



IEEE

MAGNETICS SOCIETY

NEWSLETTER

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JODIE CHRISTNER, EDITOR

PRESIDENT'S MESSAGE

By Stanley H. Charap

This will be my last message as President of the Magnetics Society. As I look back on my two year tenure in this position, I find that the Society has continued to provide outstanding services to its members and to the general community in a smooth and efficient manner.

This point was examined closely this summer as the Society was reviewed in conjunction with the IEEE TAB meeting in Sparks, Nevada. Vice President (soon to be President) David Thompson and I met with the TAB Society Review Committee and the initial response of the Committee was that we are indeed doing the job with regard to conferences, publications, financial resources, recognition of individual achievement and development of leadership, among others. We should have had a formal report back by this time, but it hasn't happened.

As I mentioned in an earlier column, the TAB Periodicals Committee will be conducting a review of our publications as part of a series of reviews of all IEEE Society Publications. Our turn will come up early in 1993 and I know that our Publications Department Chairman, Bill Lord, has discussed the form of that review with the Periodicals Committee. I am confident that our publications will be considered to be among the best in the IEEE.

The results of the election of AdCom members and Officers of the Society should appear elsewhere in this Issue. I want to extend my sincere congratulations to all of the new leaders. The Society is in good hands!

Finally, I want to express congratulations and thanks to the present leadership of the Society for their jobs well done. It has been a pleasure working with all of you.

As for me, I look forward to welcoming everyone to Albuquerque in June 1994 as Chairman of the next Joint Intermag-MMM Conference.

NEW TECHNOLOGY DIRECTIONS COMMITTEE OF THE IEEE TECHNICAL ACTIVITIES BOARD

By Ronald J. Pogorzelski

Division IV Representative, NTDC

The NEW TECHNOLOGY DIRECTIONS COMMITTEE (NTDC) is a standing committee of the IEEE Technical Activities Board (TAB). Its charter is to identify emerging technology areas not currently addressed by IEEE entities and to encourage and facilitate the formation of appropriate ad-hoc intersociety committees in such areas.

The Committee currently consists of a maximum of seventeen members. They are the Chair, the immediate Past Chair, a representative of each of the ten IEEE Divisions, and five Members-at-Large which are to broaden the representation by including other professional societies, government, etc. Recently, at the suggestion of the TAB Structure Review Ad-Hoc Committee, each of the IEEE Societies and Technical Councils was invited to appoint a corresponding member to the NTDC. These corresponding members provide a key technical link between the NTDC and the Societies. Because of this new linkage, the 1993 committee will consist of five standing members and the 37 corresponding members.

The current activities of the NTDC include the development of a set of "Grand Challenges" in electrotechnology. They are:

1. To be or not to be reachable anytime, anywhere (wire-free and fiberless communication)
2. To have instant access to all information (databases, high-speed links, flat panel displays and interfaces)
3. To be present or absent anytime, anywhere (virtual presence and reality)
4. Abundant, clean, safe and affordable energy.

NEW TECHNOLOGY DIRECTIONS (Continued on page 2)

5. Intelligent highways and transportation systems (personal global navigation)
6. The paperless office (flat panel displays, pen and tablet)
7. The cashless society (electronic purse and wallet)

In addition to these lofty goals, the committee is considering a number of near-term activities in support of new technologies. For example, an Ad-Hoc Committee of NTDC is exploring the possibility of co-sponsoring, with the IEEE Atlanta Section, an interdisciplinary New Technologies Conference with possible emphasis on environment, health, and safety issues.

NTDC is also compiling a list of video tapes on emerging technologies currently in production. Several of the Societies have indicated interest in expanding production of such tapes.

In the interest of preparing a "Portfolio" of emerging technologies, NTDC has solicited from each Society a summary of emerging technologies related to its technical purview. Several fascinating summaries have been received and will form the basis of the portfolio.

NTDC recognizes that as Engineers we must emphasize that the new technologies which we promote must be incorporated into new products which fulfill the needs of humanity. Thus, we must not merely study new phenomena but must study their application for the good of mankind. Interestingly, the fastest growing IEEE Society is currently the Vehicular Technology Society. This rapidly growing area is certainly among those having a positive impact on Society. This growth has spread to the related areas of signal processing, information theory, and communications all of which are areas of interest to specific IEEE Societies.

As mandated by its charter, the NTDC has formed an Ad Hoc Committee on "Energy" chaired by Thomas Pinkham, our Division VII Representative. This Committee is to include representation from a number of Societies. This relates to the fourth "Grand Challenge" listed above.

NTDC also recognizes its relationship to lifelong learning in the practicing engineers must be encouraged to become proficient in the emerging technologies identified by the committee. Educational materials must be made available by the IEEE through its cognizant Societies and through IEEE Press. Communication is paramount both intersociety and with the lay public which must be made aware of the engineers' contribution to the quality of life.

NTDC continues to meet and plan promotion of new technologies within IEEE and welcomes your suggestions in this regard.

1993 INTERNATIONAL MAGNETICS CONFERENCE, APRIL 13-16, 1993 STOCKHOLM, SWEDEN

The International Magnetics Conference (INTERMAG), sponsored by the Magnetics Society of the Institute of Electrical and Electronic Engineers (IEEE) will be held from Tuesday, April 13 through Friday, April 16, 1993 at the Folkets Hus, Stockholm, Sweden. The purpose of INTERMAG '93 is to provide a forum for presentation of new developments in applied magnetics, related magnetic phenomena, and information storage techniques. In addition to the contributed papers, there will be invited papers, sessions wherein competing technologies can be assessed, tutorial sessions, and workshops for less formal discussion of timely and/or controversial topics. Special emphasis will be placed on applications oriented topics. The presentations at INTERMAG '93 will cover all areas of applied magnetics, magneto-optics, related magnetic phenomena and information storage technologies. Topics in recent years have included all aspects of magnetic recording, various magnetic and other memory technologies, microwave magnetics, permanent magnet materials and technologies, magnetic multilayers, control and power conversion and conditioning, magnetometry and transducers, magnetic separation, magnetic levitation and drives, applied superconductivity, field calculations, and magnetic materials — properties and processing. The digest deadline was November 1, 1992.

Information on registration and accommodations for the conference can be obtained from the Conference Coordinators:

Congrex (USA), Inc.
7315 Wisconsin Avenue, Suite 606W
Bethesda, MD 20814 USA
(301) 469-3355 FAX (301) 469-3360

Congrex (Sweden)
P.O. Box 5619
11486 Stockholm, Sweden
46(8)-612-6900 FAX 46(8)-612-6292

Conference information may also be obtained from the Publicity Chairman:

Prof. John Nyenhuis
1285 Electrical Engineering Building
School of Electrical Engineering
Purdue University
West Lafayette, IN 47907-1285 USA
(317) 494-3524 FAX (317) 494-6440
Internet: nyenhuis@ecn.purdue.edu

SAKURAI HONORED WITH ACHIEVEMENT AWARD

The 1992 IEEE Magnetics Society Achievement Award was given to Prof. Yoshifumi Sakurai during the Plenary Session at Intermag '92 in St. Louis, Missouri. Prof. Sakurai is President of Setsunan University. He has had a distinguished career in education and scientific leadership, including professorial positions at Osaka University, Kyoto University, and Setsunan University, member of the Science Council of Japan, chairman of numerous professional and scientific committees, and President of the Magnetics Society of Japan. Professor Sakurai is an IEEE Fellow and received the 1985 Magnetics Society Award from the Magnetics Society of Japan.

Yoshifumi Sakurai, through his many achievements in applied magnetics, laid the foundation for magneto-optic storage devices. His most significant contribution was in the development of magneto-optic thin film memories using amorphous rare-earth transition metals. In 1974 he discovered the extraordinary Hall effect in Gd-Co films and applied it to the measurement and evaluation of magnetizing properties of magnetic materials. He has presented more than 70 papers, wrote 5 books, and edited 2 books.

Prof. Sakurai is the 11th recipient of the Achievement Award. Previous winners are F.E. Luborsky, H.W. Lord, H.F. Storm, J.J. Suozzi, F.J. Friedlaender, A. Bobeck, F.B. Humphrey, P.P. Biringer, D. Gordon and E.W. Pugh.

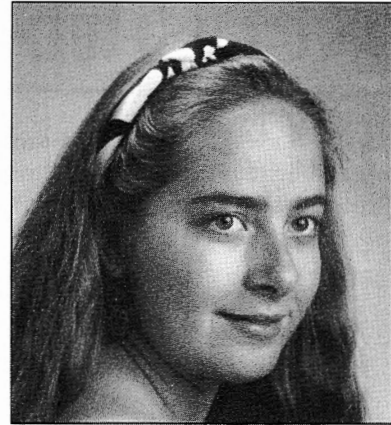
NOMINATIONS SOUGHT FOR ACHIEVEMENT AWARD

Nominations are now open for the Magnetics Society Achievement award. The submission deadline is March 1, 1993. Please send nominations in the format used for Fellow nominations to

Dr. Fred Luborsky
Lowell Road
Schenectady, NY 12308

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MAGNETICS SOCIETY NATIONAL MERIT SCHOLARSHIP WINNER



Barbara E. Thompson

We are happy to announce that the winner of the 1992 National Merit Scholarship, sponsored by the IEEE Magnetics Society, is Barbara E. Thompson, daughter of David and Carol Thompson of San Jose, California.

Barbara will attend Carnegie-Mellon University, and is interested in a career in molecular biology. During her high school years at Leland High School in San Jose, Barbara was a volunteer tutor in mathematics and science for three years. She also worked as a volunteer at the Children's Discovery Museum in San Jose. Her favorite academic subjects have been science and history, and her enjoyment of science and her interest in finding causes and preventions of genetic diseases have determined her career choice.

Besides her interest in genetic diseases, Barbara dreams of one day traveling in space. Because of her interest in science and space exploration, she was chosen by her school to participate in the NASA-Ames Student Space and Biology Research Program. Barbara also has been an officer in her high school's Science Club and devoted a significant effort to creating a visually appealing and informative poster on the nature of light for the local Physics Olympics.

The objective of the **IEEE Magnetics Society Newsletter** is to publicize activities, conferences, workshops and other information of interest to the Society membership and technical people in the general area of applied magnetics. Copy is solicited from the Magnetics Society membership, organizers of conferences, officers of the Society and local chapters and other individuals with relevant material. Send copy to Dr. Jodie A. Christner, Dept. 2H2, IBM Corporation, 3605 Hwy 52 North, Rochester, MN 55901-7829, Telephone: (507) 253-5513 FAX: (507) 253-4146.

MAGNETICS SOCIETY ANNOUNCES THREE DISTINGUISHED LECTURERS FOR 1992 - 1993

The Magnetics Society is pleased to announce its Distinguished Lecturer program for 1992-1993. Magnetics Society chapters wishing to invite these speakers should contact them directly. Anyone seeking more information about this program can contact Edward Della Torre at (202) 994-5517.



DR. CARL E. PATTON

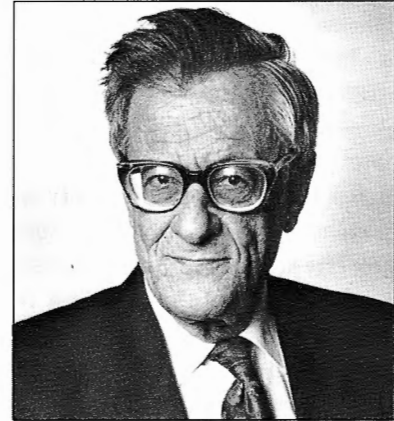
High Frequency Magnetic Excitations-Resonance, Spin-Wave Instability, and Solitons

The precessional motion of a classical magnetic moment in a magnetic field is the basis of a rich variety of high frequency phenomena and device physics, ranging from ferromagnetic resonance and magnetostatic modes to nonlinear phenomena such as spin wave instability, solitons, and chaos. This talk will emphasize the intuitive physics and device applications of these phenomena in bulk materials and thin films.

Biography

Dr. Patton is Professor of Physics at Colorado State University, Fort Collins. He received his B.S. degree in physics from M.I.T. and his M.S. and Ph.D. degrees in electrical engineering from Cal-Tech. His research group at CSU is involved in magnetics research on microwave and millimeter wave relaxation processes, Brillouin light scattering in films and superlattices, hexagonal ferrite materials, nonlinear spin wave processes, and envelope solitons in thin films. Dr. Patton is a Fellow of the IEEE and the American Physical Society.

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DR. AMIKAM AHARONI

Agreement Between Theory and Experiment as Criterion for Their Validity

A theory is usually expected to explain existing experimental results and to predict new ones, while an experiment is usually expected to check the validity of existing theories and to prepare data for modifying them. In practice these goals are not always easy to achieve, and the comparison between a theory and an experiment can sometimes be misleading.

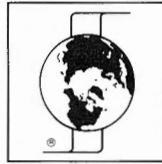
Specific examples from the literature on magnetism exist for cases in which theory and experiment were both correct, but did not agree with each other, *and* for cases in which a wrong theory agreed with experiment. Some of the reasons for this behavior will be discussed in the talk, and some advice will be offered on how to try to avoid these pitfalls, but with no guarantee of a fully successful avoidance.

Biography

Dr. Aharoni is the Richard Kronstein Professor of Theoretical Magnetism at the Department of Electronics, Weizmann Institute of Science. He received the M.Sc. and Ph.D. degrees in Physics from the Hebrew University, Jerusalem, Israel. He published 145 papers, mostly in the field of Micromagnetics and the theory of Superparamagnetism, but several of them contain an experimental work in which he was also involved for some time.

Prof. Aharoni is an invalid who walks on crutches, and cannot board a train or use an escalator. Please indicate means of transportation from the nearest major airport.

Amikam Aharoni
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DR. SHUN-ICHI IWASAKI

Evolution and Future of Perpendicular Magnetic Recording

A perpendicular recording mode provides a new principle upon which ultra high density recording becomes possible by reducing the inherent demagnetization with increasing recording density in the medium. The fact is quite contrasted with a conventional longitudinal recording mode.

The emphasis of this talk is on the initial motives for the research, the discovery of Co-Cr media with perpendicular magnetic anisotropy and the development of the thin film perpendicular head. The present status and the prediction for the future on the development of the perpendicular magnetic recording will also be discussed.

Biography

Dr. Iwasaki is president of Tohoku Institute of Technology, member of the Science Council of Japan and professor emeritus of Tohoku University. He received bachelor and doctoral degrees from Tohoku University in Sendai, Japan, in 1949 and 1958, respectively.

He has been engaged in the research of magnetic recording about 40 years mostly at the Research Institute of Electrical Communication of Tohoku University. His main works are: His invention of the metal (Fe-Co alloy) particulate magnetic tape (1958), introduction of the self-consistent iterative method to analyze the demagnetization process (1968), and invention and development of the perpendicular magnetic recording since 1977. His entire works were concentrated into fundamental studies for high density magnetic recording. He is a fellow of the IEEE and a person of the Cultural Merit of Japan. He received the Technical Achievement Award of the IEEE Computer Society and the Cleo Bru-

netti Award of the IEEE.

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38TH ANNUAL CONFERENCE ON MAGNETISM AND MAGNETIC MATERIALS: Minneapolis, Minnesota USA November 15-18, 1993

The Thirty-Eighth Annual Conference on Magnetism and Magnetic Materials will be held at the Hyatt Regency Hotel, Minneapolis, Minnesota USA. The Conference annually brings together scientists and engineers interested in recent developments in all branches of fundamental and applied magnetism. Emphasis is traditionally placed on experimental and theoretical research in magnetism, the properties and synthesis of new magnetic materials and advances in magnetic technology. The program will consist of invited and contributed papers. Selection of contributed papers is based on abstracts. An Abstract Booklet will be available in advance of the Conference from the American Institute of Physics. Registrants will receive the booklet at the Conference. Proceedings will be published in the Journal of Applied Physics.

Individuals who are not on the Conference mailing list may obtain Conference information and details concerning the preparation of abstracts by contacting Janis Bennett, American Institute of Physics, 500 Sunnyside Blvd, Woodbury, NY 11797; telephone (516) 576-2403, FAX (516) 349-0247; or Diane Suiters, Courtesy Associates, 655 15th Street N.W., Suite 300, Washington, DC 20005; telephone (202) 639-5088, FAX (202) 347-6109.

This topical conference is sponsored jointly by the American Institute of Physics and the Magnetics Society of the IEEE in cooperation with the American Physical Society, the Office of Naval Research, the Minerals, Metals and Materials Society, the American Society for Testing and Materials and the American Ceramic Society.

The meeting will be open to all persons subject to a registration fee of approximately \$250 (marked reduction for students).

This publicity is released by the Conference Steering Committee % John Nyenhuis, Purdue University, School of Electrical Engineering, 1285 Electrical Engineering Building, West Lafayette, IN 47907-1285, telephone (317) 494-3524, FAX (317) 494-6440.

THE BIENNIAL IEEE CONFERENCES ON ELECTROMAGNETIC FIELD COMPUTATION

by Adalbert Konrad, University of Toronto



Left to Right: A. Konrad, J.-L. Coulomb, M. V. K. Chari, J.-C. Sabonnadiere and T. Nakata.

The Fifth Biennial IEEE Conference on Electromagnetic Field Computation (CEFC) was successfully held during August 3-5, 1992 in Claremont, CA, under the joint sponsorship of the Magnetics Society and Harvey Mudd College which boasts a mere 600 students for a faculty of 72, the highest proportion of graduates earning a Ph. D. in the U. S. (42%) and a median SAT score of 1390, a figure that ties it for second place with MIT and Yale, after CalTech. The conference was preceded by a 2-day short course coordinated by the General Chairman Dr. S. R. H. Hoole on integrating numerical methods into the undergraduate electromagnetics curriculum, and was followed by the TEAM/ACES Workshop on the validation of electromagnetics software, organized by Professor Nathan Ida of the University of Akron and Dr. Harold Sabbagh of Sabbagh Associates.

The IEEE CEFC has its origin in the GFUN Users' Meeting, started by Dr. Larry Turner at Argonne National Laboratory (Argonne, Illinois) and later held at Colorado State University (Fort Collins, Colorado) by Prof. William Lord (now the Editor-in-Chief of the IEEE Transactions on Magnetics). The name of the meeting was changed to Mag-U-Comp by Dr. John R. Brauer (MacNeal-Schwendler Corp.) when it was held at A.O. Smith Data Systems, Inc. (Milwaukee, Wisconsin) and again to EM-COMP by Prof. Zoltan J. Cendes of Carnegie Mellon University when it took place there in December 1984. The 1984 meeting already attracted 60 participants.

The IEEE was first involved when the 1986 Workshop on Electromagnetic Field Computation hosted by Dr. Madabushi V.K. Chari was co-sponsored by the Schenectady Section of the IEEE and IEEE Region 1. Over 120 people attended this meeting with many of the participants coming from overseas. IEEE involvement continued with the sponsorship by the Washington Section of IEEE of the Third IEEE CEFC organized by Prof. Edward Della Torre and held in December 1988 (Washington, DC). This conference also had cooperative sponsorship from the Magnetics, Antennas and Propagation, Microwave Theory and Techniques and Computer Societies of the IEEE. Attendance was close to 150 with many participants coming from abroad and giving the conference an international flavour. The Fourth CEFC conference was organized by Prof. Doug Lavers of the University of Toronto (Toronto, Canada) in October 1990. There

was strong support for this conference from IEEE Region 7 and the Toronto Section of the IEEE.

Planning to create a permanent liaison between the IEEE and the CEFC conferences was started in 1988 with the idea of obtaining full sponsorship by the IEEE Magnetics Society. News of full sponsorship came just prior to the Toronto conference.

The purpose of the CEFC conferences is to continue to fill the need which led to the creation and development of this conference during the 1980's. The CEFC is intended to bring together electromagnetic field computation experts and enthusiasts from both low and high frequency groups and to provide an opportunity for the cross-fertilization of ideas in a cordial atmosphere and at a level of interaction intensity that is only possible in a smaller conference. The CEFC is also intended to provide an interactive forum for both formal and informal discussions of leading edge advances in the area of electromagnetic field computations.

The successful fifth conference brought together scientists, engineers and educators involved with or working on all kinds of electromagnetic field computation. It was attended by about 270 participants from all over the world and had a long list of cooperating sponsors. Each day, the technical program consisted of sessions that were of common interest to the different groups of participants, for example: Identification and Optimization; Adaptive Mesh Generators and Visualization; Parallel Computation, Neural Networks and Expert Systems, Edge Elements. These were followed by sessions of specific interest to low and high frequency groups and educators who teach electromagnetics. Low frequency applications included electrothermal and metal processing problems, electrical machinery and power devices, eddy current devices, etc. Sessions on high frequency electromagnetic field computation included radiation, scattering and wave-guiding devices.

In keeping with the philosophy of past CEFC conferences, there was a balanced mix of invited speakers representing both the community of well-known, established researchers and the younger up-coming group. Most notable among the familiar names were two guest speakers, C.J. Carpenter (University of Bristol, Bristol, UK) and Dr. Madabushi V.K. Chari (General Electric Company, Schenectady, NY, USA). John Carpenter — who despite being awarded the higher doctorate of the University of London, the D. Sc. (Eng.) degree, refuses to carry the title Doctor — gave a stimulating talk on a circuit model approach to field computation while Dr. Chari, the winner of the IEEE Nikola Tesla Award for 1993, gave an interesting overview of finite element applications in electrical engineering.

The next CEFC conference will be held in Grenoble, France and is hosted by Professor J.-C. Sabonnadiere, Director of the Electrotechnology Laboratory at the National Polytechnique Institute of Grenoble. The Seventh IEEE CEFC is scheduled for 1996 in Okayama, Japan, under the chairmanship of Professor T. Nakata. These will be the first CEFC conferences to be held in Europe and Asia and are expected to be as successful and every bit as interesting as all the previous meetings.

The Proceedings of the 5th IEEE CEFC (approx. 340 pages) is available from the CEFC Secretariat, Harvey Mudd College, Claremont, CA 91711 for US \$25 and a \$15 surcharge for overseas orders. Selected papers from the conference will appear in the IEEE Transactions on Magnetics (March, 1993) and the IEEE Transactions on Education (May, 1993).

REPORT ON THE SPECIAL COURSE ON COMPUTATIONAL ELECTROMAGNETICS

by Richard L. Coren and Finley R. Shapiro
Department of Electrical and Computer Engineering
Drexel University
Philadelphia, Pennsylvania 19104

The organizers of the Conference on Electromagnetic Field Computation (CEFC) arranged a special course on Computational Electromagnetics in the undergraduate curriculum for the Thursday and Friday preceeding the conference. It was held at Havey Mudd College, and attended both by electromagnetics instructors and industry researchers from the United States and other countries. The course organizer was Prof. S. Ratnajeevan H. Hoole.

Prof. Hoole began with a discussion of the changing nature of undergraduate electromagnetics (EM) in the modern electrical engineering (EE) curriculum. The techniques used in industry for doing electromagnetics have changed much faster than the content of college courses. In industry, electromagnetics work is almost entirely numerical, as implemented in commercially available computer programs. It is therefore felt that numerical techniques for EM need to be taught to undergraduates. At the same time, EM is being squeezed within and out of the EE curriculum as other subjects are introduced. In some recognized schools one can earn an EE degree without exposure to an EM course.

Prof. Hoole then proceeded to discuss how computational EM can be the focus of an undergraduate EE course or sequence of courses in EM. He went on to review the laws of EM in the form they are used for numerical methods, and discussed different approaches which are in use for calculations: the Finite Element, the Finite Difference, and the Integral Methods.

Prof. Hoole was followed by Prof. Adalbert Konrad of the University of Toronto, who discussed the Finite Element method of analysis, and Prof. Abd A. Arkadan of Marquette University, who introduced the Boundary Element method. Some of the other presentations over the course of the two days were on Postprocessing (Phillipe Wendling of Magsoft Corporation), applications in power devices (Prof. Arkadan), magnetic recording (James Monson of Harvey Mudd College), electron devices (Prof. Hoole), and time dependence (Prof. Konrad). An important part of the course was that time was allotted for hands-on experience with some commercially available software packages.

One course presentation, which was followed by a paper at CEFC, was by C.J. Carpenter of the University of Bristol. Prof. Carpenter pointed out that computational EM is done almost entirely in terms of two potentials ϕ and \mathbf{A} , and he proposed that EM courses should also be taught based on the potentials. Less emphasis would then be placed on the vector fields \mathbf{E} , \mathbf{D} , \mathbf{H} , and \mathbf{B} . This would simplify the presentation and make vector calculus less of a stumbling block than it currently is for many students.

The suggestion of a potential-based presentation of EM aroused considerable interest and discussion during the ensuing week. One concern was how young engineers, trained to work in terms of ϕ and \mathbf{A} , would be able to interact with older colleagues who are accustomed to thinking in terms

of \mathbf{E} and \mathbf{H} . Another issue was how specific topics would be taught and analyzed.

The course closed with a panel workshop on integrating numerical methods into the undergraduate curriculum. The panel was chaired by Dr. Hoole and panelists were M. V. K. Chari of General Electric, C. J. Carpenter of Bristol University, J. B. Davies of University College London, and Ablert Foggia of ENSIEG in France. There arose a rather vigorous discussion among audience members on the limits, needs, and desired attitudes and approaches to EM presentation, and the role of EM computational methods at the elementary and advanced educational levels. Part of the issue is that engineering instructors often feel an obligation to transmit a classical understanding of the topic of electromagnetics to the next generation of engineers. However, the trade-off between traditional studies and numerical problem solving is a zero-sum game, and the balance remains a topic of discussion and debate.

The Course on Computational EM left its attendees more knowledgeable in its subject and with new attitudes and provocative ideas toward teaching EM.

IEEE MAGNETICS SOCIETY ANNOUNCES STUDENT TRAVEL AWARDS

The Awards Committee of the Magnetics Society of the IEEE will sponsor several students working in magnetics to attend the Internag Conference to be held April 13-16, 1992, in Stockholm, Sweden.

Nominations will be accepted up to December 20, 1992 from faculty advisors of the interested students. This deadline will be firm. The nominator must be a member of the Magnetics Society. The nomination should be made in a one or two page letter and must contain the following information:

1. the source and extent of current support for the student;
2. whether or not the student has submitted a paper for presentation;
3. whether or not the student has received a previous travel award;
4. itemized budget requirements.

If air travel is planned the budget should be based on the most economical air fares available. It is expected that some of portion of the cost will be borne by the student and/or his/her institution. The awards will be announced December 30, 1992.

Nominations for students working in the United States and Canada should be sent to:

Dr. David A. Thompson
IBM Almaden Research Center
Mailstop K01/802
650 Harry Road
San Jose, CA 95120-6099

Nomination for students in all other countries should be sent to:

Prof. P. P. Biringer
Department of Electrical Engineering
University of Toronto
Toronto, CANADA M5S 1A4

RECOGNIZING IEEE-USA — WHAT IT IS AND WHY IT IS

by William W. Middleton, Chair
Opinion Survey Committee

Every organization, good or bad, has its detractors, and IEEE United States Activities (IEEE-USA) is no exception. Some of IEEE's U.S. members seem bent on derailing IEEE-USA one way or another.

Some die-hard members have never recognized IEEE's evolution beyond The American Institute of Electrical Engineers (AIEE). Some volunteers cannot stomach embracing anything beyond the technical dimensions of engineering. Some members have even failed to grasp the basic concepts of the organizational structure for professional activities and refuse to recognize that IEEE-USA has matured substantially, since its founding in the 1970s, to become a significant force on the national scene.

No one doubts the rights of members to express their opinions. What is disturbing is that in the effort to make their points, they omit numerous facts about how IEEE's professional movement evolved and how support for IEEE-USA's structure of today developed. Arguing a point of view but failing to recognize facts borders on being intentionally deceptive. We must revisit some of IEEE-USA's history to set the record straight.

How It All Began

Members' freedom of choice to add a professional objective to IEEE's purposes lead to changes in IEEE's Constitution in 1972. In fact, the changes passed by a substantial margin. The Constitution now permits activities directed to the interests and needs of members residing in a particular country or area of the world.

The earliest implementation of IEEE's professional activities was executed by the United States Activities Committee, which operated under IEEE's Regional Activities Board (RAB). Members found this structural arrangement undesirable, due to RAB's transnational character, and formed the United States Activities Board (USAB) in 1974.

As with all new ventures, USAB needed funding to support its activities. In 1972, IEEE's Board of Directors agreed to use a bylaw provision permitting IEEE Regions to assess their own members a fee to meet special country, regional, or area needs beyond those suitable for funding through the general dues applicable to all members. The fee was designated to fund the professional and technical activities in IEEE's Regions. Later the provision was modified to fund professional activities exclusively.

How Are the Funds Directed?

IEEE's first regional assessment was \$5 for U.S. members in Regions 1-6. The Regions agreed to make the money available to support professional activities in the United States. This assessment was later increased to \$10, and the proceeds were aggregated to form a single fund.

While the current U.S. regional assessments now stands at a uniform \$22, the prerogative of the U.S. Regions to petition for a particular level to satisfy their own special needs has not been negated. All other IEEE Regions now have an assessment in varying amounts for their own special needs.

A Voluntary Dues Plan Just Won't Work

Detractors of the assessment means of support for professional activities suggest that IEEE-USA be organized as a

voluntary organization similar to IEEE's technical societies — only participating members would pay dues. One could draw some similarities between the objectives of the Power Engineering Society and IEEE-USA; both deal in education, conferences, and publications, and both have operating committees. However, beyond that simple fact, very little commonality exists as a basis for a voluntary dues plan to finance IEEE-USA, its objectives, organization and operation. How naive it would be even to try to support lobbying activities in the U.S. Congress, if IEEE-USA's efforts were based on how many members were interested in the "XYZ" issue; or that only 10 percent of its members were interested in supporting efforts to secure funding for cutting-edge research in Government laboratories!

No organization worth its salt goes to Capitol Hill without the full support of its members. IEEE-USA lobbies with the support of its more than 250,000 U.S. members. USAB positions are derived from surveys, papers originated by knowledgeable volunteer committees, investigations, evaluations, and extensive deliberations on the realistic and practical issues and concerns of U.S. members.

Potshots Are Easy to Take

Potshots at how IEEE-USA's \$3.5 million budget supports the pet projects of a few central planners can only come from members unaware of the process or intentionally unwilling to recognize how the budgeting process is actually done.

The task of making every buck stretch far enough to support all of the goals members would like to be accomplished is impossible. Over the years, a very carefully developed budget process has been put in place to prioritize projects based on members' expectations and careful analysis of the support required.

Each year, IEEE-USA publishes a report on the status of its projects. IEEE's Opinion Survey results repeatedly indicate an acceptable level of member satisfaction with the professional activities programs throughout the United States. Thoughtful members do not expect miracles, just continuing progress, and IEEE-USA has made much progress since 1972.

We Need the Support of All Our Members

The last thing IEEE-USA needs is further debate on how to do its job. What we do need is more attentiveness and understanding on the part of our members. Members need to become more involved in supporting the issues that are important to them by writing, calling, and visiting Members of Congress.

IEEE's U.S. members represent a very powerful force, IEEE-USA has become a leading, influential body in technology and public policy. The wisdom of our earlier IEEE leaders in setting forth the concept of IEEE-USA through extensive debate, compromise, and foresight should not be reviled through shallow and careless posturing. Not only our image, but also our influence as a respected organization is at stake.

Editor's Note: W. W. Middleton's description of the IEEE-USA is a response to the letter by S. Durrani that was published in the January, 1992 issue of the Magnetics Society Newsletter. It is reprinted from Impact, Vol. 16, No. 4, June 1992, with permission from IEEE United States Activities. Copyright © 1992 by the Institute of Electrical and Electronics Engineers, Inc.

INDUCTION HEATING COMES TO PHILADELPHIA

by Bryen Lorenz, Widener University

Dr. Gabor Bendzsak, a long term resident of Toronto Canada, recently visited Philadelphia to address a joint meeting of the American Society for Metals, American Welding Society and the IEEE Magnetics Chapter (Philadelphia Section) on "The Use of Electromagnetic Fields to Improve the Efficiency of Processes and Devices." The meeting, which was held on October 15th, consisted of a social hour and dinner followed by Dr. Bendzsak's talk. Some one hundred guests attended, presenting a rich diversity in interests and backgrounds drawn from the greater Philadelphia area. The topic of Dr. Bendzsak's talk was a survey of research efforts that he is presently active in through his work at Hatch Associates Ltd. and his ties with the Electrical and Metallurgical Departments of the University of Toronto.

One such area has been in the investigation of linear stirrers in continuous casting processes. The stirrer is an electrical device which is driven by an AC power source to generate an oscillating magnetic flux. The flux couples with the matter currents in the interior of the caster and produces body forces on the melt which in turn causes the liquid material to circulate. Mixing the metal in this way assures a uniform, high quality casting product. Optimal conditions for the best mixing to occur is based on several interrelated factors such as material flow rate, viscous forces, excitation frequency and stirrer geometry. By distributing individual linear stirrers throughout the length of the casting process, mixing can be not only accomplished in a continuous fashion, but by proper adjustments of each successive stirrer, the body forces can be directed to only those regions which are in the liquid phase.

Another area of active research is in induction heating of cast slabs in the direct rolling process. The direct rolling process, a recent and significant improvement over older methods of steel making, seeks to minimize costs in flat rolled steel products. Problems, however, arise in handling the relatively thin slabs in going from the caster to the rolling mill. Due to their large surface-to-volume ratio and subsequent low thermal inertia, these slabs lose their heat at higher rates than when compared to conventional slab geometries. A variance of only 4% throughout the slab at a temperature of 1250 degrees centigrade will have adverse effects on the quality of the steel. A new temperature compensation scheme to overcome this problem was described. This new approach makes use of a system of in-line slab heating furnaces. The key feature of these furnaces is the use of induction heating to provide for the needed temperature compensation in obtaining nearly uniform slab temperature profiles.

Yet another topic that Dr. Bendzsak discussed was in the

operation of electric smelting furnaces. Electric furnaces, which operate with electrodes immersed in slag baths, are typically used as a means for the smelting of ores and concentrates. Large electrical currents, on the order of 40kA, are injected into the slag creating an intense magnetic field. This field, in turn, interacts with the DC currents to produce body forces within the bath. These forces tend to drive the slag along the side of the electrode in a direction towards the furnace bottom. The energy liberated in this process produces a strong temperature gradient within the slag setting up thermal buoyancy forces which tend to act in a direction opposite to that of the electromagnetic forces. An immediate and somewhat startling result from these investigations has been to note that scale models of these type of furnaces, normally fabricated prior to full-scale plant implementation, would be controlled by electromagnetic forces due to the small electrodes used, while full-dimensioned furnaces would instead exhibit thermal buoyancy effects. Dr. Bendzsak went on to point out that the three dimensional numerical solution of this problem is not easily obtained. The effort involves advanced computer techniques to simulate appropriate classical equations in electromagnetics, fluid mechanics, and heat transfer.

In conclusion, Dr. Bendzsak went on to briefly discuss induction related problems in the iron superstructures which both surround and are permeated by high magnetic fields such as those encountered in arc and smelting furnace environments. These, if ignored, can lead to beam failure through thermal effects (resistive heating) resulting in structural collapse. Methods to correct the problem have been to redesign the building structure to minimize the closed electrical paths formed from the interlocking beam structure, use of nonconducting structural connectors and water-cooled magnetic shielding.

As a final note to the proceedings, I would like to mention that Dr. Paul Biringer, The 1992 Distinguished Lecturer in Magnetics, who was to have originally given this talk, had been taken seriously ill over the summer and regrettably could not be with us. I would like, along with the rest of the membership of the Magnetics Society, to extend my sincere wishes for his speedy recovery.

WANTED: OLD INFORMATION

If you have unused magnetics books and journals and would like to see them used again, consider donating them to a needy home. Our education committee chairman will try to locate a matching institution. Please send details (NOT the materials themselves!) to: Ronald Indeck, Department of Electrical Engineering, Washington University, St. Louis, Missouri, 63130-4899, (314) 935-4767, fax: (314) 935-4842, email: rsi@ee.wustl.edu.

MAGNETICS SOCIETY OFFICERS AND ADMINISTRATIVE COMMITTEE MEMBERS FOR 1993

Election of officers for calendar year 1993 and of one third of the Administrative Committee for a three year term beginning on 1 January 1993 was completed on 15 November 1992. The officers and elected AdCom members who will serve in 1993 are the following:

MAGNETICS SOCIETY ADMINISTRATIVE COMMITTEE 1993

Officers

President: D. A. Thompson (ex-officio)
Vice President: C. E. Yeack-Scranton (ex-officio)
Secretary/Treasurer: J. E. Opfer (ex-officio)

Elected Administrative Committee Members

Terms Expire 31 December 1993:

R. E. Fontana, Jr.	K. Harada	R. Indeck	T. M. Jagielinski
H. Jouve	M. H. Kryder	H. A. Leupold	R. Wood

Terms Expire 31 December 1994:

J. Christner	E. Della Torre	W. Doyle	F. Friedlaender
C. Perlov	B. Shula	D. Stancil	T. Suzuki

Terms Expire 31 December 1995:

P. Biringer	R. Hoyt	R. E. Josephs	J. Judy
D. Lambeth	M. Parvadi-Horvath	S. Uchiyama	P. Wigen

The Nominations Committee who conducted the elections consisted of E. Della Torre, D. I. Gordon (chairman), R. E. Josephs, F. E. Luborsky, and P. Wigen.

"Celebrate National Engineers Week, February 14-20, 1993."

One week each year is set aside to honor American engineers and encourage young men and women to join us in the exciting tasks of finding solutions to today's technical challenges and helping create the world of tomorrow. This year, on February 14-20, thousands of professional engineers will visit the nation's classrooms as part of the successful and ongoing Discover "E" program.

Please join us in this important effort by volunteering to give a presentation on engineering to a science or math class at a local school. Contact your engineering society chapter or headquarters to find out how you can help encourage the engineers of tomorrow.

Martha Sloan
1993 President,
The Institute of Electrical and
Electronics Engineers, Inc.
Chair, National Engineers Week

Kenneth T. Derr
Chairman and CEO,
Chevron Corporation
Honorary Chairman,
National Engineers Week



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CONFERENCE CALENDAR

- NOVEMBER 2-5, 1992** **ASM Symposium on Hard and Soft Magnetic Materials with Applications.**
Chicago, IL.
K. S. Narasimhan 609-829-2220 or J. Salsgiver 412-226-6268.
- DECEMBER 1-4, 1992** **MMM-Conference on Magnetism and Magnetic Materials.**
Houston, Texas.
Ms. Diane Suiters, Courtesy Associates, 655 15th St. NW, Suite 300, Washington, DC 20005, TEL: 202-639-5088, FAX: 202-347-6109.
- DECEMBER 6-9, 1992** **Special Session at GLOBECOM on Signal Processing and Coding for Recording Channels.**
Michael W. Marcellin, Department of Electrical and Computer Engineering, The Univ. of Arizona, Tucson, AZ 85721.
TEL: 602-621-6190, FAX: 602-621-8076. marcellin@ece.arizona.edu.
- JANUARY 26-30, 1993** **ISEM5-International Symposium on Simulation and Design of Applied Electromagnetic Systems.**
Sapporo, Japan.
H. Igarashi, Secretariat, Department of Electrical Engineering, Hokkaido University, Kita 13, Nishi 8, Kita-ku, Sapporo 060, Japan.
- APRIL 13-16, 1993** **International Magnetics Conference (INTERMAG).**
Stockholm, Sweden.
INTERMAG '93, % Congrex (USA), Inc., 7315 Wisconsin Avenue, Suite 606W, Bethesda, MD 20814 USA. TEL: 301-469-3355, FAX: 301-469-3360.
- AUGUST 23-28, 1993** **EMMA-European Magnetic Materials and Applications.**
Kosice, Czecho-Slovakia.
P. Sovak, Dept. of Exp. Physics, Faculty of Sciences, nam.Febr.vitazstva 9, 041 54 Kosice, Czecho-Slovakia. TEL: xx42-95-21128.
- NOVEMBER 15-18, 1993** **38th Conference on Magnetism and Magnetic Materials (MMM).**
Minneapolis, MN.
Ms. Diane Suiters, Courtesy Associates, 655 15th St. NW, Suite 300, Washington, DC 20005, TEL: 202-639-5088, FAX: 202-347-6109.

