



PhD in Information Technology and Electrical Engineering

Università degli Studi di Napoli Federico II

PhD Student: Giovanni Gravina

XXXIV Cycle

Training and Research Activities Report – First Year

Tutor: Prof. Carlo Forestiere



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PhD in Information Technology and Electrical Engineering - XXXIV Cycle

Giovanni Gravina

1. Information

- a. Giovanni Gravina , MSc in Electronic Engineering – University of Naples Federico II
- b. XXXIV Cycle- ITEE – University of Naples Federico II
- c. Without fellowship - Air Force Officer at 10th Aircraft Maintenance Unit (Lecce)
- d. Tutor: Prof. Carlo Forestiere

2. Study and Training activities

- a. Courses (credits in brackets)
 - Electrodynamics - MSc course of Mathematical Engineering
 - Numerical Methods in Electromagnetism - MSc course of Electrical Engineering
 - Advanced Techniques for Security and Robustness Testing - Ad hoc course (2)
 - MHD equilibrium and stability - Ad hoc course (1)
- b. Seminars
 - A leap into functional data analysis: from theory to applications (2)
- c. External courses
 - PNRM 2019: AIR4MAM- Immersive training and remote maintenance for ItAF (2)

	Credits year 1							
		1	2	3	4	5	6	
	Estimated	bimonth	bimonth	bimonth	bimonth	bimonth	bimonth	Summary
Modules	20	0	3	0	0	6	6	15
Seminars	5	0	2	0	0	0	2	4
Research	35	3	3	3	4	4	4	21
	60	3	8	3	4	10	12	40

3. Research activity

My research activity is mainly focused on the development of new spectral methods .

During my first year, the electromagnetic modes and the resonances of homogeneous, finite size, two-dimensional bodies have been examined in the frequency domain by a rigorous full wave approach based on an integro-differential formulation of the electromagnetic scattering problem. Using a modal expansion for the current density, geometric and material properties of the body have been detached and the integro-differential equation for the induced surface current density has been solved. The current modes and the corresponding resonant values of the surface conductivity (eigen-conductivities) have been evaluated by solving a linear eigenvalue problem. The eigen-conductivities and the current modes have been studied in detail as the frequency, the shape and the size of the body vary. Open and closed surfaces have been considered. Moreover, the invariance of important topological features (number of sources and sinks, the number of vortexes, the direction of the vortexes) has been shown.

4. Products

- C. Forestiere, G. Gravina, G. Miano, M. Pascale, R. Tricarico
Electromagnetic modes and resonances of two-dimensional bodies, Physical Review B.