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About this issue

This edition reports back on the results of the recently concluded FEKO student competition, sharing some of the interesting EM work that is being carried out at universities across the globe. Users are reminded of the useful Ctrl-Shift key combination and are invited to attend the international FEKO User's Meeting which will be held to coincide with ACES 2012 in Columbus, Ohio, USA.

If you would like to comment or ask questions about the content of this issue, please send us an email, or contact your local distributor.

quarterly@emss.co.za ✉

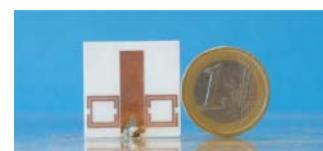
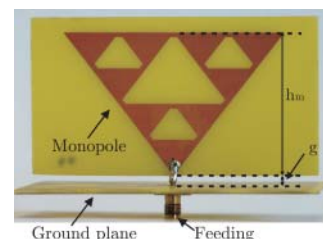
Student Competition Results for 2011

The 2011 FEKO Student Competition drew entries from all over the world, including Australia, South Korea, Taiwan, Russia, Turkey, Belgium, Spain, South Africa, Argentina and the United States of America. The entries featured topics ranging from antenna design to MRI research. The design, placement and/or human body radiation effects of several types of antennas were considered for a variety of applications, such as RFID tags, mobile devices, GPS and low earth orbit satellite reception, aircraft direction finding systems, tyre pressure monitoring systems and body wearable antennas.

WINNER

This year's winner is Joan Gemio Valero from the Antenna and Microwave Systems group at the Autonomous University of Barcelona, Spain, for his entry entitled "Multiband antennas for a remote sensor network central unit". Joan is working towards his PhD with Dr Josep Parrón Granados, who receives the supervisor award.

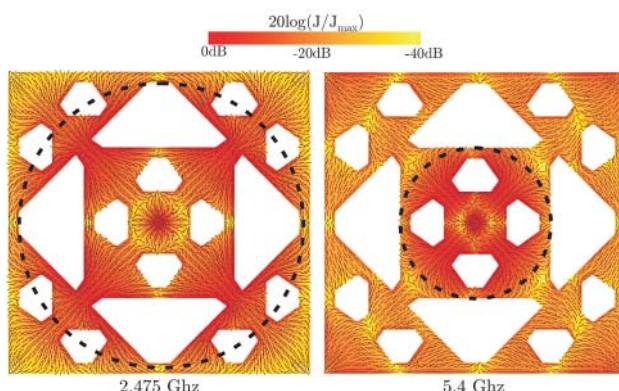
The focus of Joan's entry is on the design of multiband monopole antennas for the central unit of a remote sensor network. He proposes two solutions to obtain the required multiband performance, namely fractal-based ground planes and resonator loaded monopoles. He uses FEKO to investigate the operating principles of the antennas and to adjust their design parameters. In his report he compares simulation results with measurements for several manufactured antennas, including a triangular monopole on a solid ground plane, a triangular monopole on a fractal-based ground plane, a triangular monopole using fractal elements



Sierpinski monopole and SRR loaded monopole prototype antennas (Joan Gemio Valero).

(Sierpinski monopole) on a fractal-based ground plane, symmetric as well as asymmetric loaded monopole antennas and split ring resonator loaded monopole antennas.

Joan shows that studying the current distributions of an antenna can give valuable insight into its operating principles. He illustrates this in a parametric study of the input reflection coefficient of a resonator loaded monopole antenna, showing how the monopole length, resonator width and length of the resonator capacitor strip affect the positions of the minima in the antenna's S_{11} response.



Current distributions in a fractal-based groundplane (Joan Gemio Valero).

"This year's winner is Joan Gemio Valero from the Antenna and Microwave Systems group at the Autonomous University of Barcelona, Spain."

“Studying the current distributions can give insight into the operating principles of the antenna...”

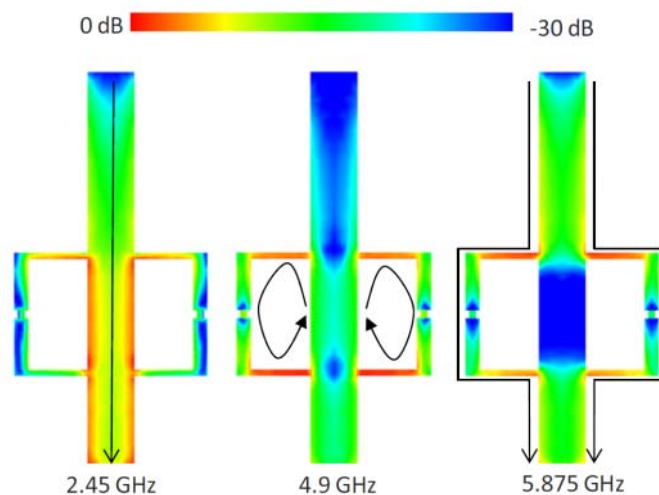
Some of the work on which Joan based his student competition report has been presented at the 3rd and 4th European Conference on Antennas and Propagation (EuCAP) in 2009 and 2010. His research group has also published articles in the IEEE Antennas and Wireless Propagation Letters as well as the Journal of Electromagnetic Waves and Applications.

HONOURABLE MENTION

Honourable mention is made of Miguel Sossouhounto, a Master’s student from the Royal Military Academy in Brussels, Belgium, for his detailed model of a Light Multirole Vehicle (LMV) that he submitted as part of his entry entitled "Analysis of antenna and vehicle interaction using simulation software FEKO".



Miguel Sossouhounto’s CADFEKO model of a Light Multirole Vehicle (LMV).



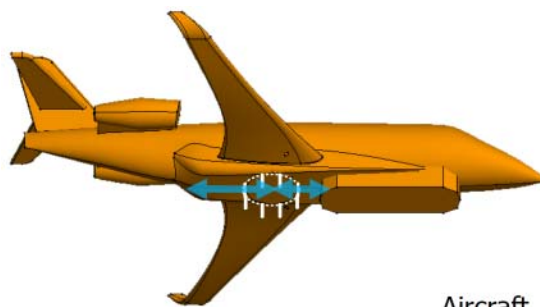
Current distributions of a resonator loaded monopole antenna shown at different operating frequencies (image from the student competition report of this year’s winner, Joan Gemio Valero.)

“Honourable mention is made of Miguel Sossouhounto ... for his detailed model of a Light Multirole Vehicle (LMV)...”

By considering different antenna locations, operating frequencies and field properties in specific directions of interest, Miguel investigates which of the vehicle details should be included in the model to obtain accurate EM simulation results. He evaluates the model fidelity for two systems with different radiation requirements. By comparing simulations for the entire vehicle to simulations with certain elements removed, he draws conclusions based on a threshold of accuracy required from the simulation results. He notes that large dielectrics electrically close to the antenna (e.g. windows, tyres) have an important effect on the simulated radiation patterns, while the LMV may be approximated by a shell and still yield accurate far-field results.

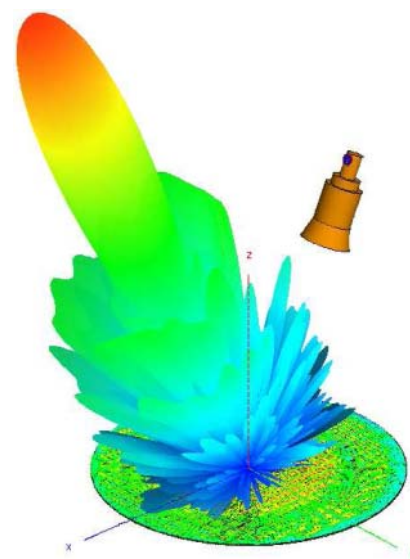
OTHER ENTRIES

Many interesting entries were received, covering a variety of fields ranging from bio-electromagnetics (radiation and MRI) to antenna design for various applications. The antennas varied from microstrip to waveguide designs, while topics included tyre pressure monitoring systems, RFID tags and low earth as well as GPS signal reception.



Aircraft

The optimum placement of direction finding antennas on aircraft for accurate DOA estimation was investigated by Gangil Byun from Hongik University, South Korea.



The radiation pattern of a reflectarray antenna by Payam Nayeri, who is with the Center of Applied Electromagnetic Systems Research (CAESR), The University of Mississippi, USA.

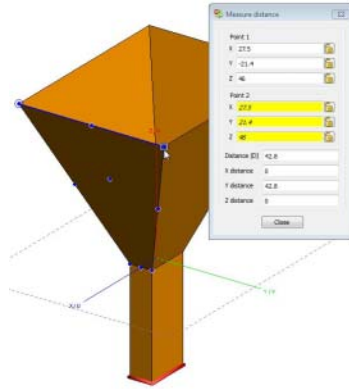
“Many interesting entries were received, covering a variety of fields ranging from bio-electromagnetics (radiation and MRI) to antenna design for various applications.”

Tips and Tricks: Using Ctrl-Shift to Snap to Points

Ctrl-Shift is a very useful key combination for entering coordinates or variable values in input dialogs. It can greatly facilitate the creation and transformation of geometry as well as the placement of named points and workplanes in CADFEKO, the measuring of distances and angles in CADFEKO and POSTFEKO and changing the offset position of 3D farfield patterns in POSTFEKO.

Hold Ctrl-Shift to:

- Select variables from the model tree to enter the corresponding variable in the entry field of a dialog box.
- Activate *Preview* mode in which the active (yellow) dialog entry field is updated based on the cursor position in the 3D view (click to select).
- Snap to named points, corners, edges, midpoints of geometry edges and faces (in model view) and mesh vertices (in simulation mesh view).



Ctrl-Shift can be used to snap to a corner or the centre point of an edge or face.

FEKO Quarterly

“Ctrl-Shift is a very useful key combination for entering coordinates or variable values into input dialogue boxes.”

FEKO Suite 6.1 Certification

FEKO engineers constantly pursue fluent, effortless integration and use of our software on the latest and most advanced computing platforms. This means that FEKO is regularly subjected to stringent quality tests by third parties, including independent test houses, Intel and Microsoft. These authorities are then entitled to grant FEKO certification for use on a variety of platforms. Recent tests that FEKO was subjected to delivered the following results:

- FEKO Suite 6.1 obtained the “**Compatible with Windows 7**” certification.
- FEKO Suite 6.1 passed the “**Microsoft Platform Ready**” test and thus works with **Windows Server 2008 R2**.



Microsoft certified FEKO 6.1 to be **Microsoft Platform Ready**, i.e. compliant with Windows Server 2008 R2.

These certifications are important to FEKO users, as they testify to the fact that FEKO is a cutting edge technology tool that works well with modern computing platforms and operating systems and that FEKO software maintains a consistently high standard of quality.



FEKO 6.1 was certified as **Compatible with Windows 7**.

“FEKO is regularly subjected to stringent quality tests...”

Release of Antenna Magus 3.3

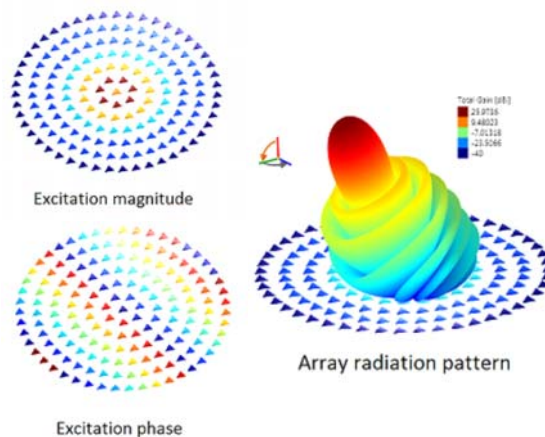
The latest version of Antenna Magus introduces six new antenna topologies, a circular array distribution, three new tools and the capability to export certain planar antenna models to AWR Design Environment.

The following antennas can now be designed using Antenna Magus:

- ◆ Compound box pyramidal horn antenna
- ◆ Backfire-helix-fed parabolic reflector
- ◆ Planar/folded 2-arm trapezoidal log periodic antenna
- ◆ Printed folded dipole
- ◆ Cylindrical dipole in infinite array
- ◆ Cavity-backed slot array

The Antenna Magus 3.3 Toolbox contains these newly added tools:

- ◆ Radar range equation calculator
- ◆ Antenna gain prediction, given the main beam beamwidth (and vice versa)
- ◆ Expected gain calculation, given the aperture area and the efficiency



A concentric circular array design showing the element excitation magnitude and phase and the resultant synthesised radiation pattern.

“The latest version of Antenna Magus introduces... a circular array distribution...”

“FEKO is proud to be a platinum sponsor of the forthcoming conference of the Applied Computational Electromagnetics Society (ACES).”

The FEKO team believes in the sharing of knowledge and the value that can be extracted from gathering of the great minds in any industry. It is with this belief in mind that FEKO is proud to be a platinum sponsor of the forthcoming conference of the Applied Computational Electromagnetics Society (ACES), which will be held from April 10th to April 14th, 2012, in Columbus, Ohio, USA.



Downtown Columbus, Ohio. (Photo courtesy of ACES website)

The annual ACES conference has established itself as a gathering of both academic and industry professionals where information is presented on the innovative use of Computational Electromagnetics (CEM) tools as well as on the development of new CEM solution methods and insights. Although the focus of the conference is on the modelling of EM problems, various prominent technologies are focussed on with topics that include small antennas, EBG and artificial materials, RFID, Frequency Selective Surfaces and many more to cater for a wide range of interests in EM technology.

The ACES conference also coincides with the annual international FEKO users meeting, where the FEKO product manager (Dr Ulrich Jakobus) and other FEKO personnel will discuss future developments of FEKO. A trip to the ACES conference will therefore be valuable to current and prospective FEKO users.

More information on the ACES conference can be found on the society's conference web page: <http://aces.ee.olemiss.edu/conference/2012/>.

Exhibitions and User Meetings

For a complete list of events, including short courses and user meetings, and for more information about the following events, please visit www.feko.info/about-us/events.

30 Nov – 2 Dec 2011	Microwave Workshops & Exhibition (MWE), Yokohama, Japan
5 – 8 Dec 2011	Asia Pacific Microwave Conference (APMC), Melbourne, Australia
9 Dec 2011	FEKO User Meeting, Melbourne, Australia
19 – 20 Dec 2011	IEEE Applied Electromagnetics Conference & IEEE Indian Antenna Week, India
10 – 14 April 2012	ACES 2012, Columbus, OH, USA
April 2012	FEKO User Meeting, Columbus, OH, USA (date TBA)

About FEKO

Applications

- Antenna Design
- Antenna Placement
- EMC Analysis
- Scattering Analysis
- Biomedical
- Microstrip circuits
- Waveguide
- Cable Analysis

Fast Solutions

- Parallel Processing (Multi-Core CPUs, Clusters)
- GPU Computing
- Fast Frequency Sweep
- Out-of-Core Solving

Solution Techniques

- Method of Moments (MoM)
- Multi-level Fast Multipole Method (MLFMM)
- Finite Element Method (FEM)
- Physical Optics (PO)
- Ray-Launching Geometrical Optics (GO)
- Uniform Theory of Diffraction (UTD)
- Planar and Periodic Green's Functions
- True Hybridisation of MoM/FEM, MoM/PO, MoM/GO, MoM/UTD, MoM/MTL
- MoM for Multiple, Complex Dielectric Bodies

Model Formats

- Solid Models (Parasolid, DXF, ACIS, CATIA, Pro-E, IGES, STEP, Unigraphics)
- Meshes (CADFEKO, FEMAP, NASTRAN, AutoCAD DXF, STL, PATRAN, ANSYS CDB, ABAQUS, ASCII data format, GID)

Services

- Extended Service Contract
- On-site Training (Short Course)
- CAD Preparation
- Runtime Solutions
- Engineering Consulting Services

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