FEKO Student Competition Results for 2010

Announcement of the FEKO Student Competition results for 2010. (November 2010)

The 2010 FEKO Student competition drew entries from across the globe. The entries were not judged on the complexity of the EM problem solved, but rather on the clarity by which the EM problem was defined, consideration of computational electromagnetics (CEM) principles in the application of FEKO, the innovative and apt use of FEKO features as well as the verification, effective representation and correct interpretation of results.

1. Winner

This year’s winner is Christopher Thajudeen with his entry entitled “From Electrically Small Ultra-Wideband Antennas to Large Scale Building Imaging; Using FEKO to synthesize Full Building Through-the-Wall Radar Imaging Scenarios”. Christopher is a PhD student studying under the supervision of Dr Wenji Zhang at Villanova University in Pennsylvania, USA. He receives prize money to the value of US$2000 to spend on a computer of his choice.

Christopher investigated the design of ultra-wideband electrically small antennas for Through-the-Wall Radar Imaging (TWRI). These antennas are of interest in the development of through-wall imaging systems for mobile platforms. Space-filling Peano curves have been used as top loads for electrically short dipoles, achieving a bandwidth of about 10%. To increase the bandwidth to 35%, Christopher employed a dual stacked configuration of Peano Top-Loaded Monopoles. The simulated antenna radiation pattern was used as a radiation point source to model the use of the antenna for a mobile Synthetic Aperture Radar (SAR) TWRI scenario. The Multilevel Fast Multipole Method (MLFMM) was used to analyse the antenna placed on an electrically large, but finite, ground plane and Geometric Optics (GO) for the forward modelling of TWRI, in addition to the full wave Method of Moments (MoM) solution. To simulate the monostatic radar system, a grid search was performed using OPTFEKO.

Read more in the announcement issued by The College of Engineering at Villanova University.
Christopher Thajudeen’s design of a Dual Stacked Peano Top-Loaded Monopole. The figures show his schematic, the radiation pattern calculated using FEKO and photos of the antenna prototype (top and side view).

A FEKO model of a wall concealing two targets and point sources used to model a Synthetic Aperture Radar and the Through-the-Wall Radar Imaging result (dashed outlines indicate the true locations of the targets), by Christopher Thajudeen (Villanova University, USA).

2. Honourable mention

A second prize was awarded to Jacob Adams, a PhD student supervised by Prof. Jennifer Bernhard at the University of Illinois at Urbana-Champaign, USA. Jacob receives honorary mention and an Amazon gift voucher for his entry on the application of Characteristic Mode Theory. His entry is entitled “Analysis of a Low Q, Electrically Small Spherical Antenna Using Characteristic Modes”.

Jacob Adams used Characteristic Mode Theory to analyse a TM10 monopole antenna. A graph by Jacob Adams (University of Illinois at Urbana-Champaign) showing the admittance of the antenna’s significant characteristic modes.

3. Other Interesting entries

Theunis Beukman from Stellenbosch University in South Africa submitted an entry on microstrip narrowband filters. He designed a linear and a cross-coupled spiral resonator filter as well as a tuneable combline filter in FEKO.
Mohd Khairul Hisham Ismail from the Universiti Teknologi Malaysia entered his analysis of a microstrip patch antenna with two stepped slots for dual frequency operation, which he designed for GPS and GSM frequencies.

Microstrip linear and cross-coupled spiral resonator filters and FEKO model of a tunable combline filter, by Theunis Beukman (Stellenbosch University).

FEKO model of Mohd Khairul Hisham Ishmail’s stepped slot patch antenna for dual frequency operation (Technological University of Malaysia).