

Title: Recent Advances in Antenna Impedance Analysis and Matching Circuit Optimization

Speaker:

Dr. Jussi Rahola
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Date: Monday, 22 November 2010

Time: 10:30 am – 11:30 am

Venue: Room 603, Chow Yei Ching Building

Abstract:

In the talk several aspects of matching circuit analysis and antenna bandwidth estimation will be covered. Firstly, the differences between the traveling wave and power wave definitions of S parameters and reflection coefficients are reviewed. The power wave definition of S parameters greatly simplifies the analysis of matching problems when complex termination impedances are used. The optimization of broadband matching circuits for antenna applications is discussed. In the case of real matching components it is important to optimize the total efficiency of the matching circuit (taking into account the losses in the components) instead of just optimizing the impedance matching. The obtainable antenna bandwidth using matching circuits can be estimated using the Q value and bandwidth potential techniques. It is shown that the bandwidth potential approach produces more reliable estimates especially for broadband and multiresonant antennas. The concept of electromagnetic isolation removes the effect of matching so that the isolation of differently matched antenna systems can be reliably studied. Finally, the impedance matching and antenna analysis tool Optenni Lab is demonstrated.

Biography of the speaker:

Jussi RAHOLA obtained the M.Sc. (Tech.), Lic.Sc. (Tech.) and D.Sc. (Tech.) degrees in applied mathematics from Helsinki University of Technology in 1990, 1994, and 1996, respectively. The topic of his dissertation was the solution of large dense systems of linear equations of electromagnetics using iterative solvers and the fast multipole

method. From 1989 to 1999 he was working as an application specialist and a development manager in CSC - IT Center for Science Ltd, Finland. During 1997-1998 he also worked in CERFACS, Toulouse, France as a post-doctoral researcher in the field of computational electromagnetics. From 2000 to 2009 he worked in Nokia Research Center and Nokia Devices R&D as a senior research engineer, research manager and principal scientist in the field of antenna research. In 2009 he founded Optenni Ltd as is working as its managing director. He has over 30 publications in international journals and conference proceedings. His research interests include antennas, circuit simulation, computational electromagnetics and numerical mathematics.

Organizer: Dr. L. Jiang