	Michael J. Sosa (908) 562-5324
June 17-18, 1993	IEEE Investment Committee	Ritz Carlton Aspen, CO	Michael J. Sosa (908) 562-5324
November 4-5, 1993	IEEE Investment Committee	To be announced Hawaii	Michael J. Sosa (908) 562-5324

EMCS SPONSORED/ COSPONSORED SYMPOSIA SCHEDULE

1993 Dallas/Ft. Worth: August 10-12
Grand Kempinski Hotel
Ed Vance
817/478-5653

1994 Sendai, Japan: May 17-19
Sendai International Center
T. Takagi
Tohoku University
Aoba Aramaki
Sendai, Japan

Chicago, IL: August 22-26
Palmer House Hotel
Bob Hofmann
708/979-3627

1995 Atlanta, GA: August 21-25
Marriott Marquis Hotel
John Rohbaugh
404/894-8235

1996 Santa Clara, CA: August 19-23
Santa Clara Convention Center
Double Tree Hotel
David Hanttula
415/335-1071

1997 Austin, TX: August 18-22
Austin Convention Center
Hyatt Hotel
Gene Cory
512/736-0714

1999 Japan: May 15-17

2000 Washington, DC
Bill Duff
703/914-8450

EMCS COOPERATING/ PARTICIPATING SYMPOSIUM SCHEDULE

1992 Calcutta, India: December 2-4
North American Travel: Agelet
Tours
Tel: 1-800-237-1517

PIERS 1993 CALL FOR PAPERS

The Progress in Electromagnetics Research Symposium (PIERS 1993) will be held July 12-16, 1993, at the Jet Propulsion Laboratory, California Institute of Technology, Pasadena, California.

PIERS provides an international forum for reporting progress and recent advances in the modern development of electromagnetic theory and its new and exciting applications. Topics include:

- Time-domain electromagnetics, pulse coupling, and distortion
- Inverse scattering
- Remote sensing of the Earth, ocean, and atmosphere

- Polarimetric radar scattering, polarimetric passive remote sensing
- Imaging
- Random and nonlinear media
- Geophysical subsurface probing and
- Scattering and diffraction.

For more information, or for a complete list of topics, contact: Dr. Jakob J. van Zyl, PIERS 1993 Technical Chairman, c/o Ms. Georgene Peralta, Mail Stop 180-404, Jet Propulsion Laboratory, 4800 Oak Grove Drive, Pasadena, CA 91109, USA, Tel: 818/354-9311. FAX: 818/393-4468.

The Award committee consists of the Awards Chairperson, the Membership Services Director, the EMCS President and others, at the invitation of the chairperson.

Scholarship candidates should be submitted to the EMCS President by February 1st of each year to assure consideration in that calendar year. The Awards committee will present its selection for BoD ratification at the May meeting. The Award will be given in August at the annual IEEE EMCS Symposium.

Candidates must be enrolled in or be formally accepted for full-time graduate study, pursuing a MS or PhD degree. They must have demonstrated a commitment to the field of EMC. The nomination must be endorsed by at least three people, two shall be EMCS members and one shall be a previous or present college instructor. These endorsements should address technical proficiency and career intentions of the candidate. The awards committee will select the most eligible candidate. Selection criteria will be prioritized: commitment to EMC first, then followed by technical excellence. Other issues, such as financial need, may be covered in the endorsements, however, they may only be considered as background factors in the selection.

Once the BoD identifies a deceased member to be honored, a suitable announcement will be made in the Society newsletter. A part of this notice will give an address where commemorative, tax deductible donations can be accepted in his/her name for the Foundation Fund. The scholarship fund will be an approved IEEE Foundation fund. All donations to this fund are tax deductible. All donations at or above \$100 will receive recognition in the EMCS Newsletter unless anonymity is requested.

Periodic announcements will also be placed in the EMCS Newsletter

seeking nominations for the President's Memorial student Scholarship Award. The names of winners will be publicized in their hometown newspapers, the EMCS newsletter and in other appropriate IEEE publications.

Eligible candidates must be enrolled in or be formally accepted for full-time graduate study pursuing a Masters or Doctoral degree and demonstrate a commitment in the field of EMC.

Applications must include the following (typed or printed) information:

Name of applicant
Current Address
Current Telephone Number
Permanent Address
Social Security Number

Undergraduate University/College:
Major/GPA
Overall/GPA
EMC/EMI course work
Transcript

Graduate studies University/College:
Transcript
Statement of intent or abstract describing EMC related program in progress supporting application

Three endorsements:
Two IEEE EMC Society members (please include member number), and one present college instructor

Endorsements should address:
Technical proficiency
Career intentions of candidate and any other background information such as financial need.

Priority of Selection criteria:
Complete application information
Commitment to EMC
Technical excellence

Applications are due by February 1, 1993. Send to: Patricia Coles, Hewlett-Packard, 11000 Wolfe Road, M/S 42LS, Cupertino, CA 95014, Telephone 408-447-6847. Fax: 408-257-5034.

CALENDAR 1992

December 2-4

THIRD INTERNATIONAL CONFERENCE ON ELECTROMAGNETIC INTERFERENCE AND COMPATIBILITY (INCEMIC)

Calcutta, India

Contact: Shri V.R. Katti
Electrical Integration Group
Indian Space Application Centre
Vimanapura - Post,
Bangalore 560 017 India
Group Discount Travel:

Certified Travel

1-800-237-1517

Attn: Colleen

CALENDAR 1993

January 6-8

AFCEA V.S. NAVAL INSTITUTE WESTERN CONFERENCE AND EXPOSITION

San Diego (CA) Convention Center

Contact: J. Spargo Associates, Inc.

4400 Fair Lake

Fairfax, VA 22033-3899

800-336-4583, Ext. 6200

FAX: 703-818-9177

March 9-11

10th INTERNATIONAL ZURICH SYMPOSIUM AND TECHNICAL EXHIBITION ON EMC

Contact: Dr. Gabriel V. Meyer

EMC Zurich

ETH Zentrum

IKT, 8092

Zurich, Switzerland

(+411) 256 27 88

FAX: (+411) 262 09 43

August 10-12

1993 IEEE INTERNATIONAL SYMPOSIUM ON EMC

Grand Kempinski Hotel

Dallas, Texas

Contact: Ed Vance

817-478-5653

INFORMATION ON INSTITUTIONAL LISTINGS WAS NOT AVAILABLE AT TIME OF PUBLICATION.

6014849 F
EDWIN L. BRONAUUGH
11007 CROSSLAND DR
AUSTIN TX 78726
ETN13

An Institutional Listing recognizes contributions to support the publication of the IEEE NEWSLETTER and TRANSACTIONS ON ELECTROMAGNETIC COMPATIBILITY. Minimum rates are \$150.00 for listing in one issue; \$400.00 for four consecutive issues. Larger contributions will be most welcome. No agency fee is granted for soliciting such contributions. Inquiries, or contributions made payable to the IEEE, plus instructions on how you wish your Institutional Listing to appear, should be sent to Marilyn Prusan, Finance Administrator, IEEE Technical Activities, 445 Hoes Lane, P. O. Box 1331, Piscataway, NJ 08055-1331.