CEM NEWS FROM EUROPE

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2000 was a good year in Europe for antenna and propagation engineers. Several of the Institutions which run Antenna and Propagation Conferences in Europe got together to run a Millenium Special at Davos, Switzerland. A large number of the papers were devoted to mobile communications and it seems as though every European University has at least one research student working in this field. There were a number of papers on CEM but it is perhaps more notable that the 'ordinary' European engineering firm is using CEM tools in much the same way as it uses Vector Network Analyzers - as an aid to productivity.

The conference attracted over 1000 delegates and was very efficiently run by a secretariat from the European Space Technical Centre (ESTEC) The Chairman, Dr Antoine Roederer, was also from ESTEC. In addition to the people, the papers, the conversations, there was snow!!

The most notable happening in CEM otherwise is the publication of a CAD benchmark involving a Vivaldi antenna. The magazine, Microwave Engineering Europe, sets a benchmark problem to software vendors every year. Up to 2000, these problems had been devices and components. The geometry of the printed Vivaldi antenna was set out in the October 2000 issue together with a list of required responses from the vendors - Return Loss over 0.5 to 18 GHz, field plots and radiation patterns at 10 GHz. In the issues of November 2000 and January 2001, six vendors provided responses. The measured results are yet to be published but the results published so far are very interesting. A great deal of information is provided and those interested should look at the magazine's website http://www.mwee.com where the above articles can be found.

The methods ranged through Finite Element (HFSS from ANSOFT), FTDT (EMPIRE from IMST and CONCERTO from Vector Fields), Finite Integration (CST), TLM (Micro-stripes from KCC) and Method of Moments (IE3D from ZELAND).

A major topic of interest is a comparison of the runtimes which are shown in Table 1.

Table 1 Runtimes

Method	Runtime (minutes)	Machine	No of cells
Finite Element	143	450 MHz Sun Ultra 4 processors 2 GB RAM	33,914
Finite Integration	64	800MHz PIII	Not quoted
FDTD (1)	14	600 MHz Athlon 256 MB RAM	430,000
TLM	42	650 MHz PIII 128 MB RAM	400,000
FDTD (2)	120	600 MHz PIII 384 MB RAM	2,500,000
MoM	1548	450 MHz PII 256 MB RAM	2724

The time domain methods (FDTD and TLM) have much shorter runtimes although they have many more cells in their models. The actual meshing of free space and the boundary conditions applied affect the number of cells and therefore the accuracy and runtime.

Although the measured results are not yet published, some comments can be made of the responses. Five out of six vendors provided very similar Return Loss plots. There are slight differences but these are very minor. All vendors provided field plots at 10 GHz which looked very similar. The radiation patterns were more difficult to compare as every vendor seemed to produce his own scale and type of plot not to mention definition of E and H plane. Most of the vendors obtained very similar shapes of radiation pattern although the crosspolar levels were quite different.

It would have been more helpful if the magazine had specified the output format (scale, type of plot, definition of E and H plane) so that the results could be more easily compared. Nevertheless, this was an interesting exercise by all concerned.