



IEEE MAGNETICS SOCIETY NEWSLETTER



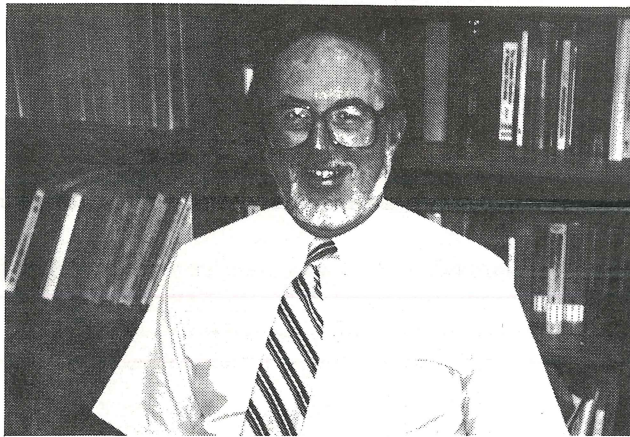
VOLUME 25, NO. 3

DECEMBER 1988

CRAIG PERLOV, EDITOR

ISSUES

Bill Doyle



Bill Doyle

Congratulations to Richy Josephs, Stan Charap and Dave Thompson who were recently elected by the AdCom to be our new President, Vice-President and Secretary-Treasurer respectively. The Society will be in capable and dedicated hands.

There have been two recent developments which will affect how the Society fulfills its responsibility to disseminate technical information. The first, which will be discussed below, is the formation of a new conference addressing special topics in magnetic recording; the second, which is discussed elsewhere in the Newsletter, is a proposed change in IEEE policy which could prevent, or at least restrict, the publication of conference proceedings in the Transactions.

Shortly after INTERMAG, an ad-hoc committee of magnetic recording specialists met to consider ways to improve technical communication in this very active field. The committee, which included Jim Lemke and the four leaders of the university recording centers in the U.S., Al Hoagland, Jack Judy, Mark Kryder and John Mallinson, felt that

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CONFERENCE PAPERS MAY DISAPPEAR FROM THE TRANSACTIONS

Richy Josephs

The IEEE is considering blocking the publication of papers from INTERMAG, MMM, Applied Superconductivity or any other conference in the Transactions on Magnetism. The All-Transactions Package (ATP) Review Committee of the Operating Committee of the Technical Activities Board (TAB) has made the following recommendation:

To maintain Transactions quality and uniformity, to insure the expected technical value to the subscribers of Transactions and to encourage the use of Conference Records for publication of IEEE Conference papers, TAB directs those societies using their Transactions for publishing conference records to stop. Publication of conference records in Transactions should cease as soon as possible, but not later than the end of 1990.

TAB has postponed until February 1989 its meeting to consider the committee's recommendation. The Technical Activities Board is concerned about the publication of Conference Records in IEEE Society Transactions. The latter consist of various memorabilia associated with a conference including digests and referred as well as unrefereed papers. TAB feels that there may be a negative influence on the sales of the All-Transactions Package which is the complete set of IEEE Society Transactions offered to institutions and libraries at a discount price. TAB's view is that the subscribers buying the ATP expect "cutting edge, archival and technically excellent" literature (the items in quotes came from the TAB committee report). Since Conference Records as a whole do not satisfy these criteria, their publication in the Transactions could reduce the appeal of the ATP and

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ISSUES (continued)

the need at INTERMAG for several parallel seminars, composed of many short papers, made in-depth discussions impossible. They suggested that a new conference be formed focusing each year on a narrow area, e.g. recording heads, and containing only 30-40 papers of substantial length. It would be held annually, except when the existing Conference on Magnetic Recording Materials (MRM) was scheduled.

The outline of the proposal was communicated to me and I asked Fred Hagedorn, our Conference Executive Committee Chairman, to take the matter under advisement. Reactions were also solicited from AdCom to give Fred some guidance. Most agreed the format was exciting and would support the Society's involvement if safeguards to protect INTERMAG could be established.

After intense negotiations characterized by good will and cooperation from both groups, a reasonable agreement, which will require approval by AdCom, has been reached. The conference will be organized under an Advisory Committee similar to M³ with S-MAG the sole financial sponsor. The recording centers will be co-sponsors and other sponsors will be added as appropriate. A constitution will be required and is being drafted. It is expected that the papers derived from the Conference will be published in the Transactions. The first conference will be held in the summer of 1990 in North America.

Several members have questioned the wisdom of supporting a new conference which may detract from INTERMAG and further dilute the volunteer base. It was our judgment that it will have a minor impact on INTERMAG, no greater than MRM. Furthermore, the conference was going to happen with or without our support. Our involvement allowed S-MAG to modify the form and timing of the conference to minimize its impact on INTERMAG and at the same time improve the overall quality of the technical communication in magnetics.

Hail and Farewell

Bill Doyle

CONFERENCE PAPERS (continued)

could possibly threaten the financial return from this lucrative service.

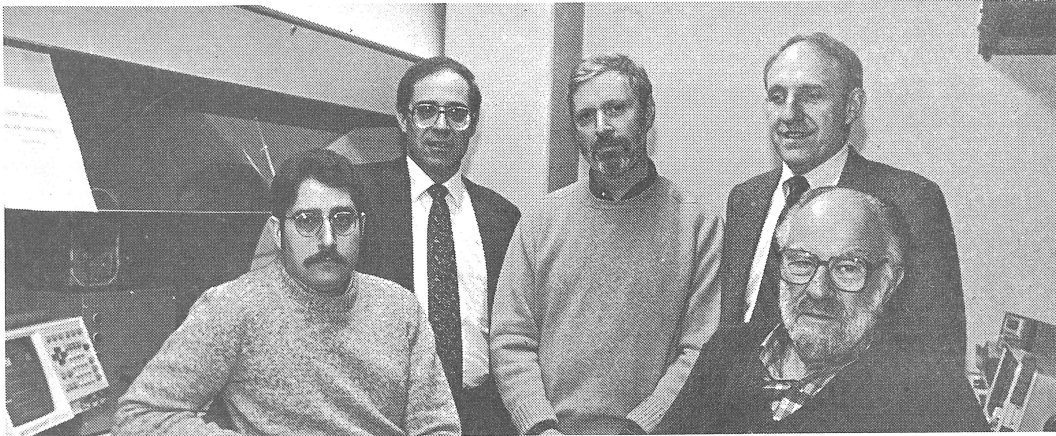
The Magnetics Society maintains that we do *not* publish Conference Records in our Transactions; we publish Conference Proceedings consisting of reviewed papers which are original, peer refereed and archival. Furthermore, those papers represent the latest work in the field of magnetics. As Bill Doyle pointed out at the TAB meeting in San Diego, the culture of the magnetics community is rooted in its two major conferences. INTERMAG and the Conference on Magnetism and Magnetic Materials have become the recognized forums for major advances in magnetics. Nevertheless, TAB feels that Conference Records and not our Transactions are the appropriate publication vehicle. Subscribers to the ATP wishing to learn the "cutting edge" in magnetics have been served quite well by the Transactions. There is an additional point with regard to the publication of refereed manuscripts in journals consisting solely of Conference Records. The prestige of papers which are original, peer refereed and archival is diminished when they appear in such journals. This is an important issue for those members whose professional advancement depends on publication in recognized, archival journals such as the Transactions.

These issues will be re-introduced by Richy Josephs at the next TAB meeting in February. If you have strong thoughts on these issues or additional arguments please write to:

Richy Josephs
220 Limestone Lane
Willow Grove, PA 19090

The IEEE Magnetics Society Newsletter is published quarterly by the Institute of Electrical and Electronics Engineers, Inc., 345 East 47th Street, New York, NY 10017. The objective of the Newsletter is to publicize activities, conferences, workshops, and other information of interest to the membership of the Society and technical people in the general area of applied magnetics. Copy should be sent to Dr. C. M. Perlov, Hewlett-Packard Labs, MS-2U, P.O. Box 10490, Palo Alto, CA 94303.

MAGNETICS IN THE DEPARTMENT OF ELECTRICAL ENGINEERING,
WASHINGTON UNIVERSITY, ST. LOUIS



Drs. Indeck, Spielman, Rosenbaum, Blaine and Muller

The Department of Electrical Engineering has had a program in magnetics for a number of years, and it is currently in the process of expanding the program in recognition of its scientific challenge, and of its increasing economic importance in information technology. The faculty involved in magnetics-related research are Jim Blaine, Marcel Muller, Fred Rosenbaum, and Barry Spielman, and they were joined in 1988 by Ron Indeck.

Jim Blaine is an affiliate professor in the department and a regular faculty member of the Department of Radiology in the University's School of Medicine. His education is in electrical engineering, and his chief concern has been the application of electrical engineering to biomedical problems. Storage technology will play a vital role in the future of radiology. The accelerating trend to digital imaging modalities and scientific visualization provides challenges in the areas of communication and storage networks. Jim has participated in developing an active program centered in the Electronic Radiology Laboratory of the Mallinckrodt Institute of Radiology, in collaboration with several industrial partners. The program focuses on the areas of display, transport, and storage system research, development, and evaluation.

Marcel Muller's work has emphasized micro-magnetics and its application to a wide variety of investigations. This has included studies of domain nucleation in magnetic ferrites and garnets, investigations of magnetocrystalline anisotropy and magnetoelastic properties, spin waves and ferromagnetic resonance, magneto-optics, and magnetic

device physics. More recently Marcel and his students have been doing research in magnetic recording technology in an NSF-sponsored project that involves a close collaboration with scientists and engineers at Hewlett-Packard Laboratories in Palo Alto. The students spend summers at HPL where they have access to specialized major equipment, and where, from contact with chemists, tribologists and mechanical engineers they can develop an appreciation for the interdisciplinary nature of their profession.

Fred Rosenbaum is a microwave specialist whose chief magnetics activity has been work on microwave ferrite devices, both phase shifters and circulators. Millimeter wave ferrite circulators have been an area of continuing interest. Most recently he has been working in the field of microwave packaging and its influence on component and circuit design. An Electronics Packaging Research Center has just been established at Washington University, devoted to the development of electromagnetic, mechanical, and thermal analysis tools for the simulation of package performance.

Barry Spielman, who also serves as Department Chairman, has a background in microwave devices and systems. His magnetics interest lies in the area of microwave superconductive electronics. This research is currently focusing on investigation of the kinetic-inductance effect in coupled transmission line structures. Barry's research is exploring the impact of this effect on "normal mode" characteristics with an eye toward exploiting these characteristics to advantage in a broad class of integrated-circuit compatible filter structures.

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WASHINGTON UNIVERSITY (continued)

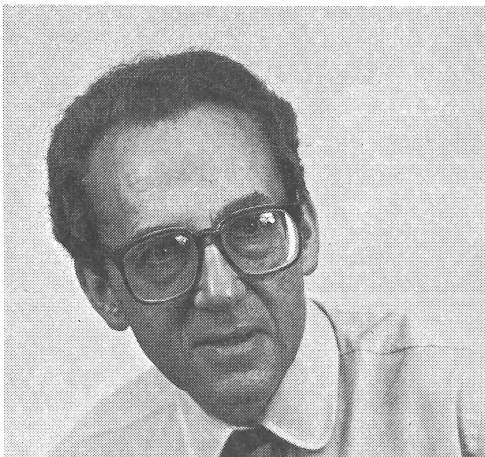
Ron Indeck earned his Ph.D. under Jack Judy at the University of Minnesota and came to Washington University from a year's NSF post-doctoral fellowship with Professor Iwasaki at Tohoku University. His research in magnetics has dealt primarily with the magnetic recording process and the recording transducer. His current work emphasizes high recording density in both longitudinal and perpendicular recording. He has developed a magnetoresistive gradiometer which shows promise as a read head for the extremely high densities now achievable in some media. At Washington University he is establishing a magnetics

research laboratory combining thin film facilities for the design, fabrication, and testing of novel transducers and a recording test station for study of the magnetic recording process. In addition to the experimental work, he is beginning a project to apply massively parallel processors to magnetics analysis.

The magneticians at Washington University are looking forward with pleasure and excitement to 1992. In April of that year, with Marcel as general chairman and Ron as local chairman, they will host their friends and colleagues at the first INTERMAG conference held in Saint Louis.

APPLIED SUPERCONDUCTIVITY AND THE MAGNETICS SOCIETY

Alex I. Braginski



Alex I. Braginski

The discoveries, in 1968-88, of superconductivity occurring at ever higher temperatures in various copper oxide compounds (cuprates) changed considerably the perception of this field by several IEEE organizations, including the Magnetism Society, and by the IEEE membership at large.* While the science of superconductivity is at the cutting edge of solid state physics, it can be argued that applications of superconductivity fit naturally into the sphere of technical interests and activities represented in the IEEE. Indeed, Transactions of several Societies such as Power Engineering, Electron Devices, Microwave Theory and Techniques and, last but not least, of the Magnetism Society (S-Mag) have been for quite some many years publishing papers on various topics of Applied Superconductivity. Specifically, the Proceedings

of the biannual Applied Superconductivity Conference, by far the most complete technical reference to the field, have been published in the IEEE Transactions on Magnetism since 1975 (March issues in odd years). In the 1970's the S-Mag also added a Technical Committee on Cryoengineering, an area which includes Applied Superconductivity (AS).

Until the recent breakthroughs, however, AS was enjoying the status of a cinderella within the community of electrical and electronic engineers. Among the reasons for this state of affairs the following are important:

- There is no firm boundary between the physics and technology of superconductivity. Both have been practiced more often by physicists, material scientists, metallurgists and mechanical engineers than by electrical or electronic engineers. AS can, indeed, be viewed as interdisciplinary.
- As a consequence of the above, most practitioners of AS did not belong to IEEE.
- The established U.S. industrial base was and remains minimal, limited largely to wire (conductor) and magnet manufacturing and a couple of very small producers of electronics.
- Curricula of most electrical engineering departments at universities and colleges did not explicitly include AS.

In the situation described above, the small AS community, active in the U.S., exhibited strong maverick tendencies by forming its own (today usually incorporated) conference organization. The most prominent became the Applied Superconductivity Conference (ASC) held in even years. Since 1974 it maintained a publication contract with the S-Mag, without being associated in any other way. In odd years, the Cryogenic Engineering Conference (CEC) and the International Cryogenic Materials Conference (ICMC) have been held jointly for the last 13 years. These latter two have a much stronger component of mechanical and metallurgical engineering than ASC. The same cast of AS characters, however, has been active on boards of all the three. The CED & ICMC proceedings have been published by Plenum Press as a book series "Advances in Cryogenic Engineering."

The advent of high temperature superconductors (HTS) resulted in excessive expectations of an imminent impact on electric power, transportation and electronics technology which will be felt overnight. Unfortunately, the public pronouncements by scientific gurus on the subject of technology exhibited an optimism inversely proportional to their knowledge of realities of engineering. Washington and state politicians stepped in, several trade organizations sprang up to make a "quick buck" in promoting the gospel of new opportunities and organizing innumerable pseudo-technical meetings, many venture capital companies were organized with less than a sound business plan as a base. Overall, the issue of superconductivity has been enjoying enormous publicity in the media and, unfortunately, acquired a political dimension.

In this climate, the IEEE Technical Activities Boards and S-Mag felt, by mid-1987, that they needed to do something to mark their presence and bring the AS community to the fold. In early 1988, both targeted the ASC by inviting this organization to join and accept their sponsorship.** Possibilities of eventually forming an IEEE Applied Superconductivity Society or an AS Council were evoked. Other suitors also appeared on the scene. In August 1988, the ASC Board rejected any association with trade organizations and formed a committee to draft recommendations for a future relationship with IEEE. The draft will be ready in Spring of 1989. It appears that the mating dance will be a prolonged one in view of the maverick

tradition described above. The prospect of ASC joining S-Mag is improbable and perhaps not even desirable because of the multidisciplinary aspect of AS. It is, indeed, possible that the first step will be for the ASC to be jointly co-sponsored by several IEEE Societies, as suggested by Bill Doyle (see footnote).

What then should S-Mag do until things sort themselves out? Very simply, support and encourage existing activities by maintaining the publication contract with ASC and a similar one with the International Magnet Conference. The AS category should be kept in the INTERMAG's call for papers. We could also show initiative in exploring the feasibility of publishing the CED & ICMC Proceedings in the Transactions. This would bring the bulk of all AS publications into one refereed IEEE periodical. The single most meaningful new action to take will be for the S-Mag members, who serve on university and college faculties, to promote courses and curricula which include applied superconductivity. New generations of EE's should be more aware and better prepared to tackle AS. Smaller desirable actions may include: a systematic listing of most important AS meetings and events in the Newsletter, sponsorship of special lectures (the 1988 Distinguished Lecturer Program indeed features AS), organization/sponsorship of special AS seminars or symposia, perhaps even a new scholarship, prize or award, if our finances permit it.

Personally, as the current chairman of the Cryoelectric Engineering Committee of S-Mag, I would like to solicit opinions and recommendations of concerned S-Mag members with respect to the usefulness and possible revitalization of the Committee. Since its inception it has been relatively inactive. Do you see for us a well defined mission which, thus far, was not recognized and left unaccomplished? Please, address your comments to the Newsletter.

* For a popular but relatively correct story on superconductivity (Karen Fitzgerald, "Facts vs Fancy") see IEEE Spectrum, May 1988, pp. 80-41.

** See "Issues" by Bill Doyle, in the September 1988 issue of the S-Mag Newsletter (Vol. 25, No. 2).

CARLETON A. BAYLESS ELECTED 1989 IEEE PRESIDENT-ELECT

Carleton A. Bayless, a telecommunications consultant in Foresthill, CA, has been elected 1989 President-Elect of the Institute of Electrical and Electronics Engineers, Inc. (IEEE). Mr. Bayless will serve as IEEE President-Elect during 1989, and will assume the office of Institute President on January 1, 1990. George F. Abbott, Director of Special Projects in Telecommunications at North Carolina State University, Raleigh, NC, was chosen IEEE 1989 Executive Vice President.

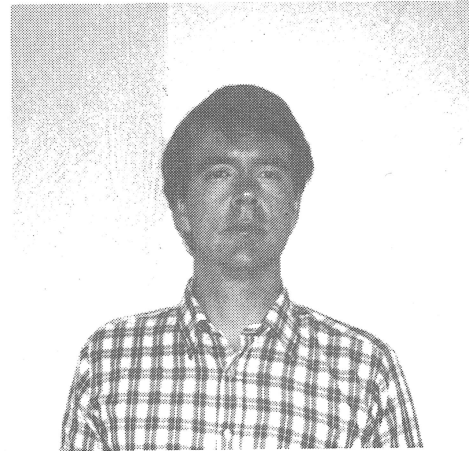
Of the 217,158 ballots which were mailed to IEEE voting members, 55,310 ballots were returned, or 25.0 percent. This compares with 26.1 percent in 1986 and 23.6 in 1984, the last years in which a similar combination of Institute, Region and Division elections were held. There were four candidates for the office of President-Elect - two nominated by the IEEE Board of Directors and two petition candidates - and three, Board-nominated candidates for Executive Vice President. Messrs. Bayless and Abbott were among those candidates nominated by the Board.

Mr. Bayless has been a member of the IEEE since 1952, and was named a Life Senior Member in 1988. He was 1986-87 Vice President of Professional Activities, and a member of the IEEE Board of Directors. Mr. Bayless has also served on the Finance Committee, *Spectrum/Institute* Advisory, Regional and Educational Activities Boards. A member of the IEEE Sacramento Section, IEEE Computer Society and IEEE Communications Society, he also served as IEEE representative to the American Association of Engineering Societies.

Mr. Abbott joined the IEEE in 1956, and was named a Senior Member in 1974. He was elected Director of Region 3 (Southeastern United States) for 1986-87, and concurrently served on the IEEE Board of Directors. His Institute activities have included membership on the Regional, Educational, and United States Activities Boards; and he was 1988 National Professional Activities Council for Engineers (PACE) and Chairman for the United States Activities Board. Mr. Abbott was Chairman of the IEEE North Carolina Council, is a member of the IEEE Communications and IEEE Computer Societies, and currently serves on the SOUTHCON Board of Directors.

BRIDGING THE USER/COMPUTER GAP IN ELECTROMAGNETIC COMPUTER-AIDED ENGINEERING

T. M. Cameron



T. M. Cameron

While computer-aided engineering (CAE) has been a buzzword in the engineering community for several years, a great deal of magnetics engineering is still performed without the aid of these powerful design tools. Two reasons for this are: 1. CAE products have often been difficult to use so that time saved in performing computations is taken up in learning and using the CAE product, and 2. practical applications frequently require analysis procedures beyond available CAE capabilities or computer power not available to most engineers.

The difficulty in applying CAE to practical magnetics design problems is illustrated by the burdensome data preparation and analysis required in the early days of finite element analysis (FEA). The complexity of preparing the input data and interpreting the voluminous output frustrated and intimidated many engineers. Furthermore, many magnetic designs involve three-dimensional effects or require hysteresis models that were not represented well in early CAE tools. This gap between the promise of magnetic CAE and the needs of practicing engineers has turned off many engineers to the use of these methods.

Fortunately, however, new CAE products provide several advances that ease this burden. Among the more salient features available for simplifying FEA are:

- Interactive, menu-driven, graphical "sketchpads" that allow devices to be drawn on the computer as they would be drawn on paper.

- Automatic mesh generation. The "mesh" is a series of connecting line segments that divides a problem into the smaller pieces, the "elements," for the finite element solution.
- Automatic prompting for material properties. The engineer does not need to search for superfluous data if the program prompts only for the information it needs.
- A problem oriented "calculator" that lets the user take the solution and calculate other quantities of interest. In magnetics problems, for example, forces and torques, the system inductance matrix, etc. may be obtained from the vector potential calculated by FEA.
- Automatic, menu-driven plotting of the solution and quantities derived from the solution.

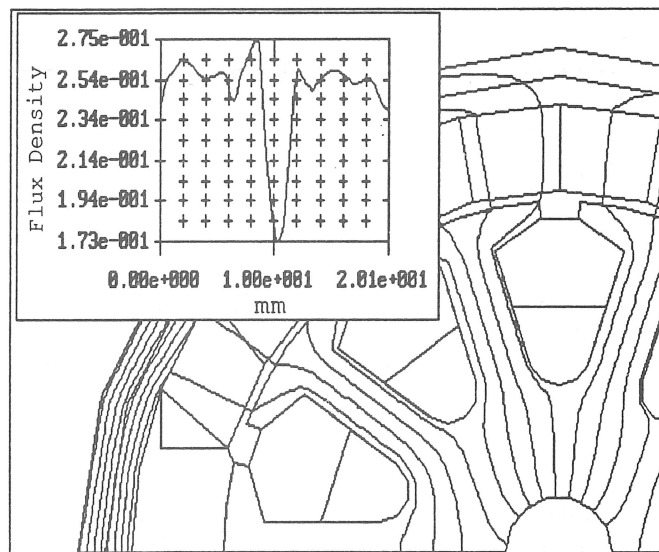
For example, in the Ansoft CAE program Maxwell™, automatic mesh generation is provided using the optimal Delaunay algorithm which yields the highest possible accuracy for a given number of elements. Post-processing in Maxwell™ is performed using interactive computer graphics. Plots such as those in the figure are easily generated by selecting commands from a menu. Advanced features like these make FEA easy to use and have created a surge of interest in magnetic CAE.

The other user/computer gap in CAE has been the limitation in the problems that may be solved. Different applications involving different field equations and constitute laws require different finite element solution procedures. The class of problems that may be solved by FEA is constantly expanding. Classes of problems that may be solved at present include electrostatics and magnetostatics, eddy currents, and microwave problems. Solid modeling and automatic 3-D mesh generation now make 3-D analysis almost as easy as 2-D analysis. And advances in optimization methods have the potential to automate component and device design procedures in the near future with design optimization software that requires little additional effort on the part of the design engineer.

Advances are also being made in the accuracy and efficiency of FEA. "Transfinite" elements improve both the accuracy and efficiency of solutions of unbounded magnetics problems by combining the advantages of analytical and numerical procedures. Another recent development is the invention of "tangential" elements that eliminate the unstable solutions that have plagued eddy cur-

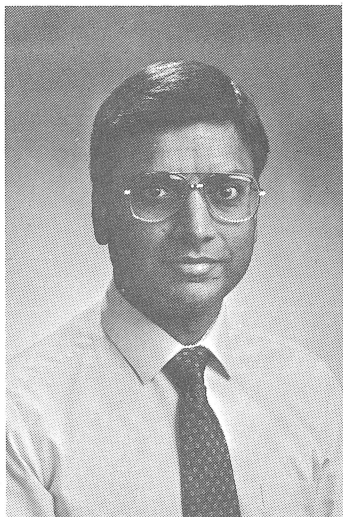
rent and microwave FEA for years. Theoretical and numerical advances such as these, and the increasing power of inexpensive personal computers, allows large and complex problems to be solved accurately, efficiently, and affordably.

To satisfy the needs of design engineers finite element CAE must: 1. automate tedious computations, allowing engineers to concentrate on their creative functions, and 2. provide accurate numerical solutions to complicated analytical problems, thereby improving the engineer's knowledge of product performance and improving product quality without costly, time-consuming experiments. Recent progress in these areas has provided CAE tools that are quick, easy to use, and that can solve difficult real world problems. These advances, combined with the low price of personal computers, have brought CAE within the reach of any engineer. Progress in the coming years will be rapid as more design engineers enter the CAE design cycle, make use of the available CAE tools, and inform developers of the features they want and need.



Section of a permanent magnet dc motor with equipotential lines (main window). Graph of magnetic flux density in the air gap between the stator and rotor as a function of circumferential position (upper left inset).

NEW CHAPTER'S CHAIRMAN



Harry Gill

Dr. H. S. (Harry) Gill of Hewlett-Packard has been appointed chairman of chapter's organization for the Magnetics Society.

He is making up the council of chapter chairpersons. The first meeting of this council will take place during the INTERMAG conference this March. The basic purpose of this meeting will be to exchange the experience of each chapter chairperson and bring out issues and problems chapters are facing. He will present the recommendations and summary of chapter chairpersons concerns to Magnetics Society AdCom. Please contact him at 415-857-5251 if you want to make suggestions.

Dr. Gill received his Ph.D. from the University of Minnesota, Minneapolis, in 1978. His research work has been in Magneto-optics, Amorphous thin film, Magnetic Bubble devices, Thin film recording media and Magnetic recording heads. Currently, he is a project manager at Hewlett-Packard Laboratories responsible for design and development of magnetic recording heads for rigid disk drives.

He is the past chairman of Santa Clara Valley Magnetics Society chapter and founder co-chairman of the Systems Design and Networks conference (SDNC) to be held in the Bay Area in April 1988.

BOOK REVIEW

Magnetism and Magnetic Materials, J. P. Jakubovics, The Institute of Metals, 1 Carlton House Terrace, London SW1Y 5DB, 138 pages.

This book is intended as a supplement for an undergraduate E&M course. Most of the descriptions and discussions in the book are of a qualitative nature. The emphasis is on gaining understanding and insight to the underlying principles of magnetism rather than on presenting tools for detailed description of magnetic phenomena. Following a brief introduction, the book goes on to discuss the origins of magnetism and the classification of materials. Elementary theories of paramagnets, ferromagnets and ferrimagnets are presented and contrasted. The next section of the book presents the behavior and theory of domain walls and magnetostriction. Also included in this section is a summary of experimental measurement methods for magnetic properties, including domain wall observation. The last section of the book covers soft and hard magnetic materials and their practical applications. This includes discussions on transformers, magnetic recording and powder magnets.

This book covers a great many topics and the author does not intend it to be a self-contained source of information. Rather it is an introduction to magnetism, explained from first principles for those unfamiliar with the subject.

NEW IEEE EMPLOYMENT REGISTRY

The IEEE United States Activities Employment Assistance Committee has implemented a third employment registry. The Graduating Engineers Employment Registry is a non-confidential, computerized data base of credentials of a graduating student members who are looking for their first engineering jobs. Employers search the registry for credentials that match their needs.

Like the Professional Engineering Employment Registry (PEER) and the Self-Employed Engineers Registry (SEER), GEER is monitored, operated and sponsored by IEEE. It is offered free for use by IEEE student members. For information or a registration form, contact your Student Branch or the GEER Service Center, 138 Old River Road, Andover, Massachusetts, 01810, Telephone (508) 683-0098.

**THE I.U.P.A.P. COMMISSION ON
MAGNETISM HAS ESTABLISHED THE
ICM AWARD IN MAGNETISM**

This award will consist of a medal to be presented at the triennial International Conference on Magnetism (ICM), at which the recipient will be invited to give a plenary talk.

The award will be made in recognition of outstanding contributions to fundamental or applied magnetism over the previous five years.

All members of the magnetism community are invited to nominate candidates for this award. Please keep in mind that the awards committee may not be familiar with an individual's accomplishments, so please provide details. Nominations for the award to be presented at the 1991 ICM in Edinburgh should be sent to one of the following before August 31, 1990:

Jacques Friedel
Laboratoire de Physique des Solides, Bat, 510
U.P.S., 91405 Orsay, France

Robert M. White
Control Data Corporation
8100 34th Avenue South
Minneapolis, MN 55440 USA

Tory Moriya
Institute for Solid State Physics
University of Tokyo
Roppongi, Minato-ku
Tokyo 106, Japan

T. J. Hicks
Monash University
Department of Physics
Clayton 3168, Australia

S. V. Vonsovsky
Institute of Metallurgical Physics
Ural Division of the Academy of Science
Sverdlovsk, USSR

AWARD NOMINATIONS ARE SOUGHT

The Magnetics society is seeking nominations for the Information Storage Award. For information and nominations contact:

Professor F. J. Friedlaender
School of Electrical Engineering
Purdue University
West Lafayette, IN 47907

**NSF TO SPONSOR
RESEARCH VISITS TO JAPAN**

For information, including application forms, contact the NSF at the following address:

Division of International Programs
National Science Foundation
Washington, D.C. 20550

ATTN: Japan Initiative

Telephone: (202) 357-9558
Electronic Mail: cwallace@note.nsf.gov

**JAPAN-U.S. INFORMATION
TECHNOLOGY CONFERENCE**

On March 1-3, the University of Alabama will host a Japan-US Information Technology Conference. The theme of this conference will be the future of the technology as it relates to major sectors of industry as well as to research in both the academic and industrial sectors. Industries represented at the conference will include chemical, steel, automobile, and manufacturing. The keynote speaker for the conference will be Dr. Mark Kryder, Director of the Magnetics Technology Center at Carnegie-Mellon University. The conference will feature two evening receptions at which the invited speakers are Japanese Ambassador Nobuo Matsunaga and US Secretary of Commerce, William Verity.

Leading representatives of industries from the US and Japan will be key speakers at the conference. These include from Japan, Makoto Kikuchi (Sony Corporation); Kazuo Yoshida (Mitsubishi Kasei); Kazuyoshi Kobayashi (Kanto Steel), and Yasutsugu Takeda (Hitachi). Senior representatives of US industry include Louis B. Campbell (General Motors Corporation), Marvin L. Mann (IBM Corporation), Marvin Runyon (Tennessee Valley Authority), and William D. Doyle of Kodak have been invited. Dr. Eleanor Westney will represent the MIT Science and Technology Program.

Further information and registration materials for the conference can be obtained by writing to Dr. Chester Alexander, University of Alabama, Box 870324, Tuscaloosa, AL 35487-0324, or calling (205) 348-3780, FAX (205) 348-5051.

EMMA '89

The aim of the EMMA '89 Conference, which is intended to be the third of the series after Grenoble '85 and Salford '87, is to make the most of European Research in the field of fabrication, application and basic characteristics of technical magnetic materials. Such a purpose should be reached through the widest possible confrontation with work around the world in this field. Thus EMMA '89 should provide a worldwide forum for the presentation and dissemination of the most recent developments and results achieved on the subject. In this particular year, there is a crossover with the 4th MRM conference, which has been traditionally held in Italy. Therefore the advisory international committees of both conferences agreed to have one-day overlap on topics of common interest. Both the conferences will be held in Rimini (Italy) from September 4 through 6 (MRM) and 6 through 9 (EMMA) 1989.

Technical Contents

Permanent magnets and applications
 Magnetic anisotropy and magnetostriction
 Coercivity and magnetic reversal mechanisms
 Magnetic transitions
 Magnetic structures
 Magnetic thin films and surfaces
 Fine particles
 Amorphous materials
 Magneto-optical materials
 Recording heads
 Magnetic insulators
 Magnetic semiconductors
 Magnetic separation
 Magnetic field computation
 Magnetic levitation
 Microwave materials and applications
 Soft magnetic materials and applications
 Magnetic measurements techniques
 Magnetic measurements on high T_c superconductors
 Biomagnetism
 Molecular magnetism

General Inquiries:

Dr. L. Pareti
 Local Chairman EMMA '89
 ISTITUTO MASPEC
 Via Chiavari, 18/A
 43100 Parma, ITALY
 Phone 521-95811

**MATERIALS RESEARCH SOCIETY
 1989 SPRING MEETING, SAN DIEGO, CA
 APRIL 24 - 29, 1989**

Symposium G: Growth, Characterization and Properties of Ultrathin Magnetic Films and Multilayers

This symposium highlights magnetic thin films and multilayers that represent a class of solid state structures which are of interest both from a fundamental point of view and because of their potential device applications. This new symposium will highlight recent experimental and theoretical advances in this area of materials research. Emphasis will be placed on the rapidly growing fields of surface/interface magnetism, magnetic thin film and multilayer structures and diluted magnetic semiconductors. Methods to evaluate their growth, lattice structure and film integrity will be presented. New opportunities for characterization of these magnetic layers have been provided by the development of spin-polarized electron spectroscopies, and recent progress in this field will be discussed. Work on classical magnetic, optical and transport phenomena will be presented, along with structural characterization techniques utilizing synchrotron x-ray studies. The symposium will also emphasize theoretical aspects of low-dimensional magnetism, spin-resolved band structure calculations and metastable phases. The properties of diluted magnetic semiconductors will be reviewed, and new developments in this area will be highlighted, particularly new materials and multilayer structures.

Contributed papers are solicited in, but not limited to, the following areas:

Magnetic Semiconductors: growth, characterization and properties
 Spin polarized electron spectroscopy studies of magnetic layers
 Metastable magnetic phases
 Low-dimensional magnetism: monolayers and superlattices
 Synchrotron radiation studies: structure and magnetic scattering
 In-situ studies of growth, structure and magnetic properties of metal layers
 Submit the original copy and three photocopies

to:

Ernesto E. Marinero
 IBM Almaden Research Center
 650 Harry Road
 San Jose, CA 95120-6099
 408 927-2016

CONFERENCE CALENDAR

5th International Conference on Ferrites, January 10-13, 1989, Bombay, India. Contact C. M. Srivastava (convener, ICF5), Head ACRE, I.I.T., Bombay 40076 India.

2nd International Symposium on Trends and New Applications in Thin Films, February 27-March 3, 1989, Regensburg, Fed. Rep. Germany. Contact Dr. H. Hoffmann, Universitat Regensburg, Inst. fur Angewandte Physik, 8400 Regensburg, Fed. Rep. Germany.

Japan-US Information Technology Conference, March 1-3, 1989, University of Alabama. For information and contact see page 9.

"International Symposium on Magnetoelasticity and Electronic Structure of Transition Metals, Alloys and Films" March 20-22, 1989, Contact IOSMES '89, Dr. M. Acet, Universitat Duisburg, Postfach 10 15 03, D-4100 Duisburg 1, West Germany

INTERMAG Conference, March 28-31, 1989 Mayflower Hotel, Washington DC. Contact Courtesy Associates, Inc., 655 15th St. NW, Suite 300, Washington, DC 20005.

7th International Seminar on Magnetism, April 3-7, 1989 at Dohma near Dresden, GDR. Contact Prof. K. J. Strnat, Magnetism Lab, KL-365, University of Dayton, Dayton, OH 45469.

Materials Research Society Meeting, April 24-29, 1989, San Diego, CA. For information and contact see page 10.

10th International Workshop on Rare-Earth Magnets and Their Applications, May 17-19, 1989, International Conference Hall, Kyoto, Japan. Contact Dr. K. Elk, Hochschule fur Verkehrswesen, Wissenschaftsbereich Physik, Postfach 103, DDR-8072 Dresden.

20th Power Electronics Specialists Conference; June 26-29, 1989, Pfister Hotel, Milwaukee, WI. Contact Prof. Tim Lipo, ECE Dept., University of Wisconsin-Madison, 1415 Johnson Drive, Madison, WI 53706.

International Perpendicular Magnetic Recording Conference '89, August 29-31, 1989, New Takanawa Prince Hotel, Tokyo, Japan. Contact Prof. Masahiko Naoe, Dept. of Physical Electronics, Tokyo Institute of Technology, 2-12-1 O-Okayama, Meguro-Ku Tokyo 152, JAPAN.

5th International Conference on Magnetic Fluids, September 1989 Riga, Latvia (USSR). Contact Professor E. Blums, Institute of Physics, Latvian SSR Academy of Sciences, 229021 Riga, Salaspils, USSR. Cable: Riga Atom USSR, Telephone 947188 (Riga)

7th COMPUMAG Conference on the Computation of Electromagnetic Fields, September 3-7, 1989, Tokyo, Japan. Contact Compumag Secretariat, Nuclear Engineering Research Lab The Faculty of Engineering, The University of Tokyo. Tokai, Ibaraki, 319-11, JAPAN.

EMMA '89, September 4-6 (MRM) and 6-9 (EMMA), Rimini, ITALY. For information and contact see page 10.

34th Conference on Magnetism and Magnetic Materials, November 28-December 1, 1989 Sheraton Hotel, Boston, MA.

INTERMAG Conference, April 16-20, 1990 Metropole Hotel, Brighton, UK.

35th Magnetism and Magnetic Materials Conference, October 29-November 2, 1990 Town and Country Hotel, San Diego, CA.

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