IEEE NSW Section

Antennas & Propagation / Microwave Theory & Techniques Joint Chapter

Report of Activities in 2003

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Committee

Chairman:	Dr Trevor Bird	*Members:*	Dr Tim Aubrey
			Dr Alan McPhail
Vice-Chairman:	Dr Andrew Parfitt		A/Prof. Graham Town
Secretary/Treasurer:	A/Prof. Karu Esselle		

Membership

As of October 2003, there are 90 members of the AP and MTT Societies in New South Wales. There are four Fellows and 11 Senior Members.

Technical Meetings

One meeting has been so far held in 2003 and two others are scheduled before the end of the year. These are listed below.

1. ELECTRICAL ENGINEERING IN THE WORLD OF PHOTONIC CRYSTALS, Dr Andrew Weily & Associate Professor Karu Esselle – Thursday, 14 August 2003

Photonic crystals have created new possibilities for controlling and manipulating the flow of electromagnetic fields. Based on the pioneering work of Eli Yablonovitch and Sajeev John, photonic crystals are formed by creating a dielectric structure that is periodic in one or more orthogonal directions. Photonic crystals may be engineered to give a range of frequencies where propagating modes will be either partially or fully suppressed, known as the photonic band gap (PBG). Defects in photonic crystals can localise the electromagnetic fields and may be used to create waveguides with right angle bends, beam splitters, high quality lasers, couplers, waveguide crossings, channel add-drop filters, (de)-multiplexers, and antennas. These devices are extremely useful for processing electromagnetic signals in communication systems. In materials that exhibit a complete PBG, there will also be complete inhibition of spontaneous emission of light from atoms and molecules. Many of the electronic properties of semiconductors, such as band gaps and localized defect modes, also apply to photons in photonic crystals. We will present some background on the field of photonic crystals, highlight recent developments, and describe some of our research work.

Attendance: 12 members 18 Non-members

2. BROADBAND OPTICAL FIBRE SYSTEMS, Associate Professor Graham Town - Thursday, 27 November 2003

Optical signals are theoretically capable of carrying information with terahertz bandwidths with quantum-limited noise. Development of robust and affordable subsystems for the generation, transmission, signal processing, and detection of broadband optical information involves a number of challenges which, if solvable, allow optical and photonic systems to provide significant advantages over purely electronic systems in a variety of applications. In this presentation, Dr Town will review recent and ongoing developments in the field of broadband guided-wave optics, particularly optical sources and novel waveguides and waveguide devices for transmission and signal processing of optical signals with large optical bandwidths. The presentation will include both theoretical and experimental results generated in the course of research by Dr Town and his students on topics such as soliton lasers, multiwavelength

lasers, optical supercontinuum generation, ultrafast all-optical switching, and coupled-mode filter design for broadband signal processing. A particular focus will be placed on the unique properties and applications of microstructured or "holey" optical fibres in applications such as telecommunications and optical tomography.

Attendance: TBA

3. FEDSAT - 12 MONTHS AND GOING STRONG, Dr Andrew Parfitt - Thursday, 18 December 2003

Australia's Federation Satellite, FedSat, was launched a year ago on 14 December 2002. Its mission is in space magnetometry, use of GPS for attitude control and atmospheric profiling, communications experiments in Ka-band and at UHF, and in self-healing space computing. A number of these experiments have been in progress and others are just starting to bear fruit. Dr Parfitt will give an update of the FedSat mission, describing the spacecraft and operations status, summarise the experimental programs being conducted around FedSat, and focus on the communications technology.

Attendance: TBA

General

I thank the speakers in 2003 and the Chapter Committee. Once again, I thank Dallas Rolph for assisting with the meeting arrangements.

As I have been elected to the Antennas & Propagation Society Administrative Committee, I will be standing as Chapter Chair in 2004. I offer my support and best wishes to the Committee for a successful coming year.

Trevor S. Bird
Chair

24 November 2003