Coordinators	 **F. FREZZA (SAPIENZA (ID 19))**  **S.MACI (High F., UNISI (ID 23))**	
Involved institutions	La Sapienza Università degli Studi di Roma — Università degli Studi di Siena	
Name of the course	**High Frequency techniques and Traveling-Wave antennas**	Type: M ; D ; A/D ; A ■
Place	**UNISI-Siena - SAPIENZA-Roma**	Date: February 21-26 2005

Summary

This course cover two topics of about 10 hours of lectures each plus exercises, all concentrated in a week. The first part cover the basic issue concerning with the fundamentals of high-frequency techniques; the second part is concerned with travelling wave antennas and basic leaky wave phenomena.

High-frequency techniques

1. Introduction on fundamentals - Equivalence principle, PO and Kirchhoff aperture radiation - Non uniform asymptotics - Space domain and spectral diffraction integrals- GO+diffraction, PO+fringe.
2. Uniform asymptotic evaluation of radiation and scattering integrals
2.1 Single variable diffraction integrals- interacting (saddle-point) - pole (wedge problem – spectral domain) - interacting (saddle-point) - end point (wedge problem – spatial domain)- interacting (saddle-point) - branch point (Sommerfeld problem) - three collinear saddle points (curved face) 2.2 Double variable diffraction integrals- saddle point 2D/partial derivative saddle points - saddle points and poles
3. Uniform theory of diffraction - Edge problem- Double edge- Corner problem - Curved surfaces
4. Incremental diffraction theories- PTD and ILDC- Incremental theory of diffraction (ITD)
- impedance BC and generalized impedance BC
5. Truncated Floquet Wave (FW) diffraction theory - Semi-infinite array- corner array- multilayer environment

Travelling wave antennas

General features and applications. Fields of a traveling-wave source, leaky waves in open structures. Characterization of traveling-wave antennas: determination of the phase and attenuation constants, relation to the radiation properties. Mechanisms employed to produce leakage: apertures, asymmetries, use of suitable modes. Scanning behavior, phased arrays of leaky-wave line sources, unit-cell approach. Transverse-equivalent networks, aperture admittance, transverse-resonance technique. Radiation-pattern shaping, aperture distribution: tapering procedures for leaky-wave antennas. Example of practical antennas: partially-open metallic waveguides, dielectric structures, printed lines. Feed, losses, manufacture issues. Measurement techniques.

Structure of the course

Lectures	Experimental labs.	Computer exercise	Total	Credits	Assessment typology
26		10	36	2	Attendance: 1 cr Assignements: 1 cr

Teachers

Name	Organization	Title
R. Tiberio	UNISI	Prof.
S. Maci	UNISI	Prof.
A. Toccafondi	UNISI	Prof.
F. Capolino	UNISI	Prof.
F. Frezza	SAPIENZA	Prof.
A. Galli	SAPIENZA	Prof.
P. Baccarelli	SAPIENZA	Researcher
P. Burghignoli	SAPIENZA	Researcher

Availability of dedicated structures

College rooms		Dedicated Labs		Classrooms		Computer rooms		Canteen	
yes	not	yes	not	yes	not	yes	not	yes	not
■		■		■		■		■	