

**Royal Academy of Engineering International Travel Grant
Report of Conference Attendance**

Report by

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Conference attended

Asia Pacific Microwave Conference, 2004, 15-18, December 2004, Hotel Ashok,
New Delhi, India.

Scope and purpose of the conference

The University of Delhi, New Delhi, India, organized the XVI Asia Pacific Microwave Conference. The purpose of the conference was to provide a congenial forum to disseminate and to discuss up-to-date scientific information in the field of microwave technology. In excess of 850 papers from different countries were selected for the conference, indicating the importance of this field. However, only 57 of these papers were selected for the oral presentations. The technical activities started just after the inaugural session on December 15, 2004 with six parallel sessions, and one poster session each day running through all the four days.

The Asia Pacific Microwave Conference is the largest event of its kind in this region of the globe. This was reflected in the diverse scope of the conference covering a broad spectrum of topics, which dealt with the latest advances and developments in all aspects of this dynamic technology. To give a flavour of the conference, some of the topics covered in the sessions included: 'solid-state devices', 'microwave-optical techniques', 'microwave and millimetre wave systems', 'phased and active array antennas', 'EMI and EMC', 'photonics and optics', 'medical and biological applications', 'monolithic integrated circuits', 'MEMS', 'EBG & metamaterial', 'superconductivity', 'communication systems', and 'remote sensing and sensors'.

In addition to the contributed papers in the regular oral and poster sessions, three short courses were also organised for the delegates, i.e.:

1. *Recent Advances in Modelling, Simulation, Characterization and Technological Evolution of Smart Geometry Structures of Submicron Devices*

This course was designed to discuss the alternative smart device structures like SGT/CGT, DG/DMG structures; current trends in SOI MOSFETs, its technology and applications; CMOS device design and applications and economical and reliable polysilicon devices which need to be explored for high frequency applications.

2. *Applications of Artificial Neural Networks to RF and Microwave Design*

This course discussed how Artificial Neural Networks (ANN) could be used to improve speed, accuracy and flexibility of microwave modelling and CAD through its

established network structures, universal approximation property, and its ability to integrate with circuit knowledge.

3. Phased Array Antenna and Adaptive Beam Forming Arrays for Radar and Communication Systems

This course provided an understanding of the fundamentals of phased array antenna and adaptive beam forming and their applications to radar and communication system. It was intended for the engineers and scientists working in R&D laboratories, Universities, industries etc. who are not very familiar with the phased array antenna and adaptive beam forming arrays but want to know more about them.

Benefits of attendance

The attendance and participation at the international conference has been immensely beneficial to me in a number of ways, namely: allowing me to present the findings of my research work; getting valuable feedback on my work from other experts; being able to exchange ideas with experts for the further development, collaboration and advancement of my work; and being able to promote UK-based research work. As a direct consequent of this activity I have had a number of internationally leading researchers expressed keen interest in my work, which I believe may lead to future collaboration. Finally, I also had the opportunity to visit the University of Delhi in order to forge a strong collaborative link with the microwave research group. We are now in a position to engage on a mutually beneficial research project and possibly exchange visits in the future.

Prior planning

To make the most out of the large conference it was necessary for me to plan and judiciously select the presentations that were useful and important to my research activity at the outset. It was necessary to do this as there were several parallel sessions running simultaneously, and it also allowed me to think of pertinent questions to ask at the sessions. This was a relatively straightforward task as the conference program was available at the conference website well in advance of the event itself. Fortunately I was able to attend most of the sessions that were of interest to me.

My contribution

The three papers I presented at the conference were entitled:

1. Aperture Coupled Microstrip Resonator (oral presentation)
2. Photonic Bandgap Folded Microstrip Ring (poster presentation)
3. X-Band High Efficiency Power Amplifier (poster presentation)

The oral presentation was made in Session B3 (Passive Devices and Circuits), before an audience of about 55 people. The presentation was followed by the obligatory question and answer session. The audience asked a few probing questions regarding how the ground plane aperture enhanced the electromagnetic coupling to the microstrip resonator. Judging from the several complimentary comments made by the audience after the session I believe that the paper was generally received well. My other two papers were presented at poster sessions. Although the poster sessions may appear to be less formal, however in my experience they are more demanding as you're under scrutiny for a couple of hours. The delegates have more time to question and find out the intricacies of your work. In spite of these drawbacks, I found the

poster session to be very useful and simulating for a number of reasons, firstly I got a more comprehensive and deeper feedback on my work, secondly I obtained a different perspective from other experts in the field, and lastly it provided me with an opportunity to develop new contacts too (e.g. Prof. Huei Wang, National Taiwan University, and Dr P. Mandrupkar, Astra Microwave Products Ltd.).

Useful advances

At the conference I've discovered a number of interesting and novel techniques that may be applicable to my current work, a few of which include: (1) the realization of miniaturized dual-mode filters developed by Chih-Yuan Tsai and Jen-Tsai Kuo, National Chiao Tung University, Taiwan. The proposed technique is shown to significantly reduce the size of the filter by 60%, as compared with a conventional filter; (2) coupling schemes for microwave filters in which the number of transmission zeros can be adjusted without altering the filters topology. This was developed by Uwe Rosenberg, Marconi Communications GmbH, Germany, and Smain Amari, Royal Military College, Canada; and (3) a compact PBG microstrip band-pass filter developed by Hai-Li Lin, and Jun-Fa Mao, Shanghai JiaoTong University, China. The PBG filter is shown to exhibit low insertion loss and slow-wave characteristics, with the advantage of being compact in size and simple to fabricate. The dimension of this filter is about one-tenth of a conventional filter and its response is spurious-free with deep attenuation levels due to the slow-wave effect.

Conclusion

The Asia-pacific region is becoming a major innovator and manufacturer of advance microwave technologies. Most of the leading players in this area from this region and globally were represented at the conference. As such the conference was extremely worthwhile for a number of reasons, i.e.: allowing me to promote my research activity; enabling me to obtain some interesting ideas for my own research work; and finally allowing me to network with some of the leaders in the field. I have fulfilled all of these objectives set out prior to the conference.

Finally, I should like to thank both the Royal Academy of Engineering and London Metropolitan University for providing me with the necessary financial assistance to attend and participate at the 2004 Asia-Pacific Microwave Conference in India.