Workshop proposal for ISAP'2008 Taipei, Taiwan

Title: Introduction to Electromagnetic Field Simulation Techniques – Theory and Applications

Duration: ½ day

Presenters: Dr. Ulrich Jakobus and Dr. A G Smith

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Short course summary:

The aim of the short course is to give an introduction into numerical field simulation techniques, with the main focus on antenna design, antenna optimisation, and also antenna placement.

Firstly, the need for modelling techniques will be motivated. Then an overview of the different techniques will be given, and two representative methods (Finite difference time domain FDTD and Method of Moments MoM) will be presented and discussed with regards to the underlying formulation, the advantages and disadvantages, and also examples for these techniques will be shown.

In the second part of the short course, the focus will be on practical examples from antenna design, optimisation, and also antenna placement. Various advanced techniques for these will be introduced, such as using a multilayer Green's function for planar antenna design, or using a fast frequency technique for broadband antenna results. Also special accelerations (e.g. fast integral equation methods) or high frequency asymptotic methods (Physical Optics, Uniform Theory of Diffraction) for modelling electrically large problems will be presented, both from a theoretical formulation point of view, but also with regards to application examples (e.g. antenna placement on a ship at high frequencies, or modelling of dielectric lens antennas).

After having attended the short course, antenna design engineers will have a good understanding of how numerical field simulation methods work, what are their advantages and disadvantages, and how to apply these methods for practical problems. As these methods and techniques are universal, the short course is also well suited for electromagnetic engineers from other areas (e.g. electromagnetic compatibility).

Short CV of main presenter:

Dr. Jakobus received his diploma and PhD degrees in electromagnetics in 1991 and 1994, respectively, from the University of Stuttgart, Germany. In 1999 he obtained the status of Privatdozent and completed the Habilitation degree (formal qualification for University professorship) at the same University. He conducted research at the University of Stuttgart in the period of 1991 to 2000 in the areas of antennas, electromagnetic compatibility, and computational electromagnetics. He is the main author of the electromagnetics computer code FEKO and joined EM Software & Systems in Stellenbosch, South Africa, in 2000 where he has been a Director and the FEKO Product Manager.

Dr. Jakobus has authored or co-authored more than 120 scientific papers for journals and conference proceedings, some of them were also recognised with best paper awards. He has also presented numerous short courses, seminars and plenary talks worldwide. He is a Senior Member of the IEEE (where he is also a member of a working group on numerical techniques), an elected member of URSI commission B (Fields and Waves), a member of VDE/ITG and of ACES.