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HABILITATION THESIS

- SUMMARY -

**Modeling, simulation and experimentation of the vehicles
dynamic behavior in the road traffic system**

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The habilitation thesis "Modeling, simulation and experimentation of the vehicles dynamic behavior in the road traffic system", highlights, in a succinct and documented way, the main scientific and professional results obtained from 2006 to the present, after conferring the title of doctor in the fundamentally field of *Engineering Sciences, Mechanical Engineering* domain (PhD thesis - *Research on the use of sunflower oils as fuels for diesel engines*, publicly supported in July 2006). Also, in the habilitation thesis is indicated the evolution of the academic, scientific and professional career, specifying the main directions of development of the respective career, in the global context of the significant and current scientific achievements in the field of Mechanical Engineering. Last but not least, in the habilitation thesis the individual capacity to organize and coordinate didactic and research activities is highlighted. The main directions addressed in the academic, scientific and professional career refer to: *Dynamics of vehicles, Dynamics of the road traffic accidents, Safety of the vehicles and safety in road transport, Biofuels, Alternative energy sources for propelling vehicles and protecting the environment*.

The didactic activity carried out at the Technical University of Cluj-Napoca (UTC-N), as an assistant from *October 2000 to October 2002*, lecturer from *October 2002 to October 2008* and associate professor from *October 2008* to present, found in activities of teaching specialized courses, coordinating laboratory work, projects and productive practice, students from specializations coordinated by the Department of Road Vehicles and Transport (DART) within the Faculty of Automotive, Mechatronics and Mechanical Engineering (FARMM) of the UTC- N, as well as activities for guiding diploma projects, graduation and dissertation works.

The scientific activity carried out so far at DART within the FARMM of the UTC-N has followed and aims to develop and publish scientific papers and specialized books, in order to develop the knowledge in the field, by extending the results of the scientific research undertaken. To date, I have prepared 137 scientific papers, these being published in various Congresses / Scientific Conferences and specialized journals recognized by CNCSIS, in the country and abroad, 96 of them being published after the completion of the doctoral thesis. Also, I have elaborated and published through CNCSIS accredited publishers (with ISBN) eight didactic works (specialized books), four of them (1 - single author, 2 - first author and 1 - coauthor) being after the completion of the doctoral thesis. I have also elaborated and published, through international publishers, three chapters in books (coauthor), all after the completion of the doctoral thesis.

Regarding the scientific visibility, internal and international, we can mention the citations (2010 - 2019) of my own works (*312 citations*), in works of other authors published in ISI quoted journals (*177 - citations*) and in BDI indexed scientific journals (*135 - citations, 65 being in WoS publications - Web of Science and Scopus*).

I actively participated as a member in research groups, respectively as scientific leader of some objectives or activities within 14 research / development-innovation projects based on contract / grant, won through competition, of which seven were carried out after completion of the PhD thesis.

In January 2007, I received the Excellence Award from the Faculty of Mechanics of UTC-N, for the young researchers, for exceptional achievements recognized in the field of scientific research and for promoting the prestige of the university.

The main direction of the scientific research that is to be followed in my professional future is with reference to the possibilities and limits of the vehicle dynamics field development (classic, hybrid, electric), the reconstruction of the road accidents, the development of the vehicles safety systems and alternative energy sources for propelling the vehicles and protecting the environment. Important of the concern in this area is attested abundantly by the involvement of the most important international organizations in research programs and implementation of the road safety measures with the direct involvement of the vehicle accidents dynamics and the energy sources needed to self-propelling the vehicles.

The continuation and development of the academic, scientific and professional career aims constantly to be in line with the development objectives of the Department of Road Vehicles and Transport within the Faculty of Automotive, Mechatronics and Mechanical Engineering of the Technical University of Cluj-Napoca, in which I carry out my activity. Thus, of the aspects that are considered, it is mentioned: the extension of the specialized knowledge; the modernization of the courses and the practical activities, as well as the assisted learning, coordinated and directed; developing teaching skills and techniques within the current and prospective areas of competence; emphasizing the practical nature of laboratory activities, applications, year projects, diploma projects and dissertation works; encouraging the participation of students in local, national and / or international competitions of a scientific nature; widening and strengthening of professional relationships with scientific personalities from prestigious universities in the country and abroad; supporting and promoting multi-, inter- and cross-disciplinary scientific research in order to integrate into complex research projects at university, national and international level; accessing national and international research programs; collaboration with research structures in the country and abroad; generating relevant knowledge through research, innovation and creation, pursuing results that bring prestige and visibility and that can be transferred into products, technologies and solutions; collaboration with the economic-social environment by extending and applying the research results within the different economic organizations; development of scientific research activities both individually and within groups of the researchers; identifying the possibilities of patenting the results of scientific research; integration of students, masters and doctoral students in research in order to develop the human resource; participation in prestigious national and international scientific events and inventions fairs; increasing the quality of scientific publications; capitalizing on the results of the research undertaken by publishing them in prestigious international journals, ISI quoted and / or BDI indexed; active and sustained involvement in the development and maintenance of a work atmosphere based on collaboration, honesty and open communication; continuous improvement and performance throughout the career; taking responsibility for the contribution to the smooth running of the activity in the institution; active involvement in the development and strengthening of working and living relationships with members of the university community, supporting values such as: knowledge and mutual respect, respect for the rules of good conduct in the community as well as solidarity and academic collegiality.