Marinel-Costel TEMNEANU

Summary of the Habilitation Thesis

Electrical Measurements and Materials

Teaching and Professional Activity

Since 1992, when I entered, as young assistent, in the Department of electrical materials and measurement, Faculty of Electrical Engineering, I have carried all of my teaching activities within this department, where I successively held the positions of university assistant (1995), lecturer (1999), associate professor (2003), and professor (2009). I have conducted teaching and practical activities in the following subjects: Electrotechnical Materials, Statistical Quality Control and Reliability, Defectoscopy and Diagnosis, Manufacturing Technologies of Measuring and Control Devices, and Elements of Electronic Technology, for which I have developed teaching materials available in both printed and electronic formats.

Given the specific nature of these subjects, where the necessary equipment for conducting practical activities is very expensive, I have made special efforts to obtain funding to purchase high-performance laboratory equipment. Participation in various national and international research competitions allowed me, as project director, to obtain 12 research contracts through which I acquired equipment worth over 430,000 euros. A significant part of this equipment (estimated at 330,000 euros) is used in practical applications throughout the study years, with the remaining one being used in research activities and in the preparation of diploma/dissertation projects by final-year students.

Since 1996, I have supervised students in preparing their diploma or dissertation projects (between 2 and 6 students each year). The topics addressed were specific to the field in which I work, many of them having a high technical level and being completed with a practical component.

I have participated as a member in the admission committee of the Faculty of Electrical Engineering between 1997-2007 and 2016-2024, as well as in many graduating committees for both undergraduate (bachelor's) and postgraduate (master's) studies. I have coordinated two undergraduate study programs and two educational projects (ROSE and FDI).

Scientific research activity

The organizational and administrative framework for my research activity is provided by the *METROS Center of Excellence*, a research center within the Faculty of Electrical Engineering, "Gheorghe Asachi" Technical University of Iași.
Since 1996, I have participated in research activities conducted within 55 projects obtained through research competition (9 international projects and 46 national projects). Of these, 12 projects were obtained as project director, all of them obtained after earning the PhD title, and 3 carried out after obtaining the title of Professor.

The research topics addressed include:

- Developing algorithms and tools for acquiring electrical signals useful for evaluating the magnetic properties of materials, with dynamic amplification at the sample level, to increase the accuracy of determining energy losses in magnetic materials operating under distorted conditions;
- Investigating the possibilities of using artificial intelligence algorithms (artificial neural networks, fuzzy systems) for modeling the magnetic characteristics of materials;
- Analyzing the possibilities of realizing new sensors for magnetic field, current, and torsion using the giant magnetoimpedance effect of amorphous magnetic wires. A complete study was conducted on the characterization of low-magnetostriction wires of the composition $(Co_{94}Fe_6)_{72.5}B_{15}Si_{12.5}$, and two constructive types of sensors have been analyzed: one with axial arrangement of the sensitive element and the other one with axial arrangement of the current path;
- Analyzing the possibilities of developing new materials for electromagnetic shielding using a 3D knitted spatial structure. H-shaped structures with outer layers of conductive composites (in different compositions) were created and characterized in terms of shielding efficiency and lifecycle;
- Analyzing the possibilities of developing new materials for making protective clothing against electrostatic discharges using a new concept of bi-layer composite material;
- Analyzing the possibilities of creating smart meters with appliance recognition units based on their energy footprint (S P Q D amplitude and phase of harmonics in different operating regimes);

- Analyzing the possibilities of creating industrial devices equipped with primary seismic wave detection modules.

The obtained research results have been communicated by publishing over 80 scientific articles, of which 22 are indexed in WOS and 28 in BDI.

Coordination capacity

As research projects director, I have coordinated both the research activity and the reporting of results for 12 scientific research projects, ensuring that each of these projects meets its objectives and assumed indicators within the established deadlines. I have also significantly contributed to the training of young specialists, with PhD students being involved in 6 of these research teams, and Master's students also participating.

Between 2008 and 2016, as the Director of the Department of Electrical Measurements and Materials, I contributed to establishing the department's development policies, coordinated the development of curricula for three study programs, and also participated in drafting Self-Evaluation Reports for periodic evaluations.

Between 2016 and 2024, as the Dean of the Faculty of Electrical Engineering, I coordinated all teaching and scientific research activities within the Faculty.

I believe that my entire project management and university management experience to date provides strong arguments regarding my ability to correctly identify the challenges in my field of activity, both in teaching (the need for continuous curricular adaptation, digitalization, and internationalization of the process) and in scientific research (the need for real knowledge transfer to economic agents, the creation and consolidation of national and international partnerships, strengthening interdisciplinarity), which are the main proposed development directions.