

NEWSLETTER

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July 1991

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EDITOR'S COMMENTS

This issue contains a wide range of interesting articles. The two bug reports will surely be of interest to users of those two codes. As seen from the "NEC UK Users Group Newsletter Contents", the NEC users group in Great Britain publishes an annual newsletter with some excellent articles. Individual viewpoints on ACES are provided in the "Perspectives" articles and also in the Editorial by David Stein. Several articles on plotting software have appeared in the past in this and other newsletters. The March 26, 1991 PC magazine includes an in-depth review; their choices are GRAPHTOOL and AXIUM.

Articles have been written about ACES for the IEEE APS and IEEE EMC Newsletters. This helps inform technical professionals about what ACES has to offer. Anyone wishing to re-edit these articles and submit them to other publications including other IEEE newsletters is most welcome. Please contact one of the ACES Editors.

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ACES NEWSLETTER COPY INFORMATION

<u>Issue</u>	<u>Copy Deadline</u>
March	January 25
July	May 25
November	September 25

Send copy to Paul Elliot at the above address in the following formats:

1. A hardcopy.
2. Camera ready hardcopy of any figures.
3. If possible also send text on a floppy disk. We can read Microsoft-Word and ASCII files on both IBM and Apple disks. On IBM disks we can also read Wordperfect and Wordstar files. If it is not possible to send a Macintosh disk then the hardcopy should be in Courier font only for scanning purposes.

NEWSLETTER ARTICLES AND VOLUNTEERS WELCOME

The ACES Newsletter is always looking for articles, letters, and short communications of interest to ACES members. All individuals are encouraged to write, suggest, or solicit articles either on a one-time or continuing basis. Please contact a Newsletter Editor.

AUTHORSHIP AND BERNE COPYRIGHT CONVENTION

The opinions, statements and facts contained in this Newsletter are solely the opinions of the authors and/or sources identified with each article. Articles with no author can be attributed to the editor, or to the committee head in the case of committee reports. The United States recently became part of the Berne Copyright Convention. Under the Berne Convention, the copyright for an article in this newsletter is legally held by the author(s) of the article since no explicit copyright notice appears in the newsletter.

BIBLIOGRAPHY OF MEASURED ELECTROMAGNETICS DATA

In support of present code validation efforts and requirements, the ACES Newsletter is compiling a bibliography of measured electromagnetics data. For an example of what we need, see Jim Logan's contribution to Ed Miller's recent committee report (ACES Newsletter, vol. 5, no. 1, March, 1990, pp. 14-15)

Only with your support can this bibliography be compiled. Therefore, if you know of any measured data which would be useful to other ACES members, please send the appropriate bibliographic information to:

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Our interests all areas of electromagnetics and are not limited to radiation, propagation, and scattering.

OFFICER'S REPORTS

PRESIDENT'S REPORT

It is a pleasure to comment on the most recent ACES activities and our plans for this year and beyond. The election of new members to our Board of Directors deserves a few words. You know by now that Jim Logan and Ed Miller were re-elected and that Andy Peterson joins the Board. They have my hearty welcome and congratulations. However, I find it particularly satisfying for our society that Frank Walker, Pat Foster and Duncan Baker obtained a goodly distribution of votes. I thank them for their offer of services and do hope that they will consider letting their names stand again.

Our Seventh Annual Review of Progress in Computational Electromagnetics had several innovations. You will find comments on these elsewhere in this Newsletter, but I would be amiss if I didn't take another opportunity to thank Frank Walker, Dick Adler and Magdy Iskander and their team for their dedication and sustained efforts. I received several comments from attendees about the quality of the papers that were presented and the arrangements in general. Pat Foster, chairman for the Eighth Annual Review together with Perry Wheless of Alabama, the co-chairman, are already at work on adaptations for next year's meeting.

At the Board of Directors meeting in Monterey I had the pleasure to announce that Prof. Karl Kunz of Pennsylvania State University has agreed to replace Jim Logan as our ACES representative on the CAEME board. Jim had to forego this role with great reluctance due to the pressure of other urgent demands. Also at this meeting we launched a multi-pronged re-activation program called **Vitality 91**. Its elements are the tuning up of total corporation activity, from membership, through committees, to the Board members. Each Board member will be expected to take a proprietary interest in the activity of one or two committees and help to animate it. Committee chairmen will be expected to revitalize the roles of their committees, by getting their members involved in adapting the committee activity to the changing demands. Increased membership, both individual as well as institutional will be promoted as a corporation-wide activity. This is where each one of us can play an important role. I invite you all to get involved in any way that your circumstances allow. Particularly encouraging to me was the initiative of Andrew Terzuoli Jr. and Frank Walker who volunteered as co-chairmen of the Software Exchange Committee replacing Chuck Vandament, and of Russ Taylor who will serve as chairman of the Users Group, replacing Chris Smith. A grateful welcome to you gentlemen. My thanks go out to Chuck and Chris for their past efforts and their willingness to assist their successors.

During ICAP 91 I had the opportunity to address a meeting of ACES members, some from Europe, and members of the UK NEC User's Group. Pat Foster and Tony Brown were kind enough to arrange the meeting. I outlined the plans noted above with respect to the immediate plans of the society and our interest in the best possible regional representation and collaboration with other societies. My message was well received and I expect that we shall continue these discussions on how best to link with the NEC User's Group. At the same time I reinforced our interest to assure that we identify members in each country to serve as official points of contact for information on ACES, its mission and services.

Our next Board meeting will take place at the University of Western Ontario on June 25th, during AP-S 91. As required by our constitution, the election of officers will take place at this time. In addition we expect to do our mid-year review of the state of corporation affairs and our progress with **Vitality 91**.

Are you involved yet in any committee activity? If not, what's keeping you? We need you to promote ACES and its mission. Let's do it together!

Stanley J. Kubina
ACES President

SECRETARY'S REPORT

Current ACES membership now stands at 510 of which 398 are in the U.S; 19 in the remainder of North and South America, 63 in European countries, 5 in Asian/Africa countries, (which includes the middle east), and 25 in the Pacific Rim Regions. The international influence in ACES is very healthy.

During 1990, we successfully held to our budget which had been set up by the Financial Committee as part of a 5 year program. Excellent cooperation by David Stein's Publications Committee was a key factor meeting our goal.

Richard W. Adler
ACES Secretary

COMMITTEE REPORTS

USERS GROUP COMMITTEE

Discussions at the March conference revealed confusion and uncertainty regarding the function of the group. Several suggestions were discussed, all of which required much greater participation by the general membership than had been previously available. The general theme of the discussions was that the User Group should accumulate and make accessible, corporate knowledge about the applicability and accuracy of various techniques in computational electromagnetics and provide assistance to others in using the tools available. I would appreciate suggestions about how we can be of service to the membership.

Several years ago Ed Miller suggested establishing a Modeling Handbook. He suggested a "fill-in-the-blanks" format for both consistency so that information would be easy to retrieve, and to make it as easy as possible to submit information. Ease of submission seems essential to encourage participation. The objective of the Handbook would be to provide an easily accessible library of techniques that work, as well as those that do not work. Ed also suggested the following information be included in the Handbook:

Code Directory. The Code Directory would contain a catalog of available codes including information on their formulation, availability, areas of applicability and machines on which they run.

Tutorials. The Tutorials would include basic information on how to get started, as well as other commonly encountered but more subtle aspects not often revealed in the literature.

Check Cases. The Checked Cases would compare results of solutions with different codes or methods as well as with experimental data.

Solved Problems. The Solved Problems will be cataloged topically, rather than chronologically as they appear in the general Literature

An additional use of the handbook would be to provide feedback to code developers regarding deficiencies and desirable upgrades to their codes.

I suggest the following format for Handbook submissions (after Ed Miller's suggestion):

Author - Name, affiliation, address, telephone, and an indication of willingness to help others with similar problems.

Application - Configuration (e.g. communication antenna on tank; airplane...), excitation (e.g. radiation, scattering...), purpose (e.g. design, validation...).

Problem Description - Geometry (pictures are best if available), object size (major dimensions), frequency range, environment (free space, ground plane, lossy ground), and other details as appropriate.

Code(s) Used - Name of code, version, where obtained, description of modification made, (if not a standard code), specifics of the code formulation, machine on which run, and any other pertinent information.

Model Description - Number/type of unknowns (linear, surface, volumetric), physical approximations (wire mesh for surface, features omitted...), and any other pertinent information.

Results Obtained - (e.g. current distribution, input impedance, radiation patterns, near field patterns, scattering patterns...)

Validation Technique - (numerical, experimental, analytic, estimated feasibility etc.).

Comments - What was difficult, what was easy, how could the code be improved to make it easier, less approximate etc., was the effort worthwhile, recommendations...

One issue, apparently not previously addressed, is dissemination of the information in the handbook. Should we use electronic mail, an electronic bulletin board or a hard copy? If we publish the information in the newsletter, it will again become chronological. Do users have access to the electronic services, and if so, which ones?

If you have any thoughts about how the User Group can be useful, an input for the Handbook, or answers to any other questions raised please address them to:

Dr. Russell W. Taylor
McDonnell Douglas Helicopter Company
5000 E. McDowell Rd.
Bldg 530/B338
Mesa, AZ 85205-9797

Remember, the User Group can only respond to your future problems if members participate, so **DO IT NOW!!!**

ACES EDITORIAL BOARD

(PUBLICATIONS COMMITTEE)

[This is an abridged version of the ACES Editorial Board 1990 Annual Report.]

The 1990 accomplishments of the ACES Editorial Board, which now represents 11 nations on five continents, are unprecedented within ACES. While the **ACES Journal** and the **ACES Newsletter** continue their rise to preeminence, the Editorial Board maintains its tradition of spearheading other ACES activities which themselves are expected to generate additional papers and articles. Our achievements have been made possible only because of the vision and dedication of several Editors, special recognition for whom is now appropriate:

Wes Williams and Managing Editor Dick Adler (both USA), have arranged the inclusion of the **ACES Journal** in various international abstracting and indexing data bases. Their efforts, in turn, were fruitful only because other Editors and authors have made possible an **ACES Journal** which meets (and exceeds) the standards of the databases.

The guest editors of published and forthcoming special (orthematic) issues of the **ACES Journal** — Stan Kubina and Adalbert Konrad (Canada), Fulvio Bessi (Italy), and Tony Fleming and Ken Joyner (Australia) — have created a series of publications which, in addition to boosting our international stature, have attracted new ACES members from several nations.

Another intended **ACES Journal** special issue, which under guest editor Hal Sabbagh (USA) evolved into **The ACES Collection of Canonical Problems — Set 1**, has launched the ACES Benchmark Problem Solution Program. This “publications spinoff,” in turn, has re-kindled the earlier ACES interest in code validation and performance analysis. Furthermore, it created an opportunity for ACES to co-sponsor three previously-scheduled TEAM (Testing Electromagnetic Analysis Methods) Workshops, respectively in Toronto, Canada, in Sendai, Japan, and in Sorrento, Italy. In this manner began the ACES Workshop Program, which had been proposed in 1989 as a way to provide worldwide regional activities for ACES members unable to attend the annual symposia in Monterey (and as an alternative to rotating the symposia among various locations). It is anticipated that future Joint ACES/TEAM Workshops and other similar regional activities will generate additional material for the ACES publications.

The **ACES Newsletter**, edited by Paul Elliot (USA), has become a second “flagship publication” with its own valuable articles. In addition to promoting dialogue within the professional community, it is publishing an annual index of **ACES Journal** and **ACES Newsletter** code references. Furthermore, the **ACES Newsletter** has begun a cumulative, running bibliography of measured data and of predicted data which can be useful in code validation activities. These **ACES Newsletter** projects can lead to new opportunities for joint technical activities with other professional societies. As its newest project, the **ACES Newsletter** has begun publishing new canonical and other benchmark problems as they are received by the Software Performance Standards Committee. As a result, members now obtain the benchmark problems without having to wait until separate volumes of these problems can be published.

The ACES-sponsored code user groups, another “publications spinoff” (now under the leadership of Russ Taylor), were organized by Chris Smith (USA). We anticipate that the code user groups will generate additional material for the **ACES Newsletter**, and this type of material will enable the **ACES Newsletter** to fulfill its original objectives as envisioned by our founders. However, the primary beneficiaries of user group activities will be the code developers and code users, as discussed in previous issues of the **ACES Newsletter**.

Opportunities for joint activities with other professional societies and international agencies are being identified and pursued by several **ACES Journal** Editors — **John Bowler**, **Peter Excell**, and **Pat Foster** (United Kingdom), **Tony Fleming** and **Greg Haack** (Australia), **Duncan Baker** (South Africa), **Giorgio Molinari** (Italy), **Adalbert Konrad** (Canada), and **Reinaldo Perez** and **Bob Bevensee** (USA). In addition, such opportunities have been pursued by **Hal Sabbagh**, **Ed Miller**, and **Jim Logan** (USA) and by **Stan Kubina** (Canada), but in their other capacities as ACES Officers and Directors. Joint activities with other groups will make ACES more visible to authors and prospective members, and when the activities themselves generate **ACES Newsletter** articles or **ACES Journal** papers, the payoff will be more direct. Already, ACES and TEAM have agreed to publish companion volumes of benchmark problems with solutions. New activities proposed include jointly-sponsored data bases, jointly-sponsored code user groups, and cross-validation of predicted and measured data (with results discussed both in the **ACES Journal** and the journal of the other professional society). Also suggested were ACES-sponsored workshops at the annual symposia of other professional societies. These workshops would focus on the computational electromagnetics aspects of the symposium theme (for example, remote sensing). Still another suggestion involves an exchange of newsletter reports, articles, and announcements. This provides increased exposure for authors, increased scope for the newsletters, and additional information for the readers.

Likewise meritorious have been the promotional activities of **Ron Marhefka** and **Andy Maffett** (USA). Their efforts have enabled some of our colleagues to learn about ACES and to reap the benefits of membership.

Let us not take for granted the services of those Editors for whom English is a second language. To them belongs much of the credit for making ACES viable as an international professional society. On a larger scale, the intercontinental exchange of technical knowledge has been possible only because of the scientists, engineers, and mathematicians who have chosen to learn the languages of other lands. Let their example be an inspiration to all of us.

Equal in importance to our Editors' efforts have been the efforts of key members of the ACES '91 Symposium team — especially Symposium Chairman **Frank Walker**, Short Course Chairman **Jay Rockway**, and CAEME Director **Magdy Iskander** (all USA). Though not serving on the ACES Editorial Board, all of these people have contributed substantially to the success of the ACES publications. The renewed international, interdisciplinary interest in ACES — made possible by the impressive papers, the vendor booths, the short courses, the international panel, the canonical problem session, and the funding agency representative — will bring new **ACES Journal** and **ACES Newsletter** authors and subscribers (members).

Please join me in saluting these leaders within ACES!

David E. Stein
Editor-in-Chief

EDITORIAL

Within several months, we shall again elect three Directors, each for a three-year term. Because of the increasing interest among our members in serving as Directors, real choices — such as we experienced for the first time in the previous election — are again anticipated. As in any organization, however, the election of a candidate with only token interest remains a possibility.

With the advent of "real elections" come the capability, and also the imperative to select leaders who will address critical organizational needs. For example,

1. Some committees, and the areas of activity which they represent, have been inactive for years. Consequently, we are not offering to our members the full range of activities and services which we should be providing. Such unfulfilled expectations may account for the loss of many of our original members during 1988- 1989, even though our total membership increased dramatically during this same period — which incidentally was prior to our policy of not including membership with symposium registration.

2. Key promotional activities have depended upon a very small number of people, and certain tasks are beyond our present workload capacities. For example, many of our newest members learned about ACES from the publicity for our symposia, canonical problem solution program, and **ACES Journal** special issues. A larger membership (subscription base) can be advantageous from a publications standpoint, because the **ACES Journal** and the **ACES Newsletter** then become more attractive to authors and also to advertisers. Furthermore, the resulting larger revenue base can someday enable us to publish the **ACES Journal** more frequently — thereby minimizing the "turnaround time" for authors. However, membership recruitment is not a direct responsibility of the ACES Editorial Board, and there should be additional efforts to attract members. As another example, the ACES Editorial Board made possible the ACES Workshop Program / canonical problem solution program (sponsored jointly with TEAM). Nonetheless, the Editors by themselves cannot guarantee the ACES participation necessary to sustain the Workshop Program, nor is this their responsibility.

3. Though funding is more difficult to obtain today than in times past, we should be attempting to identify new possible funding sources for needed projects such as code validation / performance analysis (including the establishment of supporting data bases) — to the extent permitted by our status as a non-profit corporation. To date, little effort has been expended here.

4. Strategic planning should be expanded beyond matters of membership and budget, so that future professional community needs and possible new roles for ACES are identified.

To remedy these and similar problems, President Stan Kubina has launched an ambitious new program, "Vitality '91." Its success, however, is contingent upon the active support of people willing to give some priority to ACES. No one expects every member to make ACES his first priority; however, in the cases of Directors, Committee Chairmen, and other key people, certain expectations are appropriate, even after allowing for temporary, short-term work overloads. Some Directors have already exceeded these expectations, but the need to choose others like them is now greater than ever before.

All members can help implement "Vitality '91" — and build an ACES even more responsive to their needs — by applying the following questions and criteria to the candidates' statements:

1. What have you already done for ACES, and when (how recently)? In answering this question, candidates should focus on specific achievements. Merely having served as a Committee Chairman, as a Symposium Chairman, as an Editor, or previously as a Director (formerly known as an AdCom member), is not enough.

2. What do you plan to do for ACES if you are elected to the ACES Board of Directors? The Board needs men and women with initiative and preferably also with strategic vision. In our present stage of evolution as a professional society, the willingness to attend Board meetings, vote on issues, and otherwise manage the affairs of ACES, is not enough.

3. What unique qualifications do you have to serve as a Director? This question is less readily answered; however, one's published papers, education, and year of birth do not confer uniqueness among the candidates.

These are the same questions which, last year in my role as Special Assistant to the Nominating Committee, I put forth to the candidates). In addition to helping us select the leaders whom we need, these questions eliminate the problem of casting votes based on nearly-indistinguishable candidates' statements — a problem which manifests far too often in several professional societies.

All else being equal, we can then consider balance of representation — low- vs. high-frequency application interests, university vs. government/industry, and geographic (among nations). For the upcoming election, however, these factors are best relegated to a role subordinate to our paramount needs: initiative, and strategic vision.

As in the previous election, we can arrange the nomination of candidates with a "track record" of service to ACES and with a plan for the future. Their election to office is not a foregone conclusion.

David E. Stein

PERSPECTIVES ON ACES AND COMPUTATIONAL ELECTROMAGNETICS

Two perspectives articles are featured in each issue of the ACES Newsletter to promote dialog. This month's Perspectives are from Adalbert Konrad and Ron Perez.

ACES: DC TO LIGHT, ETC.

Adalbert Konrad

The Applied Computational Electromagnetics Society is the right name for a much larger group than the one initially responsible for establishing it. It is fair to say that in its early days the society consisted mostly of those in the high frequency radiation and scattering area. However, it is time for ACES to include all involved in applied computational electromagnetics. This means also those interested in low frequency and static fields.

Collaboration with the biennial IEEE Conference on Electromagnetic Field Computation (CEFC) and the first combined ACES/TEAM workshops in Canada, Japan and now Italy are steps in the right direction. These events definitely help bring together the two groups. I believe there is much to learn from each other.

From a technical point of view, time domain finite methods is an area which should receive more attention from ACES. Both low and high frequency areas of application may benefit from an exchange of ideas and experiences.

In spite of many years of progress, the coming of age of finite element methods and so on, there are still plenty of unresolved problems. One example is spurious solutions arising from finite methods. Numerous papers published during the last decade claims the elimination of non-physical solutions. There are new claims that edge elements have solved this problem. However, there are no rigorous procedures or standard test problems for checking the validity of such claims. Perhaps the ACES/TEAM workshop experiences can teach us something here.

The educational aspects of computational electromagnetics should be addressed as well, recognizing that electromagnetics is a core subject which is part of every electrical engineering curriculum. ACES could provide a forum on how the computational aspects of electromagnetics are being taught to students at various universities around the world.

In general, ACES should reflect the current trends in its meetings and publications. I propose that the ACES Journal regularly run (perhaps on a yearly basis) special issues that are dedicated to high frequency, low frequency and the educational aspects of applied computational electro-magnetics.

The ACES Journal has come a long way to become a respectable publication but it still suffers from a name recognition problem. Often when I ask someone if he subscribes to the ACES Journal, the reply is "The What Journal?" Distribution of complementary copies of the latest issue of the ACES Journal at conferences such as COMPUMAG and CEFC might be a good remedy.

BIO

Adalbert Konrad is Associate Professor at the University of Toronto. His recent activities include time domain analysis of electromagnetic scattering, RF heating and microwave non-destructive testing. His current research interests are primarily in the areas of microwave planar networks and eddy current finite element analysis for power applications. Adalbert Konrad serves on the ACES Journal Editorial Board and is a member of the CEFC Advisory Committee where he represents the interests of ACES.

MAKING ACES WIDELY KNOWN

Reinaldo Perez

A simple survey, conducted by this author, of the technical papers published every year in the ACES literature (Newsletter, Journal and Conference Proceedings) revealed a wide variety in the subjects treated by many members of our technical community. The survey found articles in the general fields of microwaves, antenna design and analyses, propagation, electromagnetic compatibility, materials, and biological effects, just to name a few. Furthermore, applications ranged from the design of microstrip in microwave circuits to the behavior of antennas located on surface ships and aircraft.

The statistics of this informal survey can be interpreted in different ways, but the most obvious conclusion is that, at ACES the talent of our members is well diversified. One reason for this diversity is that many of us have joined ACES from several of the IEEE and IEE (to name just two) technical societies. We have found in ACES a unique emphasis on the application aspects of computational electromagnetics which has appealed to our interests.

ACES has taken the initiative to make itself more widely known by launching cooperative efforts with other "electromagnetic-related" technical societies at the national and international level. In addition, ACES is promoting its many technical services among the members of other societies (e.g IEEE-AP, IEEE-EMC) to stimulate cooperation among our members. Such efforts, undoubtedly, will result in an enhancement of the quality of our societies and publications.

The task undertaken by ACES to expand its horizons among other technical societies should continue unabated. Those of us, who are members of ACES, and enjoy "dual citizenship" with another society should continue making honest efforts to improve the awareness of ACES among the other fellow members of our societies. This endeavor will benefit all of us.

BIO

Dr. Reinaldo Perez is an electromagnetic compatibility (EMC) research engineer at the Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA. He specializes in the development and application of numerical electromagnetic codes to the analysis of EMC problems. He is a member of the IEEE-EMC society editorial staff. In addition, he is a member of ACES and serves on the ACES Journal Editorial Board.

NEC UK USERS GROUP NEWSLETTER CONTENTS

A NEC Users Group is active in Great Britain and since 1988 they have published an annual newsletter of impressive quality. The Table of Contents for these newsletters is shown below. Anyone interested in reading any of these is encouraged to contact A.K. Brown or Pat Foster:

Dr. A.K. Brown, Managing Director
EASAT Antennas Ltd.
Goodwin House, Leek Road
Hanley, Stoke-on-Trent
ST1 3NR, UNITED KINGDOM

Dr. Pat R. Foster
Microwave and Antenna Systems
16 Peachfield Road
Great Malvern, Worcestershire
WR14 4AP, UNITED KINGDOM

No. 1 (Spring 1988)

MININEC as a Teaching Tool
Brian Austin, University of Liverpool

Modelling Dielectrics
Pat Foster, Microwave and Antenna Systems

Input Impedance Using NEC1
E. M. Davenport, British Aerospace

Profit from ACES
Pat Foster, Microwave and Antenna Systems

No. 2 (Spring 1989)

CARFEM* News from Bradford University
Peter S. Excell, Bradford University

An Alternative Methods of Considering the Magnetic Current Annular Ring (Frill) Source**
J. W. R. Cox, Royal Aerospace Establishment

Derivation of the Expressions Concerning the Maximum Coupling Between a Pair of Antennas
J. W. R. Cox, Royal Aerospace Establishment

4th Annual Review of Progress in Applied Computational Electromagnetics 1988
Pat Foster, Microwave and Antenna Systems

* Computer-Aided RF Electromagnetics

** A revised version has been published in the ACES Journal,
Vol. 5, No. 1 (Summer 1990)

No. 3 (Spring 1990)

Some Remarks on the Current Slope Discontinuity Source as Described in the
NEC Manual

J. W. R. Cox, Royal Aerospace Establishment

2-D NEC Contribution

D. Brammar, Royal Signals and Radar Establishment

An Attempt to Model Microstrip Using NEC

Pat Foster, Microwave and Antenna Systems

No. 4 (Spring 1991)

International Conference on Computation in Electromagnetics

Brian Austin, University of Liverpool

Calculation and Corroborative Measurement of the Reactance of a Long-Wire Antenna
Installed on a BAC 1-11 Aircraft

J. W. R. Cox, Royal Aerospace Establishment

Performance of Resonant Dipole Antennas Using MININEC and Modelling of a Dipole
Gap Using NEC

M. J. Alexander and M. J. Salter, National Physical Laboratory

Optimising a VAX Computer for NEC Runs

Alan Boswell, Marconi Research Centre

Display of Geometry and Current Information on Wire-Grid Models

R. J. Najm and B. A. Austin, University of Liverpool

MN and YO - Enhanced MININEC and the Yagi Optimizer

Ian White, IFW Technical Services

THE REMOTE SENSING SOCIETY

Peter Excell

The RSS and ACES have agreed to a mutual exchange of recruitment advertisements, since there is some common ground in their interests, although their basic missions are significantly different.

The RSS was established in 1974 in order to bring together the wide variety of disciplines involved in remote sensing and to promote the subject as a whole. The primary interest of the majority of members has always been in satellite-borne remote sensing, but other aspects of the subject are not neglected (for instance, electromagnetic ground-probing techniques which could be a major area of common interest with ACES). The Society was launched in, and is still based in the UK, but it has earned an international standing and has a large proportion of overseas members (membership currently stands at around 700). A feature of the Society is its close connection with academic, commercial, industrial, governmental and international interests in the subject.

The declared aims of the society are to promote knowledge on the subject of remote sensing and to unify the subject, so as to help in securing the development of the various techniques and their optimal deployment to promote economic and social benefits; and to strive for adequate investment of resources in remote sensing activities so that the scale of effort comes to match the requirements.

The Society organises an annual conference, usually in the UK, as well as a large number of shorter special-interest meetings.

It is felt that there could be some common interest between the RSS and ACES in the areas of electromagnetic probing of penetrable media (e.g. the Earth's surface or biological media) and in modelling of the scattering behaviour of targets observed by synthetic-aperture radars. RSS has recently set up a number of special interest groups (SIGs), and the possibility of one on electromagnetic modelling, run jointly with ACES, has been suggested: indications of support for this would be very welcome.

Basic membership costs 25 pounds (UK) for which the member receives a substantial quarterly newsletter, reduced fees for conference and member-rate prices for other publications of the Society. The Society's learned journal is the International Journal of Remote Sensing (IJRS). This is a very substantial, high-quality journal which is published by a commercial publisher and a separate fee is charged for those wishing to subscribe to it (concessionary rate for members).

The address of the Society is as follows: The Remote Sensing Society, Department of Geography, The University, Nottingham NG7 2RD, UK, but informal enquiries can be directed to our "link man", Dr. Peter Excell at the University of Bradford, West Yorkshire BD7 1DP, UK.

TOPICS IN APPLIED COMPUTATIONAL ELECTROMAGNETICS IN WESTERN EUROPE

Technical Activities and Initiatives (tentative and incomplete)

1. Radiation hazard analysis (1 KHz - 100 MHz)
 - Nearfield analysis to establish protective safety measures for technical personnel and persons with implanted pace makers
 - High power near-field breakdown protection (SW broadcasting)
 - EM field distribution and propagation in organic tissue
 - Biomedical phenomena
2. Environmental scattering (1 MHz - 100 MHz)
 - Noise propagation and shielding in automobiles
 - Analysis of bearing errors in radio direction finding systems due to parasitic environmental scattering
3. Cellular Radio Networks D1 and D2 in Germany (400 MHz - 1 GHz)
 - Array analysis and synthesis of wide-basis base station antennas
 - Analysis of coupling and re-radiation effects and optimization of antennas attached to aircraft naval vessels and vehicles in particular automobiles
4. High frequency applications (10 GHz - 100 GHz)
 - Multiple reflector antenna contour shaping
 - Stripline planar antenna arrays for automobile applications and satellite communications
5. Computational issues (1 KHz - 100 GHz)
 - Improving error propagation and performance of CAE software
 - Patch model improvement with regard to near-field accuracy
 - Linking antenna analysis and propagation prediction
 - Training and educational use of commercial software

Rudiger Anders
Applied Electromagnetics Engineering

COMPUTATIONAL ELECTROMAGNETICS IN THE UK

The level of activity in Computational Electromagnetics is on the increase within the UK; there is an active NEC user group and 1991 will see the first IEE International Conference on Computation in Electromagnetics to complement the well established applications-driven conferences such as ICAP. Interests cover the entire frequency spectrum and the whole range of numerical techniques but a few examples may be singled out as being particularly pertinent to the UK.

The Transmission Line Modelling method is prominent and a software package incorporating graphical pre and post-processors is available commercially; the ease of use of this package contributes to the method's popularity. The major application has been to EMC coupling problems; an application of increasing importance as a result of EC legislation. Modelling of microwave tubes is receiving increasing attention; both TLM and NEC are used for 'cold' modelling' and a Virtual Particle, particle-Mesh code has been used to simulate conventional and high power microwave devices. In the UK, early interest in parallel computing was stimulated by the transputer and research into parallel algorithms continues. The concurrent processor facility at Edinburgh University gives ready access to large arrays of transputers. A 192 node transputer array running a parallel TLM code is planned for a dedicated lightning and EMC modelling facility for aircraft in connection with the European Airbus and European Fighter Aircraft projects.

High frequency techniques for antenna and radar cross-section prediction are well established in the UK. Antenna synthesis has been driven by the space industry and the use of general purpose optimisation packages combined with high frequency prediction codes is being pursued by a number of organisations for array and reflector antenna synthesis, as well as profiled corrugated horn and feed chain design. Geometrical Optics synthesis procedures and diffraction based synthesis procedures are also well established. Remote sensing applications are of increasing interest to the UK space industry while the maritime communications application continues to stimulate antenna research. There is renewed interest in storing, processing, retrieving and interchanging large quantities of predicted and measured EM data.

The UK has had a particularly high uptake of first generation cellular radio systems due in part to a large number of car-phones fitted in company cars. Hand held versions have led to computations to investigate the safety implications of the relatively high powers involved. Future personal communications networks will involve lower powers and the emphasis is shifting to better propagation models and numerical parabolic equation techniques are an active area of research.

David W. Lizius
AEA Technology, Culham Laboratory, UK

MAJOR AREAS IN ROMANIAN COMPUTATIONAL ELECTROMAGNETICS RESEARCH AND DEVELOPMENT

1. Numerical methods for electromagnetic field problems, under specified boundary conditions include:

a) Quasi-steady state electromagnetic field in electro-conductive medium with nonlinear magnetization as applications in the design of electrical machines and devices.

b) The magnetic field and the losses due to eddy-currents produced in electromagnetic and ferro electromagnetic shields, with practical application in electromagnetic compatibility for systems such as electrical machines, transformers and high current bus-bars in electrical power distribution stations.

2. Numerical methods for electromagnetic field problems with feed conditions expressed as terminal voltages or feed currents.

3. Development of numerical packages for the modelling of electric and magnetic circuits.

4. Investigation of the physical state of systems by electrotechnic methods (non-destructive fault-detection) such as low voltage impulse methods and frequency response methods applied to electrical machines and transformers - experimental research and numerical models

5. Numerical methods and experimental measurement techniques concerning electrodynamic stresses and pumping of electro-conductive fluids in magnetic fields, with applications in electromagnetic stirring of melted steel, pumping of the nonferrous melted, etc.

6. Electromagnetic methods in metallurgical technologies of composite materials used in aeronautics experimental research and numerical models.

**Dr. Ing. Mihaela I. Morega
Polytechnic Institute of Bucharest
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COMPUTATIONAL ELECTROMAGNETICS IN CHINA

In China, both low and high frequency electromagnetic computations are being pursued. The topic areas are varied, with each investigator having a specialty of interest.

For example, scientists in Information and Control Engineering devote themselves to high frequency study areas. Their topics cover all areas of antennas, such as: Microstrip Antennas, Reflector Antennas and Feeds, Antenna Arrays, Scattering and Inverse Scattering, Measurement Techniques and Remote Sensing, Transients, Millimeter Wave Techniques, etc. Numerical methods used include the Finite Element Method (FEM), Finite Difference in Time Domain (FD-TD), Boundary Element Method (BEM), Moment Methods and Optimization Methods.

We initially assumed that the ACES Symposium was a domestic Annual Conference of the United States. Papers have been submitted for the 1991 Symposium from our country. Now it is clear that participation is world-wide. We have a strong faculty in the Information and Control Engineering Dept. of our Xian Jiaotong University with research interests in high frequency problems. We also have interest and experience in solving various kinds of electromagnetic problems for power frequencies. We are active in the power electromagnetic field in both national power and industrial applications.

ACES opens a real possibility for cooperation between you and our university. If cooperation between us develops, I am convinced it will be of mutual benefit to both of us.

Dr. Yuanren Qiu
Electrical Engineering Dept.
Xi'an Jiaotong University
Xi'an, Shaanxi, 710049, P.R.C.

SOME PERSPECTIVES ON COMPUTATIONAL ELECTROMAGNETICS IN SOUTH AFRICA

Computational electromagnetics (CEM) in South Africa is driven by a dedicated group of researchers at four universities and one research organisation, rather than by being initiated by industry. At present most of the industry requirements are met using a limited number of public domain programs and in-house programs developed by the researchers. Expertise in the application of the various codes is generally restricted to those individuals originally responsible for the introduction of the public domain codes or a limited number of students graduating under their tutelage.

Industry involvement usually flows from substantial marketing efforts by the various groups and some far-sighted organisations have been generous in their support of various research activities, especially in the solution of specific industry related projects. In general, industry cannot afford to employ full-time personnel to work on the limited number of problems which might require the use of CEM.

The range of research activities is essentially similar to that reflected in the present CEM literature. This ranges from application and validation of CEM techniques, through improved user interfacing with various codes and improvement of various codes to the development of in-house codes. This report aims at giving an overview of these activities.

The application and improvement of existing method of moments codes such as NEC2 represent a substantial part of CEM in South Africa. To this end a number of users have improved the input/output features of these codes. A new source model has been validated using input impedance measurements. Work has also been done on the application of adaptive collocations for thin-wire codes.

Because of limitations imposed on the size of problem that could be addressed using NEC2 on existing mainframes accessible to the researchers and problems with turnaround time, considerable efforts have been made on the implementation of NEC2 on transputer arrays. At present 16- and 64-transputer implementations are being investigated. These efforts are being marketed commercially.

Improved moment method techniques have been applied to the analysis of radiating slots in waveguides with or without a central dielectric septum. The computed results have been validated through comparison with very accurate network analyser measurements.

Alternate techniques for the analysis of simple wire antennas have been developed and are being improved. These techniques are validated against NEC2 and by measurement.

Two groups are presently active in the application of commercial software such as MAGGY (marketed by the MacNeal/Schwendler Corp) and MAXWELLFEM software (marketed by the ANSOFT Corporation) and in-house codes to the problems encountered in close field quasistatic electromagnetics. These involve the analysis of eddy currents, magnetic circuits and electromagnetic integration of circuit components. The problem of size limitations has been addressed.

Codes based on integral equation techniques are being developed for predicting radiation from antennas mounted on penetrable bodies as well as the analysis of microstrip structures. Scattering from penetrable and non-penetrable bodies is being investigated and the results validated against experiment.

Work on differential equation methods using commercially available finite element software using transfinite elements) and local in-house codes developed using the boundary element method is being used to study scattering from two dimensional inhomogeneous penetrable media. This is an ongoing research activity. Finite difference time domain methods have been developed for analysing discontinuities in dispersive waveguide structures.

For experimental studies and validation of results there are a number of anechoic chambers, one compact range, and open air ranges available. A nearfield measurement facility is under development. Transformation of the measured farfield back to the surface is being investigated to predict the surface distortion of reflector antennas.

Computational electromagnetics is introduced at the various universities at undergraduate level and forms an important component at postgraduate level. All of the research activities discussed above form the basis of masters or doctoral theses. The universities stress the importance of all research activities being open being open, and consequently papers on the research topics are regularly submitted for publication in various journals. In many cases, the pertinent software is available to other researchers on receipt of a written request.

Prof. Duncan C. Baker
University of Pretoria
Pretoria, South Africa

COMPUTATIONAL ELECTROMAGNETICS INTEREST IN THE AUSTRALIAN REGION

(not necessarily in order of importance)

1. High frequency methods (e.g. GTD, PO) for analysis of scattering from large complex radar targets.
2. Scattering from radar targets in the resonance and Rayleigh regions (e.g. MOM, Wire-grid modelling and surface patch modelling).
3. Propagation of HF ground wave over irregular, inhomogeneous terrain.
4. Effects of ground screens on ground wave and sky wave at HF.
5. Effects of irregular terrain on the performance of large HF arrays (e.g. sidelobe effects for receiving antenna arrays used in OTHR).
6. Common-mode effects in OTHR vertical log periodic antenna arrays.
7. Mobile SATCOM antennas.
8. Antennas for ground probing (impulse) radar.
9. Quasi-optical antennas.
10. Reflector antennas.
11. Printed circuit antennas and millimetre wave integrated circuit antennas.
12. Spectral Domain Techniques.
13. Computation of fields inside lossy, inhomogeneous dielectric bodies.
14. Remote sensing of the sea surface using OTHR.

GENERAL COMMENT

Of the well known numerical modelling codes, a number of organisations in Australia have access to, and make use of codes such as NEC2, NEC3, NECGS, NEC-BSC, NEC-REF, ESP, although there are restrictions on some codes.

Various organisations are involved in work relating to radioastronomy, telecommunications, HF and microwave/mm-wave radar.

Computational Electromagnetic methods and applications cover almost the entire radio frequency spectrum from ELF to mm-waves.

G R Haack
Surveillance Research Laboratory
Salisbury, South Australia

BRIEF PRESENTATION OF GENERAL ASPECTS OF ELECTROMAGNETIC FIELD COMPUTATION IN SOUTH AMERICA

This report is concentrated on activities in Brazil. The reason for this is communication and interaction with other South American countries is minimal. Since Brazil has a large hydroelectric power generation potential in the central and Amazon Forest regions but industrial power consumption is 1000-3000 Km away in San Paulo and southern states, our electromagnetic computation is focused on supporting power generation, transmission and distribution industries. Most electronic based research and development is based in companies which operate as "joint ventures" with foreign groups such as Hewlett-Packard, Siemens, Phillips, IBM, Hitachi, etc.

In Brazil there is some work on applied electromagnetics computation. At this moment, our group (Univ. Federal of Santa Catarina) is leading the sector. We work very closely with industries (such as WEG and Embraco), furnishing Finite Element software for electromagnetic analysis and developing new products for them. At Sao Paulo, there is another group also using FE methods for High Voltage problems and at Belo Horizonte a new group is being constructed with a very competent team. These groups work with static or low frequency problems, in connection with our industrial needs. We expect these groups will transition to high frequency problems if it is necessary. We have no knowledge of other field computation work groups in the rest of South America. This is because there no scientific agreements or papers originated by the other countries of South America.

J.P.A. Bastos
Universidade Federal de Santa Catarina
Santa Catarina, Brazil

BUG REPORT - BASIC SCATTERING CODE (NEC-BSC)

Ron Marhefka of Ohio State University, Columbus, OH and Grant LaBarre of the Naval Weapons Center, China Lake, CA have discovered a bug in the Basic Scattering Code (NEC-BSC) versions 3.1 and 3.2. It is in subroutine SLABCF (which for those of you with version 3.2 is located towards the end of file NZBSC32P.FOR). It occurs right after the comment:

C!!! Find reflection and transmission coefficients for slab.

The following line: **IF (LSLAB(MP).EQ.-2) THEN**

should read: **IF (LSLAB(MP).EQ.-2 .OR. LSLAB(MP).EQ.-4) THEN**

This fix corrects errors for plates coated with dielectric on one side with the ray incident on the dielectric side of the plate. The error resulted in the omission of the conducting plate backing. Very little error would have occurred for dielectric coatings much thicker than the dielectric skin depth.

BUG REPORT - NEC-2 AND NEC-3

Jerry Burke of Lawrence Livermore National Laboratory reports the following is found in the single and double precision versions.

In subroutine NETWK the dimension VSRC(10) should be the same as the VSRC dimension in the main program, which is VSRC(30) in the program as distributed. This is only a problem when the number of voltage sources that are located at network connection points exceeds 10. If not corrected this has resulted in huge efficiencies of greater than 100% in the output file.

A different concern, although not a bug since it is described on page 372 of the NEC manual, relates to the the dimension for the maximum number of segments having network ports connected. The difficulty only occurs when also calculating the maximum relative admittance matrix asymmetry ($I4 = 1$ in the excitation EX input). In that case the dimension applies to the sum of the number of segments with network ports connected plus the number of segments with voltage sources that are not at network connection points. Violating this rule produces the error message "TOO MANY NETWORKS".

[Editors note: Next issue will contain a report on running 4000 segment NEC-2 problems on and IBM desktop microcomputer]

INDEX TO VOLUME 5 OF THE ACES JOURNAL AND THE ACES NEWSLETTER

A comprehensive index, to include computational electromagnetics techniques and applications, is planned for the **ACES Journal** and the **ACES Newsletter**. As a first step in compiling this comprehensive index, we offer the following index of computer codes as discussed in **ACES Journal** papers and in **ACES Newsletter** articles. This computer code index will be updated annually in the second issue of each volume of the **ACES Newsletter**.

Computer Codes

Legend:

AJ	ACES Journal
AN	ACES Newsletter
CP1	ACES Collection of Canonical Problems — Set 1 (published in 1990)
*	Pre- or post-processor for another computational electromagnetics code
**	Administrative reference only; no technical discussion (does <u>not</u> include bibliographic references)
page #	The <u>first page of each paper or article</u> in which the indicated code is discussed

NOTE: The inclusion of any computer code in this index does not guarantee that the code is available to the general ACES membership.

COMPUTER CODE JOURNAL OR NEWSLETTER ISSUE AND PAGE

BICON2	AJ Vol. 5, No. 1	p. 62
BIGANT	AN Vol. 5, No. 3	p. 12**
CHECK	AJ Vol. 5, No. 2	p. 17
CIAO	AN Vol. 5, No. 3	p. 13
DIGLIB	AN Vol. 5, No. 1	p. 33
DBR	CP1	p. 34
EKSCX (NEC subr.)	AJ Vol. 5, No. 2	p. 58
EXECUT (NEC-BSC subr.)	AN Vol. 5, No. 3	p. 17
ESP	AJ Vol. 5, No. 1	p. 2
	AN Vol. 5, No. 3	p. 5**
GEMACS	AN Vol. 5, No. 3	p. 5**
GENER	AJ Vol. 5, No. 1	p. 62
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MININEC	AN Vol. 5, No. 3	p. 5**
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MININEC3	AN Vol. 5, No. 3	p. 13**
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MMP3D	CP1	p. 60
* MODEL	AJ Vol. 5, No. 2	p. 17
NAC-PRE (I-NAC-3 subr.)	AN Vol. 5, No. 3	p. 19
NAC-ENG (I-NAC-3 subr.)	AN Vol. 5, No. 3	p. 19
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NEC2	AJ Vol. 5, No. 1	p. 25
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* NECPLOT	AN Vol. 5, No. 1	p. 33
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* NEEDS 2.0	AN Vol. 5, No. 3	p. 7**
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PCINT (NEC subr.)	AJ Vol. 5, No. 2	p. 58
RDPAT (NEC subr.)	AN Vol. 5, No. 1	p. 33
Richmond's program	AJ Vol. 5, No. 2	p. 43
SOMNEC	AJ Vol. 5, No. 2	p. 58
SOMNEC2D	AJ Vol. 5, No. 2	p. 58
SPEX	CP1	p. 34
TAME	AN Vol. 5, No. 3	p. 13

Errata

The following errors were found in the "Index to Volumes 1-4" as published in the **ACES Newsletter**, Vol. 5, No. 2 (July 1990):

"DOTIG1" was incorrectly listed as "DOTIGI"

A reference to the ESP code was incorrectly listed as "AKM Vol. 3, No. 2."
It should have been "AJN Vol. 3, No. 2."

"NEC-3D" was incorrectly listed as "NEC-30"

"NEC-3I" was incorrectly listed as "NEC-31"

Richmond's program was incorrectly listed as "RICHMOND"

A reference to the SRC code was incorrectly listed as "AJN Vol. 2, No. 2."
It should have been "AJN Vol. 2, No. 1."

CALL FOR PAPERS

**THE APPLIED COMPUTATIONAL ELECTROMAGNETICS SOCIETY
ANNOUNCES A SPECIAL ISSUE OF THE ACES JOURNAL ON:**

BIOELECTROMAGNETIC COMPUTATIONS

There are a number of areas where bioelectromagnetics, the interaction of biological tissue with electromagnetic energy, is being studied. Bioelectromagnetics can produce very beneficial effects to improve, for example, medical and industrial capabilities. On the other hand, there are unwanted side effects which may be a health hazard. There is a need for computational efforts to help quantify these important issue and improve our ability to harness electromagnetic energy to best effect.

Suggested topics for papers include:

Whole body and partial body dosimetry
Bioelectromagnetic/thermal interactions
Analytic methods including functional analysis
Differential methods and coupling techniques
Surface and volumetric integral equation techniques
Quasi-static, resonance and high frequency techniques
Graphics and computer I/O
Computer code validation

Papers may address applications including:

- Biomedical applications
 - RF hyperthermia
 - Physiological interactions and modeling
- RF biohazards
 - industrial/scientific/medical
 - communications systems eg. broadcast, microwave, radar
 - defence eg. radar, shipboard antennas
- Magnetic and electric near fields, body currents
- High voltage power line effects and modeling
- Lightning effects
- Standards

DEADLINE FOR PAPERS IS NOVEMBER 30, 1991

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**Share your knowledge and expertise with your colleagues
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The Annual ACES Symposium is an ideal opportunity to participate in a large gathering of EM Analysis enthusiasts. Whether your interest is to learn or to share your knowledge, this symposium is aimed at you. In addition to technical publication, the Symposium organises live demonstrations and short courses. All aspects of electromagnetic computational analysis are represented but particular emphasis will be placed on applications in the 1992 Symposium.

The purpose of the Symposium is to bring analysts together to share information and experience about the practical application of EM analysis using computational methods. There are four areas, Symposium papers, short courses, demonstrations and vendor booths. The NSF/IEEE CAEME (Computer Applications in Electromagnetics Education) Center will organise a special session of technical presentations on Computer Applications. This special session will cover topics of interest in education/training, evolving computer technologies and the latest in electromagnetics computation and analysis. In conjunction with the special session, there will be booths dedicated to the interchange of ideas and software. Please contact Magdy Iskander for CAEME details. Contact Pat Foster or Perry Wheless for details of the other events

**1992 ACES
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The 8th Annual Review of Progress in Applied Computational Electromagnetics

SUBMISSION OF PAPERS

Suggested topics for papers include:

APPLICATIONS

Antenna Analysis
EMC/EMI
EMP, shielding, radiation effects
 Impulse and transient analysis
Propagation and Scattering
Microwave, mm-wave components
EM machines and devices
Power Transmission
Accelerator design
Biological applications
Data interpretation
Code studies of basic Physics

NUMERICAL METHODS

Differential methods
Integral methods
Method of Moments
Finite Element methods
Finite Difference methods
GTD and FTD methods
Spectral Domain techniques
Low/high frequency issues
Time Domain techniques
Hybrid techniques
Perturbation multi-pole methods
New algorithms

CODE DEVELOPMENT

EM Field Codes
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 GEMACS
System Compatibility Codes
 IEMCAP
 SEMCA
 AAPG
 COEDS
Time Domain Codes
Code Validation
CAD/automesh genera
Graphical I/O Techniques

TIMETABLE

October 1, 1991:

Abstract Submission

Refereeing is carried out on the abstract which must not be more than a single page including figures. Please supply four copies.

November 1, 1991:

Authors notified of acceptance

January 15, 1992:

Submission of camera-ready copy, not more than 8 pages including figures. All submissions become the property of the SYMPOSIUM and will not be returned. The author of each paper accepted for publication will be required to provide Copyright Releases from the author and the sponsoring organisation to the Symposium. Copyright Release forms will be supplied at time of acceptance. The author and sponsoring organisation will retain the right to free use of the copy protected material. For both abstract and final paper, please supply the following data for the lead author - Full name, address, telephone, and FAX number for both work and home and a brief professional biography.

Projected cost per person for the Symposium will be \$180.00 (\$195.00 after March 9, 1992).

SHORT COURSES

These will cover numerical techniques, computational methods, surveys of EM analysis and code usage instruction. Fee for a short course is expected to be \$70.00 per person for a half-day course and \$120.00 for a full day, if booked before March 2, 1992. Full details will be published by October 1, 1991.

DEMONSTRATIONS

These will cover computer demonstrations, software demonstrations, poster papers and key-note speakers.

VENDOR BOOTHS

These will cover product distribution, small company capabilities, new commercial codes.

CALL FOR PAPERS

**Applied Computational Electromagnetics Society
announces a special issue of the
ACES Journal on**

Computer Applications in Electromagnetics Education

The Applied Computational Electromagnetics Society, in cooperation with the NSF/IEEE Center on Computer Applications in Electromagnetics Education (CAEME), is pleased to announce the publication of a 1992 special issue in the area of computer applications in electromagnetic education. There has been a remarkable increase in interest in this topic and with the establishment of the CAEME Center, many individualized efforts have been integrated and a useful collection of software and computer-generated videos is now available to education. Furthermore, with the fast-paced development in the computer technology and the availability of sophisticated graphics and new technologies such as multimedia presentations, new and expanding opportunities continue to be available to educators to help support this drive in boosting electromagnetic education. This special issue will help focus on this issue that directly impacts academia and industry alike.

Suggested Topics for Papers

- Software for electromagnetic education
- Graphics and computer I/O issues
- New evolving technologies including interactive videos
- Novel applications and effective implementation of computers and software tools in education including in- and out-of-classroom teaching
- New courses and computer-based curriculum in electromagnetics
- Computer use in laboratories
- Examples of educational use of commercial and government-owned software
- Funding challenges and opportunities

Deadline for papers is April 30, 1992

**Send papers and inquiries to:
Magdy F. Iskander
Special Guest Editor
Director of CAEME
Electrical Engineering Department
University of Utah
Salt Lake City, UT 84112
Telephone: (801) 581-6944
Fax: (801) 581-5281**

THE APPLIED COMPUTATIONAL ELECTROMAGNETICS SOCIETY, INC.

ACES sponsors a 3-day Annual Review of Progress in Applied Computational Electromagnetics around the third week in March in Monterey, CA. Publications of the society include the Annual Conference Proceedings, 2 Journals and 3 Newsletters per year. In addition, special publications are produced as the need rises. A special Journal issue on Computer Code Validation and the ACES Canonical Problem Set are examples. The Newsletter informs members of Society activities and provides a forum for modeling and code information exchanges.

The Software Committee provides a means to exchange information about electromagnetic computational codes and maintains a small software library.

The Technical Activities Committee identifies needs in applied computational electromagnetics. This committee also identifies and implements ways to address those needs.

Membership in ACES is attained through payment of a membership/subscription fee (see below).

For further information regarding ACES or on becoming a member in the Applied Computational Electromagnetics Society, contact ACES Secretary, Dr. Richard W. Adler, Code EC/AB, Naval Postgraduate School, Monterey, CA. 93943, telephone (408) 646-2352, Fax: (408) 646-2955. You can subscribe to the Journal and become a member of ACES by completing and returning the form below.

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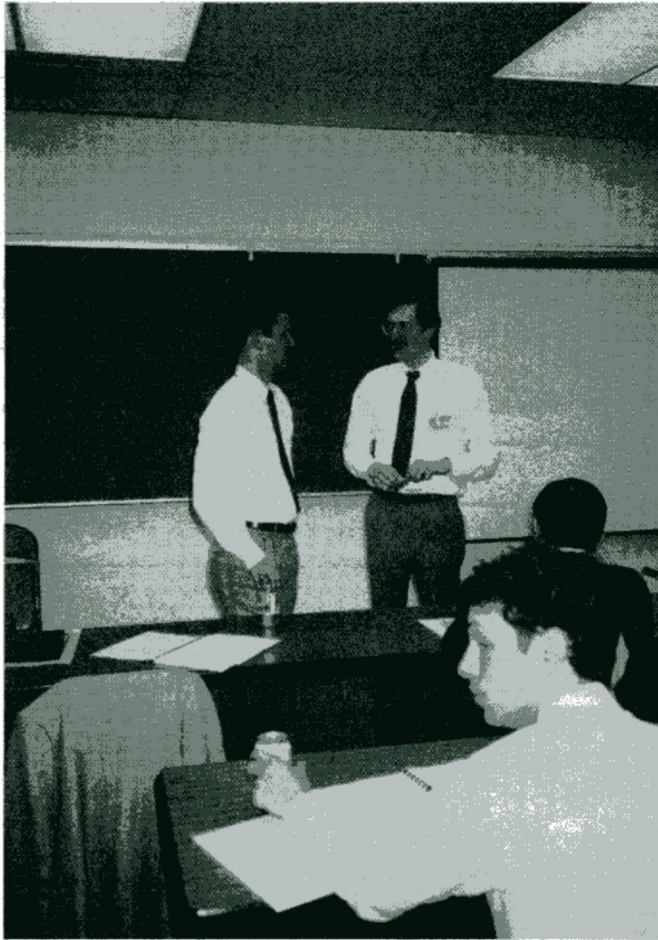
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Ron Marhefka explains



Ed (ACES first President) and Pat Miller with Stan (ACES third President) and Lily Kubina



Pres. Stan Kubina acknowledges key contributors to the '91 Conference



Vice President Hal Sabbagh relaxes



One of the Short Course Instructors, James Rautio, (Right center)



'91 Conference Chairman, Frank Walker, holding his award for doing a great job.



Bob Bevens discusses his "retirement career" plans



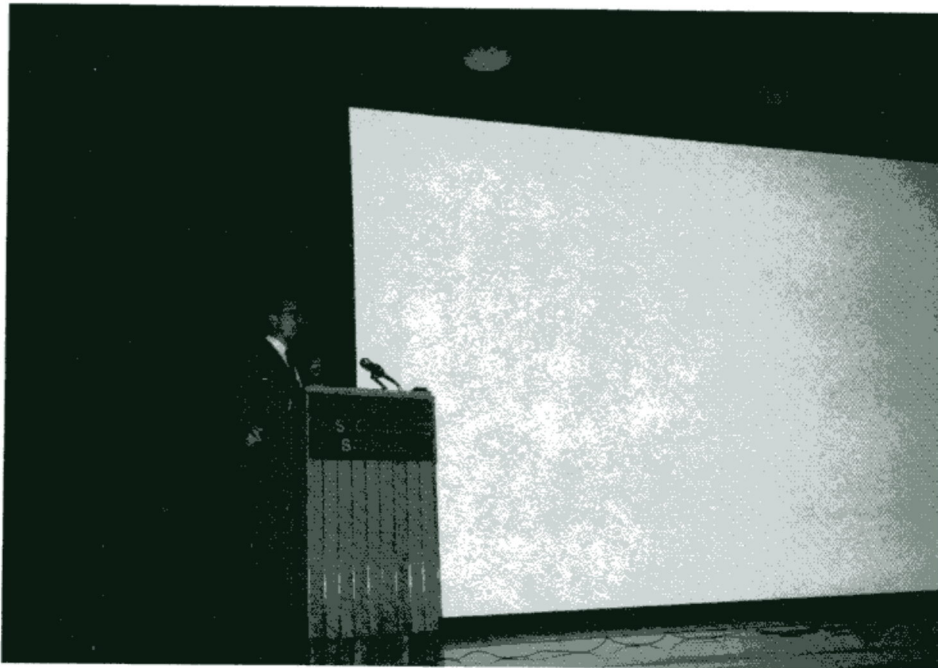
Dave Stein, center left, ponders over that last comment!



Lily Kubina, Ross Speciale and Mihaela Morega

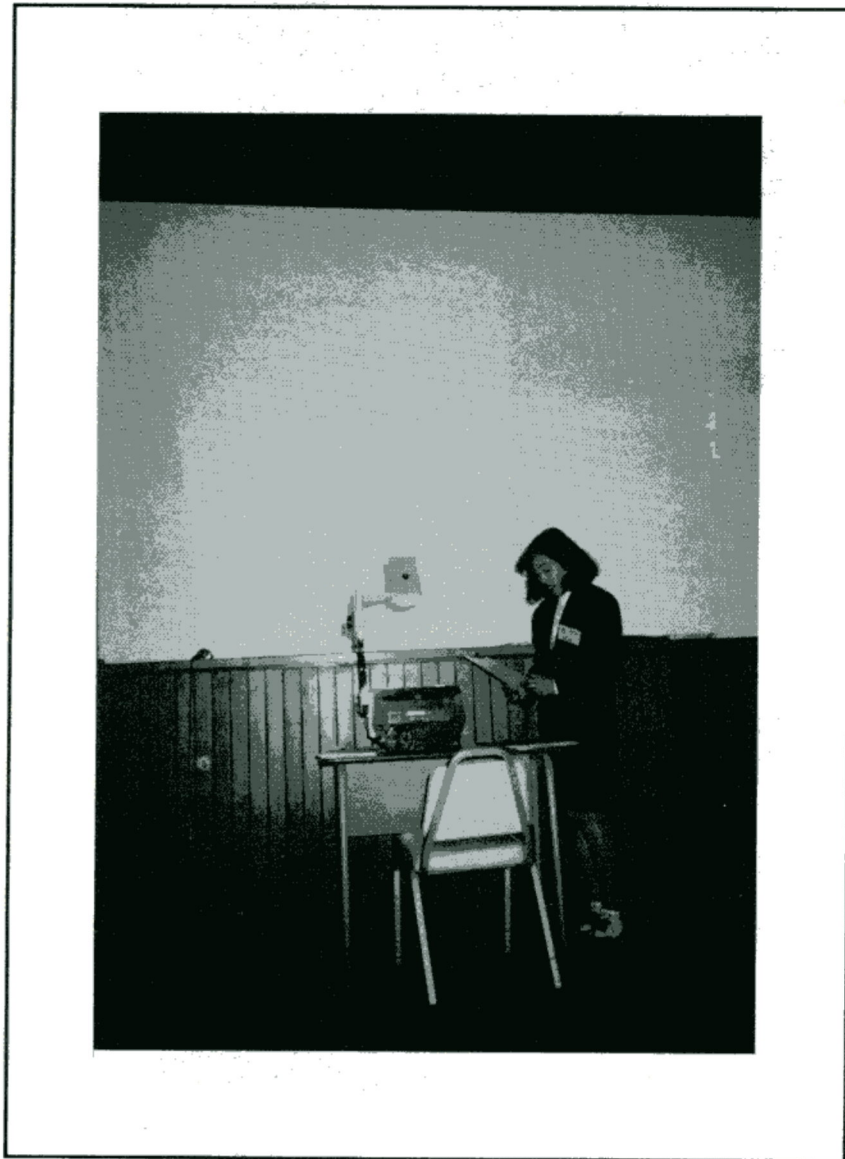


"Mr. NEC", Gerald Burke



Peter Excell clears his throat





Chiyo Hamamura of Japan presents her paper



Ray Luebbers at work

ADVERTISING RATES

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