EUROPEAN SCHOOL OF ANTENNAS (ESoA)

FREQUENCY DOMAIN TECHNIQUES FOR ANTENNA ANALYSIS

September 11-15, 2017 - Florence, Italy

Course coordinators:
Prof. Angelo Freni, (UNIFI), Prof. Juan R. Mosig (EPFL).
Additional teachers:
Prof. Z. Sipus (UNIZAG), Prof. A. K. Skrivervik (EPFL),
E.A. Attardo (Altair), M. Bandinelli (IDS)

The course aims to give the student an appreciation of the uses and limitations of frequency domain computational techniques applied to scattering and antenna problems. The module gives the student a thorough background in the methodology of these techniques from a fundamental standpoint, while giving a grasp of the practical applications. Emphasis will be given to the practical problems encountered in the implementation of the integral equation techniques (Method of Moments, linear systems, integration techniques, Green's functions, stratified media, convergence, singularities, periodic problems). Simple problems are considered to give an understanding of how the choices made in designing the algorithms translate into the real strengths and limitations of the software.
The morning's theoretical concepts will be put to work through the analysis and design of real life antenna examples during practical sessions in the afternoon. Participants are asked to come equipped with a laptop and a WiFi connection.

Course Topics

Introduction – A. Freni (UNIFI)
An overview on frequency domain methods. Mathematical aspects common to any frequency domain method. Review of basics of linear system solvers

Introduction to the Method of Moments – Z. Sipus (UNIZAG)
Construction of Moment Method programs. Examples of development of Moment Method codes (thin wire antennas, slot antennas). Scattering from metallic objects. Body of Revolution problems. Analysis of lenses and focalizing structures.

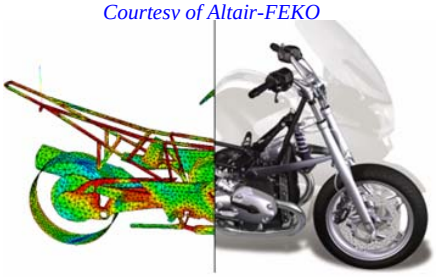
Mixed Potential formulations of some integral eq. – J. Mosig (EPFL)
Integral equations for electrostatics problems in free space. Mixed potentials for electrodynamics (full-wave) problems: vector and scalar potential. The Mixed Potential Integral Equation (MPIE) and its associated Green's functions. Method of Moments (MoM) implementations of the MPIE. Multilayered media: The spectral domain. Associated Green's functions as Sommerfeld integrals.

Periodic stuctures – A. Skrivervik (EPFL)
Definition of a periodic structure and examples of applications, eg. arrays, frequency selective surfaces and metamaterials. Periodic Green's functions in space and spectral domains. Grating lobes and blind spots. Convergence issues.

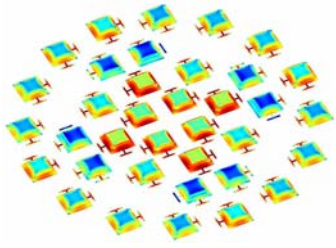
Large array modelling – M. Bandinelli (IDS)
Special acceleration techniques: theoretical overview and application examples

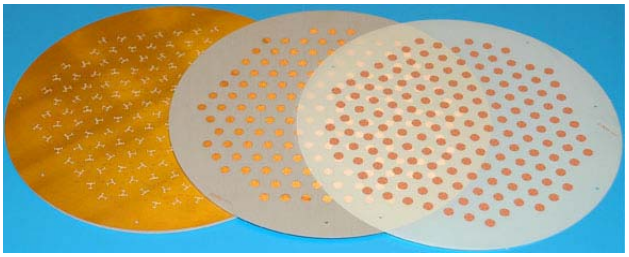
Interactive practical sessions using FEKO – E.A. Attardo (Altair)
Analysis of practical radiating and scattering examples using someof the computational electromagnetic techniques in the FEKO software package.

Courtesy of Altair-FEKO



Courtesy of IDS and Thales Alenia Space





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