

CARE

WP 5 Antenna Training Program

Prof. Stefano Maci
UNISI University of Siena

Prof. Milos Mazanek
CTU – Czech Technical University in Prague

CARE courses in red



2010

2011

ANTENNAS FOR SPACE APPLICATION
ESTEC - Noordwijk, 8-12 March, 2010
Coordinator: L. Salghetti

ULTRA-WIDEBAND ANTENNAS
KIT - Karlsruhe, 19-23 April 2010
Coordinator: W. Wiesbeck

ADVANCED MATHEMATICS FOR ANTENNA ANALYSIS
UNIZAG - Dubrovnik, 10-18 May 2010
Coordinators: Z. Sipus, S. Maci

MILLIMETER WAVE ANTENNAS
IETR - Rennes, 31 May - 4 June 2010
Coordinator: K. Mahdjoubi

TERAHERTZ TECHNOLOGIES, ANTENNAS AND APPLICATIONS
UPC - Barcelona, 7-11 June 2010
Coordinators: L. Jofre, A. Räsänen

ANTENNA MEASUREMENTS
UPM - Paris, 14-18 June 2010
Coordinators: M. Sierra Castaner, E. Beaumont

ANTENNAS FOR MOBILE COMMUNICATION
CTU - Prague, 21-25 June 2010
Coordinator: M. Fernando, M. Mazanek

RF-MEMS BASED ANTENNAS
METU - Ankara 28 June-2 July 2010
Coordinators: O. Civi, A. Skrivervik

ANTENNA HUMAN BODY INTERACTION
UMLV - Paris, 13-17 September 2010
Coordinator: J.M. Laheurte, P. Hall

ADVANCED COMPUTATIONAL EM FOR ANTENNA ANALYSIS
EPFL-POLITO - Lausanne, 4-8 Oct 2010
Coordinator: G. Vecchi, J. R. Mosig

Propagation for Space Application
ESTEC - Toulouse, 14-18 March, 2011
Coordinator: Martellucci

Industrial Antenna Design
IMST - Dusseldorf, 4-8 April, 2011
Coordinator: Simon / Manteuffel

Body Area Network
QMUL - London, 12-15 April, 2011
Coordinator: Hao

Periodic Structures for Antenna Application
SAPIENZA - Rome, 26-29 April, 2011
Coordinators: Frezza

Antenna Measurements for millimeter and submillimeter wavelengths
AALTO - Helsinki, May 9-13, 2011
Coordinator: Räsänen

Antenna Project Management
EPFL - Lausanne, May, 16-20, 2011
Coordinators: Skrivervik / Martinez

Propagation and MiMo
UNIS/KIT - Siena, 30 May - 3 June, 2011
Coordinators: Wiesbeck / Maci

Compact Antennas
UPC - Barcelona, 6-10 June, 2011
Coordinators: Jofre / Skrivervik

Terahertz Technology and Applications
UPC - Barcelona, 13-17 June, 2011
Coordinators: Jofre / Räsänen / Lombart

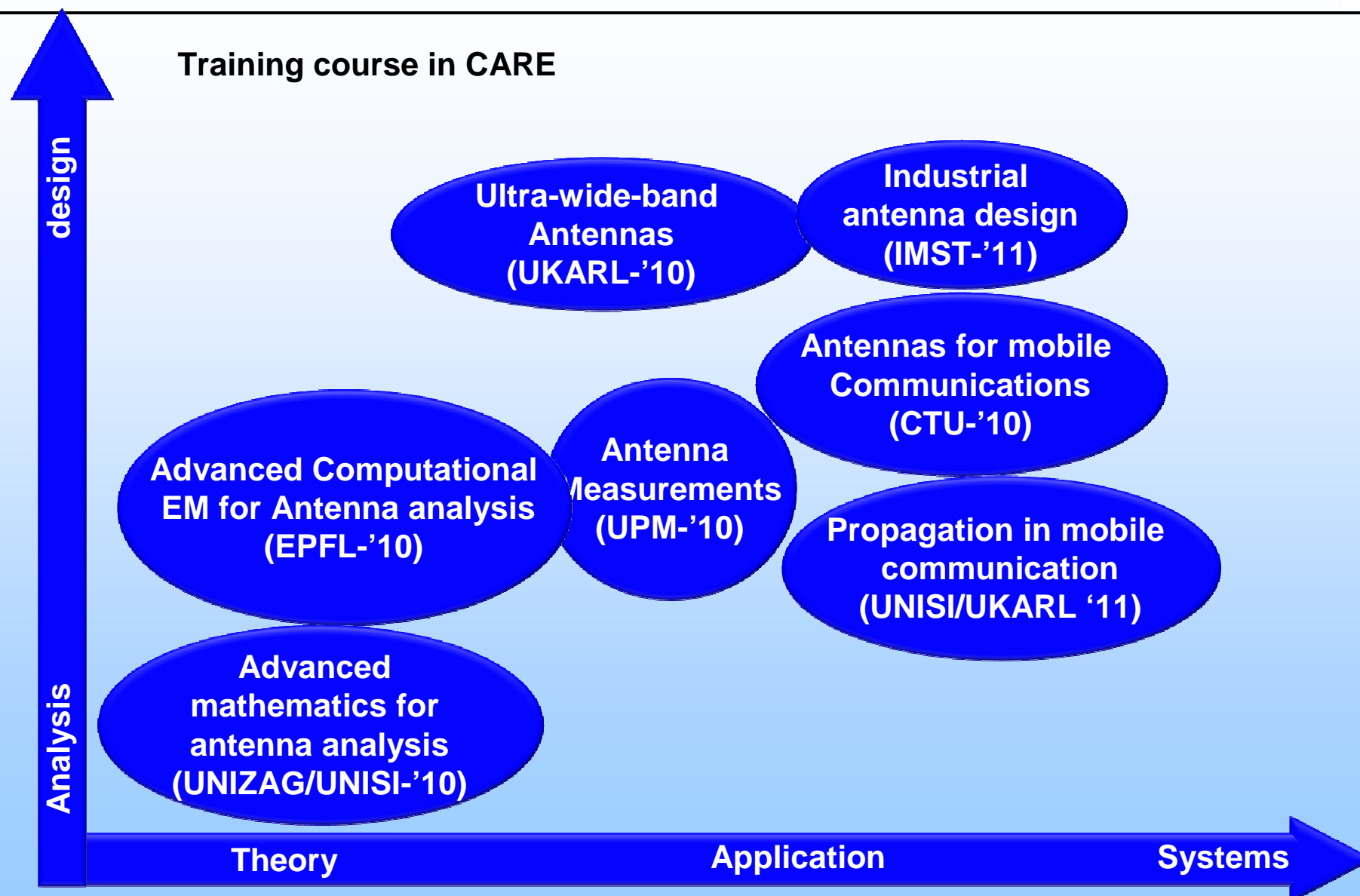
Advanced Near Field Measurements
DTU - Copenhagen, 20-24 June, 2011
Coordinator: Breinbjerg






















Antenna Imaging Techniques
UDELFT - Delft, 30 May, 3 July, 2011
Coordinator: Neto

Antenna Synthesis
UNINA - Naples, 5-9 September, 2011
Coordinator: Bucci

Frequency Domain Techniques for Antenna Analysis
UNIFI - Florence, 19-23 September, 2011
Coordinator: Freni

Reflector and Lens Antennas
CHALM - Gothenburg, 17-21 October, 2011
Coordinator: Kildal



									
S Maci UNISI	B. Lindmark KTH	A Freni UNIFI	L. Jofre, UPC	F. Frezza SAPIENZA	Z. Sipus UNIZAG	D. Manteuffel UNIKIEL	Y. Hao QMUL	G. Vecchi, POLITO	W. Ross Stone IEEE
									
L. Salghetti ESA-ESTEC	O. Bucci, UNINA	W. Wiesbeck KIT	P-S Kildal CHALMERS	K. Madjoubi IETR	P. Hall UBHAM	M Ferrando, UPV	O. Civi METU	Räisänen AALTO	A. Neto UDEFT
									
J.L. Dubard UNS	M Sierra Castaner UPM	M. Mazanek CTU	J-M Laheurte UMLV	C. Ibarr CTTC	A. Skrivervik EPFL	O. Breinbjerg DTU	W. Simon IMST	G. Gerini TNO	L. Foged SATIMO

April 19 - 23, 2010

Institut für Hochfrequenztechnik und Elektronik
Karlsruhe Institute of Technology, Karlsruhe, Germany

Teachers:

Prof. Werner Wiesbeck (IHE, Karlsruhe Institute of Technology)
Prof. Friedrich Jondral (CEL, Karlsruhe Institute of Technology)
Dr. Elena Pancera (IHE, Karlsruhe Institute of Technology)
Malgorzata Janson (IHE, Karlsruhe Institute of Technology)
Hanns-Ulrich Dehner (CEL, Karlsruhe Institute of Technology)
Christian Sturm (IHE, Karlsruhe Institute of Technology)

Prof. Werner Wiesbeck



Course Topics

- UWB antenna basics and principles of wideband radiators, transient antenna characterization, UWB antenna quality measures derived from the antenna impulse response
- UWB radio channel modelling and channel measurements with special respect to the antenna influence
- Properties and design considerations of the following UWB antennas: UWB ridged horn antennas, Vivaldi antennas, logarithmic periodic antennas, mono cone antennas, spiral antennas, aperture coupled bowtie antennas, multimode antennas, sinuous antennas, impulse radiating antennas
- UWB leaky lens antenna, Green's function of a slot printed between two infinite dielectrics, dual band leaky lens antenna design, elliptical lens concept, design of the feeding network
- Impulse radio UWB principles, modulation schemes, pulse shapes, time-hopping codes, transmitter architectures, receiver architectures, rake structures, stochastic properties of impulse radio UWB, temporal/spectral properties, amplitude properties, multi-band OFDM
- Beam-forming techniques, lenses and networks: Luneburg lens, Rotman lens, Maxon-Bloss Matrix, Butler Matrix, linear UWB antenna arrays, true time delay beam-forming, circular arrays
- UWB Radar and Imaging, time vs. frequency domain Radar, high-resolution Radar and imaging, applications
- UWB sensor networks, distributed computing, localization and imaging

Date: May 10– 18, 2010

Place: Dubrovnik

Organizer: Prof. Zvonimir Sipus, University Zagreb (Croatia)
Prof. Stefano Maci (University of Siena)

Audience: PhD students, researchers and industry engineers

Fees: PhD students / university employees: 400 €

Industry employees: 1000 €

(The registration fee includes course materials, lunches, coffee and a social dinner)



Monday: FUNDAMENTAL THEOREMS FRAMED IN THE ANTENNA ANALYSIS		
Z. Sipus (UNIZAG)	9.30-10.00	<ul style="list-style-type: none"> The European School of Antennas Introduction to the course
A. Freni (UNIFI)	10.00-13.00	Fundamental theorems (1) <ul style="list-style-type: none"> Uniqueness Energy
	Lunch and swimming break	
	15.30-19.30	Fundamental theorems (2) <ul style="list-style-type: none"> Equivalence and induction theorems Integral equation and Computational Electromagnetics (CEM) HF approximations for scattering and diffraction Examples and exercises

Tuesday: FUNDAMENTAL THEOREMS AND SCALAR AND VECTOR WAVE EQUATION IN ABSENCE OF SOURCES		
A. Freni (UNIFI)	9.00-13.00	Fundamental theorems (3) <ul style="list-style-type: none"> Reciprocity Theorem Implication of reciprocity in IE-MoM and application in CEM
	Lunch and swimming break	
	15.30-17.30	Fundamental theorems <ul style="list-style-type: none"> Examples and exercises
Z. Sipus (UNIZAG)	17.30-19.30	Scalar wave equation <ul style="list-style-type: none"> Introduction to waves Definition of scalar wave equations; basic properties Solving scalar wave equation using separation of variables

Wednesday: SCALAR AND VECTOR WAVE EQUATION IN ABSENCE OF SOURCES AND COMPLEX ANALYSIS		
Z. Sipus (UNIZAG)	9.00-13.00	Scalar wave equation <ul style="list-style-type: none"> Solving scalar wave equation using separation of variables Eigenvectors, eigenmodes and completeness relations Examples and exercises Vector wave equation <ul style="list-style-type: none"> Helmholtz and Debye potentials Open and closed domains Green's identities Examples and exercises
	Lunch and swimming break	
	15.30-17.30	Examples, open discussion and exercises <ul style="list-style-type: none"> Scalar and vector wave equation
S. Maci (UNISI)	17.30-19.30	Complex analysis fundamentals <ul style="list-style-type: none"> Complex transformations Transformation of complex variables

Thursday: GREEN'S FUNCTION		
S. Maci (UNISI)	9.00-13.00	Green's functions <ul style="list-style-type: none"> Generalities Scalar and Dyadic GF Scalar GF representation <ul style="list-style-type: none"> 1D, 2D and 3D GF for the wave eqs. GF in cylindrical spectral coordinates open-domain <ul style="list-style-type: none"> ρ-Tx line and z-Tx line GF in closed domains <ul style="list-style-type: none"> Waveguides and cavities
Lunch and swimming break		
	15.30-19.30	Examples and Exercises: <ul style="list-style-type: none"> Parallel plate waveguide Horizontal dipole in stratified media Dipoles close to cylindrical multistrates Dipoles close to a wedge

Friday: ASYMPTOTIC EVALUATION OF INTEGRALS		
S. Maci (UNISI)	9.00-13.00	Basics of asymptotic evaluation of integrals: <ul style="list-style-type: none"> Typical integral representation Saddle points and SDP Examples and exercises
Lunch and swimming break		
	15.30-19.30	Non Uniform and Uniform asymptotics: <ul style="list-style-type: none"> Saddle-point – pole interaction (wedge problem) Saddle-point – complex pole (evanescent wave diffraction, slab Green's function) End-point – saddle-point (PO-diffraction, Shadow boundary diffraction)

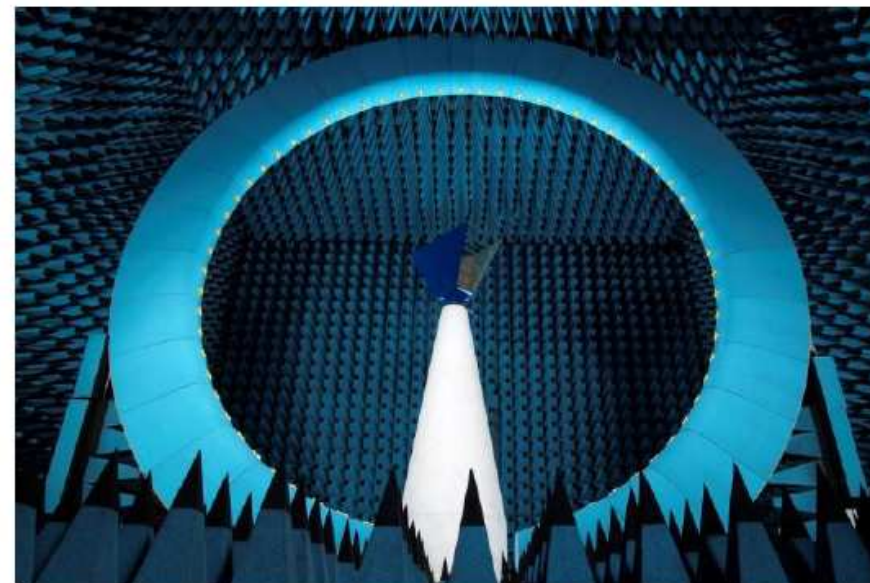
Saturday: EXERCISES		
S. Maci (UNISI) Z. Sipus (UNIZAG)	9.00-13.00	Examples, open discussion and exercises <ul style="list-style-type: none"> Green's functions Non Uniform and Uniform asymptotics

Monday: PERIODIC STRUCTURES		
G. Vecchi (POLITO)	9.00-13.00	Periodic structures: <ul style="list-style-type: none"> Floquet Theorem Green's functions for periodic structures in space domain Green's functions for periodic structures in spectral domain Convergence problems
Lunch and swimming break		
	15.30-17.30	Examples, open discussion and exercises <ul style="list-style-type: none"> Periodic structures
Z. Sipus (UNIZAG)	17.30-19.30	Examples, open discussion and exercises

Tuesday: PERIODIC STRUCTURES (CONT'D) and FINAL TEST		
A. Skrivervik (EPFL)	9.00-13.00	Periodic structures – advanced topics: <ul style="list-style-type: none"> Acceleration of calculation of Green's functions (summation by parts, Shanks' transform, Ewald's transform,...) Dispersion of Green's functions for periodic structures (dispersion diagrams, bandgaps, EBG structures, metamaterials)
S. Maci (UNISI)	14.30-17.30	Final assessment tests
Z. Sipus (UNIZAG)		

Paris, June 14-18, 2010

Monday			
<i>Measurement Theory</i>			
9:30	10:00	Welcome / instructions	Philippe/Lars/Manuel
10:00	11:00	Introduction to Antenna Measurements	Ph. Garreau
11:00	11:30	Coffee Break	
11:30	13:00	Far field and Compact Range	M. Sierra
13:00	14:00	Lunch	
14:00	16:00	Planar NF theory	S. Pivnenko
16:00	16:30	Coffee Break	
16:30	18:00	Spherical NF theory	S. Pivnenko
Tuesday			
<i>Measurement Preparation</i>			
9:00	10:00	Cylindrical NF theory	M. Sierra
10:00	11:00	Introduction to multiprobe systems - Part 1	L. Foged
11:00	11:30	Coffee Break	
11:30	13:00	Introduction to multiprobe systems - Part 2	L. Foged
13:00	14:00	Lunch	
14:00	16:00	Measurement Uncertainty (incl alignment)	S. Pivnenko
16:00	16:30	Coffee Break	
16:30	18:00	Gain and Polarization measurements: 3 Antenna method	S. Burgos
18:00	19:00	Research topics: Higher order probe corection techniques	S. Pivnenko
Wednesday			
<i>Measurements</i>			
9:00	13:00	Technical Visit: Renault	
13:00	14:00	Lunch	
14:00	16:00	Team 1: Antenna Diagnostics	G. Vecchi
14:00	16:00	Team 2: Hands-on measurements with SL	Satimo
16:00	16:30	Coffee Break	
16:30	18:30	Team 2: Antenna Diagnostics	G. Vecchi
16:30	18:30	Team 1: Hands-on measurements with SL	Satimo
Social Event Wednesday Evening			
Thursday			
<i>Measurement Diagnostics</i>			
9:00	11:00	Practical Diagnostics of Failure During Measurements	Ph. Garreau
11:00	11:30	Coffee Break	
11:30	13:00	Practical Diagnostics of Failure During Measurements	Ph. Garreau
13:00	14:00	Lunch	
14:00	16:00	Practical Diagnostics of Failure During Measurements	Ph. Garreau
16:00	16:30	Coffee Break	
16:30	18:00	Practical Diagnostics of Failure During Measurements	Ph. Garreau
18:00	19:00	Research topics: TBD	M. Sierra
Friday			
<i>Closing</i>			
9:00	11:00	Antenna Measurement postprocessing using Diagnostic techniques	M. Sierra
11:00	11:30	Coffee Break	
11:30	13:00	Exam, Evaluation, Closing	All



COURSE COORDINATORS

- Dr. Manuel Sierra Castañer. Universidad Politécnica de Madrid (UPM)
m.sierra.castaner@gr.ssr.upm.es
- Lars Jacob Foged (SATIMO)
lfoged@satimo.com

21st to 25th June 2010

Czech Technical University in
Prague, Faculty of Electrical
Engineering



Teachers

organized by: *prof. Milos Mazanek* - Czech Technical University in Prague
Prof. Miguel Ferrando-Bataller - University of Valencia
Prof. Lluís Jofre - Universitat Politècnica de Catalunya
Prof. Manuel Sierra-Perez - University of Madrid
Dr. Marta Martínez-Vasquez - IMST Germany

Coordinator:
Prof. Milos Mazanek

Fees: PhD students / university employees: 400 € Industry employees: 1000 €

Topics

1. Antennas for user terminals: Small antennas
2. Theory of characteristic modes and its applications to antenna design
3. Higher order modes for the design of planar antennas with specific properties
4. Propagation in build-up areas
5. Base stations and smart antennas
6. Design of antennas for mobile communications devices



Date: October 4 – 8, 2010

Place: Ecole Polytechnique Fédérale de Lausanne (EPFL)

<http://www.epfl.ch/index.en.html>

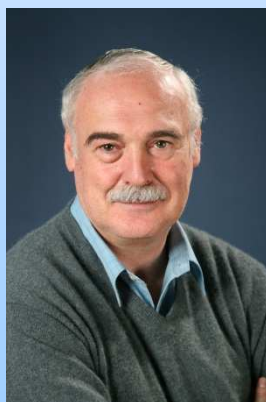
Organizer: Prof. Giuseppe Vecchi, Politecnico di Torino (I)

Prof. Juan R. Mosig, EPFL (CH)

Audience: PhD students, researchers and industry engineers

Fees: PhD students / university employees: 400 € Industry employees: 1000 €

(The registration fee includes course materials, lunches, coffee and a social dinner)



Course Topics:

Review of IE/MoM fundamentals – G. Vecchi, F. Andriulli

Integral Equation/MoM formulation; Geometrical and EM discretization; Antenna modeling issues; Problem conditioning; Iterative Methods for linear systems; Convergence and preconditioners

Integration methods for 3D structures – F. Vipiana

Singularities in MoM matrix entries: overview; Integration of singular terms for patches and wires

Higher order basis functions – D.R. Wilton

Higher order polynomial vector basis functions; Higher order modeling of both geometry and equivalent currents

IE/MoM for multilayered planar structures (1) – J. R. Mosig

Integral equations, spectral domain potentials; Sommerfeld integrals, spectral singularities, modal expansions

IE/MoM for multilayered planar struct. (2) – A. G. Polimeridis

Integration of singular terms for multilayer planar structures; Double exponential techniques, weighted averages

Domain Decomposition – G. Vecchi

Aggregate functions: strategies, implementations

High density mesh and multi scale problems – G. Vecchi

“Low frequency” issues in antenna modeling; Mesh related issues: solenoidal decomposition; Multi Resolution (wavelet) approaches for 3D structures

Fast methods – F. Andriulli

Overview of fast methods; FFT based methods (AIM); Fast multipole method (FMM): single and multilevel (MLFMA); Static based methods (ACA)