



# AMPERE NEWSLETTER

A newsletter devoted to RF & MW heating in the range 1 MHz to 20 GHz Issue 33 ISSN 1361-8598 June 2002

## AMPERE MOVES TOWARDS A NON-PROFIT COMPANY STATUS

by Ricky Metaxas

As you are aware AMPERE is an organisation devoted to the promotion of microwaves and radio frequencies in industry commerce and the domestic field. There have been eight major conferences in Europe relating to this field: Cambridge (1986); Arnhem (1989); Nice (1991); Gothenburg (1993); Cambridge (1995), Fermo (1997), Valencia (1999) and Bayreuth (2001). Apart from the biennial conference the AMPERE Committee, now enlarged to twelve members including the President, meets a couple of times a year in various European locations to discuss items relevant to the Association.

When I took over as President in September 1995 following the conference at Cambridge, I was under the impression that the Association had been registered in France following its formation in 1992. Unfortunately, this was not the case and when this was discussed at our recent Committee meetings it was felt that the prudent way forward would be to formalize the status of AMPERE. I consulted some lawyers in the UK as to the best and cheapest way to do this and the advice I was given was to register AMPERE as a non-profit making English company limited by guarantee. This is a corporate entity, where the members agree to contribute a nominal sum (say 2 Euros) in the event of its insolvency. It is one of the normal structures for non-profit making ventures in the UK. Its personality, status, rights etc, will be recognized throughout the EU and beyond. In consulting our Committee members further it transpires that it will also be cheaper to do so in the UK rather than Europe. The company would be registered with a firm of lawyers in Cambridge as it would be necessary to have a plaque attached outside permanently displaying the name of AMPERE. thus

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## Editor's Comment

This issue puts forward the case for AMPERE attaining a formal legal status by becoming a non-profit company limited by guarantee. To that effect a short article as well as two draft documents are included, the Articles and Memorandum, which basically set forth the rules by which AMPERE will be governed assuming this goes through. Please browse through these two documents and e-mail me, or indeed any other Committee member, any comments you wish to make. Such feedback will be taken into consideration by the Committee before it takes the final decision whether to proceed with this or not.

I am delighted that Yoshio Nikawa from the Kokushikan University in Japan accepted my invitation to write a brief resume on their meeting, "Symposium on Microwave Effects and applications", which was held last year in Tokyo. A parallel exhibition and poster session were also in place showing examples of recent work in the field of microwave and RF heating.

This issue also includes an article by Vadim Yacovlev from WPI in the USA on a meeting held earlier this year in Toulouse regarding some aspects of microwave simulations using numerical techniques.

Finally profuse thanks to Cristina Leonelli and José Catalá for their magnificent effort in submitting the Expression of Interest (EoI) application on time. This is part of the 6th Framework Programme of the European Community for research, technological development and demonstration activities. As members are aware this is now placed on our web site for perusal.

Ricky Metaxas  
St John's College  
University of Cambridge

# Electromagnetic Analysts meet in Toulouse

by Vadim Yakovlev, IMMG, WPI, Worcester, MA USA



The city of Toulouse

The continuous increase in the quality of modelling and the decrease in computer hardware costs have recently caused a notable growth of the use of advanced computer simulations in designing wireless telecommunication equipment, computer systems, and networking. A major result is the renewed interest in modelling and simulations among engineers and practitioners dealing with *non-communication* microwave applications. Responding to this interest, in the last several years, a number of researchers in academia and industry worldwide have been working on a variety of approaches to modelling of microwave heating. Although every major conference in microwave and RF processing (AMPERE Conferences, IMPI Symposia, World Congresses, and others) has modelling sessions in its program, it appears that analysts working in this area do not have enough opportunities for practical meetings with colleagues where various special and technical topics could be discussed.

One of such meetings, a Mini-Symposium (MS) entitled "Progress in Modelling of Microwave Heating" was held in **Toulouse**, France, on March 6-8, 2002. It was organized by the Industrial Microwave Modelling Group (IMMG) of Worcester Polytechnic Institute (WPI), Worcester, Massachusetts as a part of the European Symposium in Numerical Methods in Electromagnetics (abbreviated JEE'02 after its original French title). The Symposium in essence was set up as a forum for professionals specialising in mathematical issues in electromagnetism. The location for holding JEE'02 was doubly appropriate. Mathematics has been highly regarded in Toulouse since the first half of XVII century when one of the noblest mathematicians of all times, **Pierre de Fermat**, worked

in the city parliament and later held the highest position at the criminal court. The study of electromagnetism is a prominent feature of the latest era. Surrounded by facilities of major high-tech companies (**Airbus** and CNES to name just two),



Pierre de Fermat

that extensively employ a variety of electromagnetic applications, Toulouse has a high concentration of corresponding expertise. Indeed, out of about 130 registrants from 17 countries, more than a quarter of JEE'02 attendants were from local companies and organisations.



Prototype of the Airbus A340-500

ONERA, CERFACS, SEE, INRIA, SMAI and other respectable French institutions sponsored the Symposium. Its technical sessions were distributed over three working days. The forum took place in the Météo-France International Conference Centre in the Southwestern vicinity of Toulouse.

The MS dedicated to microwave heating was one of five Mini-Symposia held in addition to eight regular sessions. The first half of this MS was scheduled for the afternoon sessions of the second day. It started with an introduction to the MS and discussion of its motivations and objectives presented by its organizer and the session chair, V. Yakovlev. The introduction was followed by a talk focused on the conceptual issues and entitled "Microwave Heating and Electromagnetic Modelling: From Concepts to Applications in Applicator Design"; it was presented by D. Stuerger of University of Bourgogne. P. Kopyt from Warsaw University of Technology presented a review of numerical methods for solving a heat conduction problem coupled to an EM simulator. He also formulated suggestions for choosing the method that





Key speakers of the Mini-Symposium, left to right: A. Soubeyran, EADS CCR; E. Jerby, Tel Aviv University; P. Kopyt, Warsaw University of Technology; J. Monzó-Cabrera, Polytechnic University of Cartagena; D. Stuerger, University of Bourgogne; V. Yakovlev, Worcester Polytechnic Institute

that could be coupled to the existing and well-validated conformal EM FDTD solver. The extended description of numerical simulation performed for a microwave drill and the regimes of its operations were presented by E. Jerby leading a team of researchers and grad students in Tel Aviv University. He originally presented the device at the last AMPERE Conference in Bayreuth. In Toulouse, the MW drill was characterised in more detail with new data on its experimental verification.

The second part took place on the third day also in the afternoon; it was chaired by D. Stuerger. The first speaker, A. Soubeyran of EADS CCR-F reported the numerical investigation of microwave heating of biological tissues at the higher frequencies in the range from 10 to 30 GHz. An extensive experimental validation was also presented. The project was conducted jointly with ESA-ESTEC, Netherlands, IMST, Germany, and two Finnish companies, VTT and STUK. J. Monzó-Cabrera, Polytechnic University of Cartagena, spoke about convenient options available in a specially developed Matlab code for studying and designing laminar mode stirrers in multimode microwave heating ovens. This paper resulted from a cooperative effort as well: that was a project with another Spanish group in Technical University of Valencia. The paper by Yu, Smirnov and his colleagues from Penza State University, Penza, Russia was about a theoretical solution of a problem of diffraction on a dielectric body in subspace bounded by a metal surface. From a practical viewpoint, the suggested approach with the use of volume singular integral equations was less effective than modern numerical solvers. However, theoretical efforts like this showing more hidden features of the physical phenomena remain important for further understanding of processes in microwave ovens.

The Mini-Symposium was concluded by the extended presentation on the advances of modern computer modelling of microwave heating given by V. Yakovlev. The updated database of EM software packages suitable for modelling of MW heating was reviewed along with the results generated by several simulators for a test problem.

problem. Examples of simulation of different microwave structures with *QuickWave-3D* were also shown and discussed.

Overall, it was a successful meeting, which contained high-quality presentations and was filled with valuable discussions. The field experts had a chance to discuss their latest achievements, to analyse the current situation in the field, and identify its prospective trends. With ten papers in the program, it was the biggest Mini-Symposium at the JEE'02. Each speaker enjoyed the option of an extended (up to 30 min.) presentation. The sessions were well attended and received the special attention of the Organizing Committee at-large. Other Mini-Symposia and regular sessions at the JEE'02 included: Advanced Waveguide Theory, Cavities and Waveguides, Finite Element Methods, Domain Decomposition Methods, and Inverse Problems. All the topics were relevant to issues in microwave heating.

The MS more than met its goals. The Symposium in fact was an opportunity to learn more about other problems existing in theoretical and applied electromagnetism as well as about the methods that are currently in use. On the other hand, a MS entirely dedicated to microwave heating and organized in the framework of a big conference on numerical methods was a reminder to the experts in other areas of computational electromagnetics about the existence of microwave power engineering. The MS displayed the problems the field faces and showed the techniques currently being used to overcome those problems.

The JEE Organizing Committee is now analysing the results of the whole event and exploring the option of holding it on a regular basis. Several attendants of the MS expressed their viewpoints on the feasibility of making modelling of microwave heating a part of the JEE series in the future. There is a preliminary agreement about inclusion of this topic in the program of the next forum. AMPERE members will be informed about future developments in this regard.

Vadim Yakovlev  
IMMG, WPI, Worcester, MA USA; vadim@wpi.edu

# Symposium on Microwave Effects and Applications

by Y Nikawa, Faculty of Engineering, Kokushikan University, Tokyo, Japan

Due to the growing interests in the field of microwave applications in Japan, a Symposium on Microwave Effects and Applications was held at Kokushikan University, Tokyo, Japan, on August 2 to 3, 2001. This symposium was sponsored by Japan's Industrial Technology Association (JITA), the Institute of Research and Innovation (IRI), and was co-sponsored by the Microwave Technology Forum as well as the Institute of Electromagnetic Wave Application, Japan (IEAJ). A total 36 technical societies and groups attended the Symposium. The topics included verification research on the effects of microwave irradiation techniques, application research on microwave effects, theoretical research, equipment development, research in the medical and bio-science fields, and related electronic and mechanical technologies.



Delegates mingling in the exhibition area

A total of 15 sessions were held during the symposium. The session titles were "Applications of Microwave in the Field of Basic Medicine", "Applications of RF and MW to Clinical Medicine", "Effects of Electromagnetic Waves on Humans and Biological Tissues", "Wave Absorber Techniques", "Sterilization of Microorganisms by Microwave Irradiation", "Microwave Application to Food", "Microwave Assisted Analysis: Separation, Extraction, Digestion", "Organic Synthesis and Polymer Synthesis Processing", "Inorganic Synthesis, Catalysis", "Microwave Processing of Ceramics", "Machine Development", "Environmental Session (Water, Air, and Soil Remediation Technologies)", "Gas Phase Reactions/Microwave Plasma Processing", "Fundamental Problems a Microwave Spectroscopy" and "Measurement of Microwave Properties of Materials".



Delegates attending an invited lecture

Three papers were invited for special lectures; Prof. B. Ondruschka with University of Jena presented a lecture on the theme, "Use of Microwave Power for Applied Organic Chemistry", Prof. D. K. Agrawal from Pennsylvania State University presented "Extraordinary Successes with Microwave Fields for Synthesis and Sintering of Ceramics, Metals and Composites", and Dr. M. Hajek from the Institute Chemical Process Fundamentals presented a talk on "Microwave Glass Melting Technology". The total number of papers in this symposium including these 3 invited papers was 94. Of this number, the total number of oral presentations was 75 and the number of poster presentations 16, while the audience reached over 300. There was also a technical exhibition from 12 companies which generated substantial .



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A.C. Metaxas

Electricity Utilisation Group • Engineering Department  
University of Cambridge • Cambridge CB2 1PZ, UK

Tel: +44 1223 332680

Fax: +44 1223 332662

Email: [acm@eng.cam.ac.uk](mailto:acm@eng.cam.ac.uk)

<http://www2.eng.cam.ac.uk/~acm/eug.html>  
[www.ampereurope.org](http://www.ampereurope.org)

generated substantial interest regarding industrial and research equipment. There were many interesting and novel presentations resulting in active discussion and raising many interesting points. The exchange of opinion during the symposium extended the horizon of this technology. The photographs depict a lively atmosphere during the presentations and in the exhibition hall.



*The author (standing) asking a question during a lecture*

Following the success of this venue it is planned to hold a second symposium in this field once again in Japan, carrying the title, "International Symposium on Microwave Science and its Application to Related Fields". This will be held during November 21 to 23, 2002, at Naraken - Shinkokaido, Nara, Japan. The organisation of this symposium is now well under way and has already attracted much interest from prospective attendees. This symposium will be sponsored by Japan's Industrial Technology Association (JITA) and Institute of Research and Innovation (IRI), and will be co-sponsored by the Microwave Technology Forum and the Institute of Electromagnetic Wave Application, Japan (IEAJ).

The symposium aims to further the academic progress in this technology through information exchange and vivid discussion on basic and applied aspects of microwave science by researchers from various backgrounds. In parallel to the symposium, lectures and exhibitions for non-microwave specialists are also planned in order to foster better understanding of the role of microwave energy in our daily life. The scientific program will consist of lectures by invited guests, oral presentations and poster sessions. A technical exhibition is also planned. The official language of the symposium will be English or Japanese. I hope to see as many delegates from abroad joining us in Japan to make this venue a truly memorable one.

*For further details please contact:*

*Prof Yoshio Nikawa, Dept. of Electrical Engineering  
Faculty of Engineering, Kokushikan University,  
4-28-1 Setagaya, Setagaya-ku, Tokyo 154-8515  
Japan, Tel & Fax: +81-3-5481-3335  
E-mail: nikawa@kokushikan.ac.jp*

## AMPERE moves towards a non-profit company status

*continued from page 1*

Even when the Presidency moves away from Cambridge, AMPERE would thus have a permanent address as is demanded by company regulations in the UK. This does not preclude, however, at some future date, moving the address elsewhere. **We will have to lodge accounts annually even though we are a non-profit organisation and any future Committee must take full responsibility to see that all the rules are met and on time.**

The lawyers in Cambridge have drafted a set of Memoranda and Articles which AMPERE would have to abide by from the time this non-profit entity is formed. These two documents were thoroughly discussed at the last Committee meeting at Loughborough University in April. I have now discussed the changes which emerged with the lawyers and both these documents are ready to be implemented and are attached with this issue of the Newsletter. **These latest versions will also be placed on our website for members to read.** So please send me, or other committee members, by mid August your comments which the Committee will consider carefully. I hope to complete the formation of AMPERE as a non-profit organisation by the end of the year so if you feel there is a matter that you wish to bring to the attention of the Committee regarding the formation of AMPERE as a non-profit making company I urge you to do so promptly.

### Your news and views are always welcome

*Please write to the Editor:*

Dr Ricky Metaxas  
Electricity Utilisation Group  
Engineering Dept, University of Cambridge  
Cambridge CB2 1PZ, UK  
Tel: +44 1223 332680 Fax: +44 1223 332662  
Email: acm@eng.cam.ac.uk  
www2.eng.cam.ac.uk/~acm/eug.html  
www.ampereurope.org

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*Contact:*

Dr Ricky Metaxas, Electricity Utilisation Group, Engineering Department,  
University of Cambridge, Cambridge CB2 1PZ, UK  
Tel: +44 1223 332680 Fax: +44 1223 332662  
Email: acm@eng.cam.ac.uk

www2.eng.cam.ac.uk/~acm/eug.html  
www.ampereurope.org

# NEWS & EVENTS

## 37th Annual IMPI Symposium, Sheraton Atlantic City Convention Center Hotel, Atlantic City, New Jersey July 24-26, 2002

For more details contact:  
 IMPI, 10210 Leatherleaf Court, Manassas Virginia USA  
 Tel: 701 257 1415 Fax: 701 257 0213  
 or visit [www.impi.org](http://www.impi.org)

## EMC EUROPE 2002 - 5th International Symposium on Electromagnetic Compatibility September 9-13, 2002, Sorrento, Italy

The 5th International Symposium on Electromagnetic Compatibility (EMC) will be held in Sorrento, near the Amalfi coast and Mount Vesuvius is not far either. Nearest airport is Naples. Four similar EMC Symposia were previously held. Further details from [emceurope2002@aei.it](mailto:emceurope2002@aei.it)  
<http://www.aei.it/emceurope2002/index.htm>

## 3rd World Congress, Sept 22-26, 2002 Sydney Australia

Arrangements for staging the next World Congress on Microwave and Radio Frequency Applications are well under way. For further information contact:  
 3WC Managers  
 GPO Box 128  
 Sydney, NSW 2001  
 Australia  
 Tel: +61 2 9262 2277  
 Fax: +61 2 9262 3135;  
 E-mail: [mrfa2002@tourhosts.com.au](mailto:mrfa2002@tourhosts.com.au)  
[www.microwave-rf.org](http://www.microwave-rf.org)  
 For technical enquiries contact:  
 John H. Booske (Technical Programme Chair)  
 Electrical and Computer Engineering Department  
 University of Wisconsin-Madison  
 1415 Engineering Drive  
 Madison, WI 53706, USA  
 Tel: +1-608-262-8548  
 Fax: +1-608-262-1267  
 E-mail: [booske@engr.wisc.edu](mailto:booske@engr.wisc.edu)

## 9th AMPERE International Conference on Microwave & HF Heating, Sept 2003, University of Loughborough

For more details contact:  
 Professor Jon Binner, IPTME, Loughborough University  
 Loughborough, Leicestershire LE12 3TU, UK  
 Tel: +44 1509 223162 Fax: +44 1509 223949  
 Email: [J.Binner@lboro.ac.uk](mailto:J.Binner@lboro.ac.uk) or visit the following address  
[www.lboro.ac.uk/departments/iptme/research/ceramics/index.html](http://www.lboro.ac.uk/departments/iptme/research/ceramics/index.html). See also [www.ampereurope.org](http://www.ampereurope.org)

## New Book

In Issue 32 we reviewed the book entitled: **Handbook of Microwave Technology for Food Applications**, edited by Datta and Anantheswaran. We have omitted to state where it can be purchased from. The publishers are Marcel Dekker Inc. and details can be found in:  
<http://www.dekker.com/servlet/product/productid/0490-8>  
 Apologies to the authors for such an oversight.

## Newsletters on-line

Those of you with web-sites and e-mail addresses would have gathered by now that issues 31 and 32 of the Newsletter have been placed in the AMPERE website accessed via a common password and username for all members. Likewise all remaining Newsletter issues during 2002 will be placed on-line.

This is on a trial period and the Committee would like the views of the membership as to what is preferred - to have the Newsletter only on-line or to receive also a hard copy. Some Committee members expressed the view that they liked the feel of the Newsletter so for the time being both options are available. Comments to the Editor please.



Baby Lucia Sanchez Hernandez in a reflective mood ... perhaps she already thinks about microwaves despite her being a few days old! Congratulations to Marien and David and all the best for the future from all AMPERE members.



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