

Electrical machines in electromechanical systems for sustainable development

Modern electromechanical technologies can help reducing the environmental impact of different economic sectors: industry, agriculture, energy, transport, etc. New electromechanical technology is constantly finding application in areas traditionally served by hydraulic and pneumatic systems and offers an efficient and cost-effective alternative to fluid power as it eliminates leaks, is quieter, requires less maintenance than older technologies and is more environmental friendly. Electromechanical systems have suffered important changes over the last years in terms of their size, weight and power consumption, delivering power only when is needed and spending a part of their cycle time at peak consumption compared to hydraulic and pneumatic systems.

Present work summarizes the research activity of the candidate after defending the PhD Thesis at the Technical University of Cluj-Napoca, confirmed by the Ministry of National Education, on the basis of Order no. 3951, dated 5th of June 2001.

The research and teaching activities of the candidate after obtaining the PhD degree followed very closely the guidelines of the Sustainable Development politics, oriented on the benefits and interest of Electrical Engineering in this area. The main research directions of the candidate activity after 2001 are:

- Condition monitoring and diagnosis in electrical machines;
- Electrical machines and drives for automotive applications;
- Electrical machines and electromechanical systems for renewable energies based conversion systems.

Between 2001 and 2002, for seven months, the candidate worked as a postdoc researcher under the coordination of a well known experienced researcher, professor Gerard A. Capolino from the University of Picardie Jules Verne, Amiens, France (UPJV). During this period she approached condition monitoring and diagnosis of electrical machines in general, and of induction machines in particular. The research activity in this field was extended after her return in Romania, working together with the former promoter of her thesis, professor Karoly Biro, keeping also the contact with members of CREA Department at UPJV. The results of the research activity in this field will be presented in Chapter 2.

Since 2006 the candidate oriented her research activity towards two important research directions: automotive and renewable energies based applications. She continued the collaboration with her mentor, Professor Karoly Biro, but she also started to develop her own research projects. Most of the research subjects of professor Biro PhD students theses were proposed and followed by the candidate, working as a co-supervisor. The results of this activity are presented in Chapters 3 and 4.

2009 was an important moment in the professional career of the candidate, by obtaining the title of professor at the Technical University of Cluj-Napoca. This confirmed her experience for taking the next step: research group coordinator. Since then, the candidate applied and obtained research funds through several national and European calls.

The present work is organized in 5 chapters. First chapter reveals the context of the research work and its approach. Chapter 2, 3 and 4 present the results of the of the research activities under the three mentioned research lines. The last chapter synthesise the personal contribution of the candidate and defines the career development plan.

The research and development work of the candidate during her professional evolution is a very rich and dynamic one. The results can be summarized as follows:

- 4 textbooks
- 125 scientific articles presented and national and international conferences and published in scientific journals, from which :
 - 23 in ISI Thomson-Reuters indexed journals and/or proceedings;
 - 42 in BDI indexed journals and/or proceedings;
 - 21 cited by other articles in ISI Thomson-Reuters indexed journals and/or proceedings (78 citations) and in BDI indexed journals and/or proceedings (120 citations).
- 7 national grants as director/responsible ;
- 4 FP7 European projects as coordinator (2) and as Technical University of Cluj-Napoca responsible (2);
- Research team member of 12 national projects and 7 international projects.

The activity of the candidate as collaborator or as co-supervisor of PhD students work has to be mentioned. This activity is important in demonstrating that the candidate is prepared for obtaining the habilitation and enrolling her own PhD students to supervise.

A.DIRECȚII DE DEZVOLTARE A CARIEREI

Dezvoltarea durabilă este unul dintre conceptele care au stat la baza orientării activității de cercetare a candidatei și va juca același rol și în continuare, după obținerea atestatului de abilitare și a calității de conducător de doctorat. Direcțiile de cercetare vor urma întotdeauna tendințele la nivel european.

Direcțiile de dezvoltare a carierei candidatei pot fi grupate astfel:

- Creșterea numărului de proiecte de cercetare în calitate de director/responsabil, respectiv prin dezvoltarea de noi colaborări la nivel național și internațional (european, în principal), pentru atragerea de fonduri suplimentare.
- Atragerea unui număr mai mare de tineri absolvenți în activitatea de cercetare în calitate de doctoranzi și postdoctoranzi, din țară și străinătate.
- Crearea unui centru de cercetare puternic în jurul colectivului de Sisteme Electromecanice din cadrul Departamentului de Mașini și Acționări Electrice al Universității tehnice din Cluj-Napoca, centru capabil să concureze cu orice alt centru de cercetare din Europa.
- Înființarea unei companii spin-off a Universității Tehnice cu principalul domeniu de activitate în zona serviciilor de inginerie pentru aplicații industriale, în energie și transport.
- Extinderea acordurilor de colaborare atât pe linie didactică, cât și pe linie de cercetare cu universități și companii private din Europa și din spațiul internațional.