

Annual Report 2004

Commission B (Fields and Waves)

Alan Robert Clark

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1 Active S.A. Researchers and Research Groups

Research that falls under the Commission B ambit is mainly performed at the major universities, and in associated research companies. Understandably, it has actually been quite difficult to gain co-operation from individual researchers in the process of gathering information. As a direct result, only University of Pretoria and the University of the Witwatersrand, Johannesburg, is represented in the publications list.

1.1 Council for Scientific and Industrial Research

Dr Dirk Baker, Mr L.Botha lbotha@aerrotek.csir.co.za

1.2 University of Cape Town

1.3 University of Pretoria

Prof D.Baker dbaker@postino.up.ac.za and Prof J.Joubert jjoubert@postino.up.ac.za are of the School of EECS.

1.4 University of Natal

Prof Broadhurst?

1.5 University of Stellenbosch

Prof J.Cloete , Prof D.Davidson and Prof H.C.Reader Keith Palmer (antenna analysis and design) and Petrie Meyer (waveguide propagation, filters) make up an active research group at Stellenbosch.

1.5.1 EMSS—ElectroMagnetic Software and Systems

G.Smith agsmith@emss.co.za. Involved with FEKO development, FEKO is a Finite Element based electromagnetics analysis package. Associated to the University by the fact that most of his engineers hail from it.

EMSS Antennas is an antenna prototyping facility.

1.6 University of the Witwatersrand, Johannesburg

The Computational Electromagnetics Research Group within the School of Electrical and Information Engineering consists of Prof A.R.Clark a.clark@ee.wits.ac.za. I am currently supervising 4 postgraduates. Prof. Fourie has now resigned, and is committed to Poynting Innovations on a full time basis.

Also, Prof G.Gibbon g.gibbon@ee.wits.ac.za has some interesting work in investigating the propagation of Electromagnetic fields that the Elasmobranchii (eg sharks) are sensitive to in sea-water (< 20Hz!).

Annual Reports of the group are compiled in September and are all to be found on the site www.ee.wits.ac.za/~em, or ytdp.ee.wits.ac.za/AnnualReport2004.html.

1.6.1 Poynting Innovations

Poynting Innovations www.poynting.com is headed by Prof A.P.C.Fourie, and has several active researchers in the fields of antenna design, Electromagnetic analysis software (SUPERNEC). SUPERNEC is a Method-of-Moments based package, and is continuously extended by research efforts.

Since it has had historic ties with Wits, it still has a culture of research, (as opposed to simple development). The main researchers are Dr D.C.Nitch derek.nitch@poynting.co.za and Mr R.Dreyer renier.dreyer@poynting.co.za. Most of the publications from Poynting are captured on the Wits site.

Poynting Antennas is a World-class manufacturing plant, with heavy export emphasis, from HF EW antennas to 6GHz WLAN dish feeds.

South African Publications in the field of Commission B— 2004

- [1] A R Clark. *SUPERNEC Study Guide for Electromagnetics and Antennas*. Poynting Innovations (Pty) Ltd., 33 Thora Crescent, Wynberg, Johannesburg., 1st edition, 2004. ISBN 0-620-33512-2. 148 pages in full colour.
- [2] B Orchard and A R Clark. Optimizing algorithms for antenna design. *Transactions of the South African Institute of Electrical Engineers*, 95(4):279–288, December 2004. Winner of SAIEE Best Paper award, 2004.
- [3] G Mayhew-Ridgers, J W Odendaal, and J Joubert. Entire-domain versus subdomain attachment modes for the spectral-domain moment-method analysis of probe-fed microstrip patch antennas. *IEEE Transactions on Antennas and Propagation*, 52(6):1616–1620, June 2004.
- [4] J W Odendaal. Predicting the directivity of standard gain pyramidal horn antennas. *IEEE Antennas and Propagation Magazine*, 46(4):93–98, August 2004.
- [5] G Mayhew-Ridgers, J W Odendaal, and J Joubert. Spectral-domain moment-method analysis of wideband patch antennas with capacitive probe feeds. In *Proceedings of the International Symposium on Electromagnetic Theory, Pisa, Italy*, pages 670–672, May 2004.
- [6] D Baker and A J Palmer. Predicting the long-term average of the effective earth radius in south africa using ground-based observations. In *Proceedings of the IEEE Africon 2004 Conference, Gaborone, Botswana*, pages 1003–1006, September 2004.