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Newsletter of IEEE Victorian Section

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IN THIS ISSUE...

<i>Chairman's Report</i>	1
<i>Surface Acoustic Wave Devices</i>	2
<i>Recent Progress in Numerical Analysis of Magnetic Fields</i>	2
<i>EMATH Formula Calculator - Software Review</i>	3
<i>University-Industry Partnership Talk</i>	3
<i>Proposal for a Power Electronics Chapter</i>	3
<i>Annual General Meeting - Victorian Section</i>	3
<i>Introducing Two of Your Committee Members</i>	4
<i>Victorian Section Committee & Chapters</i>	4

CHAIRMAN'S REPORT

In February, 1995, the Executive Committee of IEEE Region 10 will meet in Phuket Island, Thailand.

This information is not provided so that readers can grind their teeth at the opulent lifestyle of ExCom members. (In fact, we are likely to have our noses kept to the grindstone for the whole of our visit, with little opportunity for relaxation). Rather, I want to emphasise again that the IEEE, for all its imperfections, is a very dynamic organisation by any measure. IEEE officers at all levels try very hard to fulfil their obligations to the membership. This includes, but is not limited to, the maintenance of high technical and ethical standards, and helping to implement the globalisation policy which has become a cornerstone of IEEE corporate strategy.

You, the members at large, can contribute to this process in a myriad of ways. We want to know what you think about the many issues which today face the EE profession, and the IEEE in particular. We want to know how IEEE Victorian Section and IEEE Region 10 can serve you better. We want to know how the IEEE, as a unique trans-national organisation and learned society, can better contribute to the best in Australia. To the extent that our national goals and aspirations are unselfish, mature and outward looking, the IEEE has a valuable role to play. Notionally, at least, this could become much more evident than hitherto. Cooperative multinational research; advanced tele-conferences; more effective continuing education for professional engineers; volunteer HELP services for remote areas; new approaches to the hard issues of technology-in-society. These are a few of the possible roles for the IEEE which might be considered.

Do you, our readers, have any ideas? Whether on such issues of long-term strategy or your immediate concerns, we very much want to hear from you so we can better represent you. Please let us have your thoughts, either conveyed directly to myself, or to another Section Officer.

On another matter of representative action the Annual General Meeting of IEEE Victorian Section will be held on 8th December, 1994, in the Department of Electrical and Electronics Engineering, University of Melbourne (full details elsewhere in this issue). I would strongly urge members to attend this meeting to hear the reports presented and to contribute to any ensuing discussion, and, of course, to cast votes at any elections held for section office bearers (depending on the number of nomination received). A light lunch (at individual expense) will be available at a nearby venue after the meeting.

This is my final report as Section Chairman, and I convey my best wishes to my successor as Chairman, and to the other Section Officers for the coming year.

A very Merry Christmas and a Happy 1995 to all IEEE members in Victoria and Tasmania.

Tony Gascoigne, Section Chairman

SURFACE ACOUSTIC WAVE DEVICES

Prof Eric Adler, McGill University, Montreal, Canada presented a lunch time lecture at the RMIT University Glasshouse Theatre on the 28th of September. Adler is a fellow of the IEEE and is a distinguished lecturer of the Ultrasonics, Ferroelectrics and Frequency Control Society (UFFC) so this lecture provided the ideal opportunity to elevate the status of this society which has very small representation in Victoria. Adler has been with McGill University since 1959 and his primary research interests are Surface Acoustic Wave (SAW) technology, bulk acoustic propagation in anisotropic piezoelectric materials, thin film transducers and modeling surface wave devices.

The audience of about 30 were treated to an hour lecture which highlighted areas and applications where SAW devices have, and could play an important role in consumer electronics and personal communications. To his benefit Adler concentrated on the outcomes of using the devices and their direct application. Much of the important work had been undertaken overseas where large manufacturing scale activities could reap the economic advantages from using SAW devices. He pointed to the upper frequency limits and large scale integration with other functional electronic units as the current issues to be addressed.

The detail of Adler's lecture explained the physics, performance of commercial devices compared with more

conventional devices and was appropriately supported with overhead slides showing the physical arrangement of the devices, materials used, circuit arrangements and performance measurements.

It was indicated that SAW filters were extremely small, stable and robust, tuning designed in, reproducible, low cost in large volumes and mostly single lead technology. They had found applications as bandpass filters, pulse compression (chirp) filters, fixed and programmable matched filters, transform processors, narrowband resonator filters, resonator based oscillators, sensors and low loss uhf filters.

Some of the areas of impact with varying maturity of impact included TV, CATV, Satellite, Mobile Phones & pagers, Resonators and low loss filters up to 4GHz (expected to be up to 10GHz).

For anyone with a need for further information it was indicated that the September '93 issue of UFFC Transactions provided a comprehensive overview of consumer applications.

A closing vote of thanks was provided by RMIT's Professor Alan Bradley and the IEEE thanks the RMIT Electronics & Communications Dept. for permission to use the Glasshouse Theatre.

Harry McDonald

RECENT PROGRESS IN NUMERICAL ANALYSIS OF MAGNETIC FIELDS

Prof Takayoshi Nakata, Okayama University, Japan presented a lunchtime lecture sponsored jointly by the IEEE Communications & Power Societies, Applied Computational Electromagnetics Society (ACES) and Testing of Electromagnetic Analysis Methods (TEAM) in the Monash House auditorium on the 29th of September.

Nakata is a fellow of the IEEE and has published extensively, having written a number of books on finite element analysis and electrical engineering software. He worked in industry from 1953 to 1962 at Fuji Electrical Manufacturing Company and his major interests are the electrical and magnetic characteristics of transformers, iron losses due to distorted fluxes, application of the 3-D finite element method to electric machines & electronic instruments, and standard methods to measure the characteristics of magnetic materials.

The talk examined advances in computing methods and the techniques for verifying the codes. The focus of the lecture was on the efforts of TEAM in applying these methods in the power industry in such areas as the optimal design of electric machines and electronic equipment.

TEAM started in 1985 as a means of aiding in the development and validation of 3-D eddy current codes and was later expanded to include other aspects of electromagnetic field computations. The main purpose of TEAM had been to develop meaningful problems that users and developers can use to verify and compare codes. TEAM workshops organised in rounds lasting about two years incorporating a COMPUMAG conference had been successful in achieving this.

The audience of about 20 represented both the power and the telecommunications interests, and it was pleasant for the disciplines to find an area of common interest. From the audience reaction and support there could be future justification for an Australian TEAM workshop. From a power perspective there is a need to undertake stronger practical analysis of electromagnetic fields in more compact substation arrangements.

Tony Fleming of ACES introduced Prof Nakata and Harry McDonald of the Power Chapter provided the vote of thanks.

Harry McDonald

EMATH FORMULA CALCULATOR - SOFTWARE REVIEW

EMATH is in essence a menu driven programmed calculator and library on a disk, running under DOS on IBM compatibles. It is described as a formula calculator for electrical and electronic engineering and related design applications. There is a strong slant towards power electronics, mainly switch mode power converters, with categories of equations such as: buck, boost, flyback, forward, half and full bridge, and push-pull topologies. Also included are power RF applications: transmission lines, pulse forming networks, radar, and antennas. Despite this power bias, it has great utility for other analog design applications via equations relating to RLC circuits, magnetics, wave shapes, passive and active filters, thermal considerations, semiconductors, and ICs.

After installation, typically onto a hard disk (it needs about 1.3MB), on starting, one is presented with a full screen menu divided into two halves. The left side lists the nineteen categories of equations available, while the right side lists the specific equations (up to twenty of them) under the category listed on the left hand side. There are 318 equations chosen from 52 text books, data books, application notes, and papers. The known parameters are typed in and the equation is solved for the unknown. Each equation can be rotated (transposed) to solve for any parameter. The equation description, up to 60 characters of

user entered text, the equation, the known parameters, and the answer, all with units, can be printed out. Extensive help, as appropriate, is readily available for each equation: detailed explanation, further relevant equations, waveform graphs, circuit diagrams, mechanical diagrams, tables of information, and full details of the reference used including page numbers.

I found it remarkably easy to start up and use first time. It contains an enormous amount of material in one package, and has saved me a lot of time and energy in several design projects, doing away with locating and finding the relevant information and then programming to work out the required answers to start a simulation or breadboard. On the down side, some categories do not go as far as one may wish, and the concept of this program could be extended further and into other areas. However, for a mere \$30 US plus post and deliver, I have found the present version to be a valuable asset.

EMATH PRO is produced by PROTECH, 5074 Pine Tree Terrace, Campbell, CA 95008, USA, phone (408) 378 421. My copy came from Bloom Associates Inc., Educational Division, 115 Duran Drive, San Rafael, CA 94903-2317, USA, phone (415) 492 8443, fax (415) 492 1239. **Doug Purton**

University-Industry Partnership Talk

On **Monday, 5 December 1994, at Monash University, Clayton Campus**, three Speakers will discuss issues in the development and operation of Electrical Power Centres with strong links to industry:

Professor Owen Farish, Director, Centre for Electrical Power Engineering, University of Strathclyde UK

Professor Bill Bonwick, Director, Centre for Electrical Power Engineering, Monash University

Associate Professor Peter Wallace, Associate Director, Centre for Electrical Power Engineering, Monash University

Time: 5.30 pm - Refreshments
6.00 - 7.30 pm - Meeting
Venue: Engineering Lecture Theatre E1

Professor Farish and Professor Bonwick will both present outlines of the development and operation of their respective Centres with some discussion on operational issues and the future. Associate Professor Wallace will discuss university - industry relationships.

Proposal for a Power Electronics Chapter

Power Electronics has become a major technological force in electro-technology in recent decades. This has been due mainly to the development of faster and more easily controlled semiconductor switches, and improved control methods, including microprocessors. Concerns over improved efficiency and better use of materials have been important too. Developments have grown dramatically to include such diverse applications as high voltage DC power transmission, motor controls in industry (and trains, trams, electric cars, robotics, etc.), inverters in un-interruptible remote power supplies and electronic lighting, power amplifiers and modulators, to the ubiquitous power supply functions required by all electronic equipment.

Members are invited to express interest in the inauguration of a Victorian Power Electronics Society Chapter and related activities. Please contact

Doug Purton.

ANNUAL GENERAL MEETING - VICTORIAN SECTION

The Annual General Meeting of the IEEE Victorian Section will be held at 12 noon on Thursday, 8th December, 1994. Venue: 3rd Floor Boardroom, Dept. of Electrical & Electronics Engineering, University of Mel-

bourne, Grattan Street Parkville (enter by main gate in Grattan Street). All IEEE members of all grades are cordially invited to attend.

Tony Gascoigne

INTRODUCING TWO OF YOUR COMMITTEE MEMBERS

Dr. Rod Waterhouse

Rod Waterhouse is a lecturer in the Department of Communications and Electronic Engineering at the Royal Melbourne Institute of Technology.



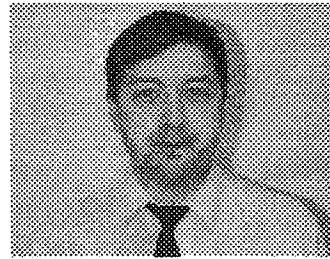
He received his Bachelor of Electrical Engineering (Hons.) and Masters of Engineering Science (Research) from the Department of Electrical and Computer Engineering, University of Queensland in 1987 and 1990 respectively. Recently, he completed his PhD from the same institution.

From 1988 to 1990, he worked in collaboration with the Defence Science and Technology Organisation, South Australia, on the development of millimetre-wave detectors and measurement Systems. Throughout his PhD studies he worked with and was sponsored by Mitec Ltd, Queensland, developing accurate modelling techniques for predicting the performance of micro-strip patch antennas.

His research interests include electromagnetic modelling of planar antennas, hybrid numerical modelling techniques, phased arrays, design of antennas suitable for mobile communication systems, optical-micro-wave interactive systems and optically distributed micro-cellular systems.

Harry McDonald

Harry has participated in various activities of the IEEE Committee since 1985 including the Power Chapter chair, Membership Development Co-



ordinator and Victorian Section Vice-Chair. His interest in the IEEE was stimulated initially whilst undertaking literature research as an undergraduate and the feedback he has received in his membership development role suggests to him that high quality publications are still the predominant attraction for membership.

All of Harry's working life (20 years) has been spent in the Melbourne City electrical distribution business. After 103 years of operation, the Melbourne Electricity utility recently merged to join Citipower as part of Victoria's Electrical reforms.

Harry's work-role has included planning, design, construction and maintenance of the electrical distribution network and its components. His professional interests are closely connected to his work. Protection systems and performance of plant feature highly in his technical reading.

His private passions include his wife and two daughters, experimental cooking with unsuspecting dinner guests, international soccer (watching not playing), listening to 60's and 70's British music and good jokes.

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