ELEctromagnetic DIAgnostics Research Center

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SEMINAR:

Pulsed EM field, close-range signal transfer in layered configurations – a time-domain analysis

Speaker: **Prof. Ioan E. Lager**
(Delft University of Technology, Netherlands)

Date: 19/11/2013 @ 10:00 AM

Location: Room A224 – Polo Scientifico F. Ferrari - Povo

Note: The seminar will be held in English

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The explosive digital data exchange in nomadic applications is the driving force behind ever faster wireless data transfer, with rates of 10 Gb/s (or higher) being deemed possible. Offering such performance, while conforming to the international spectrum regulations, pushes the capacity of the radio channel to its physical limits.
Due to its intrinsically localised, very low power operation, the close-range, inter-chip, digital signal transfer constitute a class of wireless applications that optimally make use of the radio channel's physical capacity, while precluding collision with the spectrum regulations. The most opportune solution to implementing such applications is resorting to the pulsed electromagnetic (EM) field signal transfer. Furthermore, this approach is indispensable to applications requiring simultaneous communication, localization, and imaging.
The feasibility of the (close-range) pulsed EM field, wireless transfer was previously studied for a basic, yet illustrative, inter-chip digital communication configuration. A more realistic configuration, accounting for the typical layered structure in integrated circuits (IC's), was subsequently examined by these authors via a Hertzian potential formulation, the tool for constructing the relevant space-time Green's functions being the celebrated modified Cagniard method (the 'Cagniard-DeHoop method').
The presentation will outline the methodology and the results of a time-domain TD analysis of the EM field radiated by an integrated loop antenna, as habitually realized in (Bi)CMOS technology. To begin with, a realistic model configuration will be contrived. The expressions of the space-time, EM field quantities in the free space outside the IC will then be derived. Some numerical results, demonstrating the validity of the proposed method, will be briefly discussed.

- **About the Speaker**

Ioan E. Lager was born in Braşov, Romania, on September 26, 1962. He received the M.Sc. degree in electrical engineering (1987) from the Transilvania University, Braşov, Romania, the Ph.D. degree in electrical engineering (1996) from Delft University of Technology, Delft, the Netherlands, and a second Ph.D. degree in electrical engineering (1998) from the Transilvania University. He successively occupied research and academic positions with the Transilvania University and the Delft University of Technology, where he is currently Associate Professor. In 1997 he was Visiting Scientist with Schlumberger-Doll Research, Ridgefield, CT.
His focus is on bridging the gap between electromagnetic field theory and the design and implementation of wireless applications, with a special interest for pulsed-field, digital data transfer. His broader research interests cover antenna engineering and computational electromagnetics, with an emphasis on pulsed-field/time-domain electromagnetic propagation and non-periodic (interleaved) array antenna architectures. He is active in several antenna engineering European networks, primarily in the VISTA COST Action.