



ELEctromagnetic DIAgnostics Research Center

Engineering and Computer Science Department

University of Trento

Via Sommarive 14, 38123 Trento, ITALY

Phone +39 0461 282057

Fax +39 0461 282093

SEMINAR:

Metamaterials for Wave Engineering

Speaker: Prof. Stefano Maci
(University of Siena, Italy)

Date: 21 May 2012 @ 3:30 PM

Location: Room A204 – Polo Scientifico F. Ferrari - Povo

Note: The seminar will be held in English

Contact: Prof. Andrea Massa (andrea.massa@ing.unitn.it)

In the recent years, there has been an increasing research interest in the realization of new composite materials to be applied in the design of antenna and microwave components. These special media, often called "metamaterials", are generally generated by artificially fabricated inclusions or inhomogeneities embedded in a host medium and may exhibit macroscopic electromagnetic or optical properties that do not exist in nature. The underlying interest in metamaterials is the potential to have the ability to engineer the electromagnetic and optical properties of materials for a variety of applications.

In this talk, the general concept of metamaterial will be first introduced by considering both their three-dimensional (volumetric metamaterials) and two-dimensional (planar metamaterials or metasurfaces) realizations. It will then be shown how it is possible to tailor and manipulate an incident wave by controlling the electromagnetic properties of the metamaterials. Some of the most important achievements in this field will be reviewed and some practical applications in the areas of antenna operation and EM fields control will be described, including the design of compact and/or high performance antennas and microwave devices, of flat lenses and of electromagnetic cloaks.

Finally, an overview of the possible approaches for the theoretical and numerical characterization of metamaterials will be provided.

• About the Speaker

Stefano Maci received his laurea degree (cum laude) in Electronic Engineering from the University of Florence, Italy. Since '98 he is with the University of Siena, Italy, where he presently is a Full Professor. He is Director of the PhD School of Engineering at the University of Siena and head of the Laboratory of Electromagnetic Applications (LEA). His research interests include EM theory, antennas, high-frequency methods, computational electromagnetics, and metamaterials. He was a co-author of an Incremental Theory of Diffraction for the description of a wide class of electromagnetic scattering phenomena at high frequency, and of a diffraction theory for the analysis of large truncated periodic structures. He was responsible and international coordinator of several research projects funded by the European Union (EU), by the European Space Agency (ESA-ESTEC), by the European Defence Agency, and by various European industries. He was the founder and presently is the Director of the European School of Antennas (ESoA), a post-graduate school that comprises 30 courses on antennas, propagation, and EM modelling though by 150 teachers coming from 30 European research centres.

Stefano Maci was Associate Editor of IEEE Transactions on EMC, two times Guest Editor of IEEE Transaction on Antennas and Propagation (IEEE-TAP), Associate Editor of IEEE-TAP. He is presently a member of the IEEE AP-Society AdCom, a member of the Board of Directors of the European Association on Antennas and Propagation (EuRAAP), a member of the Executive Team of the IET Antennas and Propagation Network, a member of the Technical Advisory Board of the URSI Commission B, a member of the Italian Society of Electromagnetism. He was recipient of several national and international prizes and best paper awards, and he is principal author or co-author of 110 papers published in international journals, (among which 70 on IEEE journals), 10 book chapters, and about 350 papers in proceedings of international conferences.