Lorenzo Ciorba

Curriculum vitae

Current position: **Research Fellow** at National Research Council (CNR); Institute of Electronics, Computer and Telecommunication Engineering (IEIIT); Applied Electromagnetics and Electronic Devices Group; Torino (TO)

Education

current	**Ph.D. student**, *Electrical, Electronics and Communications Engineering* , Politecnico di Torino.
2015–2018	**Master's Degree**, *Mathematical Engineering*, Politecnico di Torino. Grade:*110/110*
2012–2015	**Bachelor's Degree**, *Mathematics for Engineering Sciences*, Politecnico di Torino. Grade:*96/110*

Master thesis

at	*Istituto Superiore Mario Boella (ISMB), Laboratorio antenne e compatibilità elettromagnetica (LACE)*
title	*Hybrid antenna measurement and simulations*
supervisor	prof. Giuseppe Vecchi
cosupervisors	G. Giordanengo, M. Righero
abstract	see next page

Interests

I am interested in mathematical models, discretization of partial differential equations, linear algebra and numerical methods.

Languages

Italian	Mothertongue	
English	Level:B2	*Certification: IELTS 5.5*

Computer skills

Development	MATLAB, C, Java

Publications

- title *Numerically Enhanced Antenna Measurement Technique*
  authors L.Ciorba, M. Righero, G. Giordanengo, G. Vecchi
  meeting 2018 IEEE International Symposium on Antennas and Propagation and USNC-URSI Radio Science Meeting; 8-13 July 2018 ; Boston, Massachusetts
- title *Near-Field Phase Reconstruction for UAV-based Antenna Measurements*
  authors L.Ciorba, G. Virone, F. Paonessa, S. Matteoli, K.Z. Adami, A. Magro, O.A. Peverini, G. Addamo, G. Giordanengo, M. Righero, G. Vecchi
  meeting 13th European Conference on Antennas and Propagation (EuCAP); 31 March - 5 April 2019; Krakow, Poland
- title *Far Field Evaluation from Undersampled near Field Measurements Using Numerically Built Basis Functions*
  authors L.Ciorba, G. Giordanengo, M. Righero, G. Vecchi
  meeting 13th European Conference on Antennas and Propagation (EuCAP); 31 March - 5 April 2019; Krakow, Poland

Other interests

I play guitar since I was 15 years old, in particular I play in an amateur band.

Abstract of my thesis

The thesis analyzes a method to determine the electric far-field radiated by electrically large antennas (or antennas placed over structures) using few measured near field samples of the electric field and numerically constructed expansion functions. Full test of an antenna can be complex and time consuming. When working with classical expansion functions, namely vector spherical harmonics for classical spherical range measurement, an estimate on the number N of sampling points one needs to acquire is given by

$$N = \frac{4\pi r^2}{(\frac{\lambda}{2})^2} \tag{1}$$

where r is the radius of the minimum sphere enclosing the radiating structure and λ the wavelength. When structures which are large in terms of wavelength are considered, as antennas placed on satellite or other platforms, this number is so large that makes the measurement easily impractical. The aim of this method is to use information about the antenna, the scattering structure and the far-field of the antenna in isolation to drastically reduce the number of sampling points needed to determine the radiated far-field of the antenna mounted on the platform. More precisely, the antenna is enclosed in a virtual surface, where unknown electric and magnetic currents are placed. We determine these currents imposing matching between the field radiated by the currents and the near-field samples acquired, and then use them to evaluate the far-field. We show results of reconstructions of simulated electric fields of

- a dipole over a plane mock-up at frequency 3 GHz,
- a reflector antenna at frequency 8 GHz,

while in the last chapter we show results of a reconstruction with measured near field samples of the same reflector antenna.