

# Habilitation Thesis

## Intelligent monitoring systems achievement applied in power systems

### Abstract

In the frame of the habilitation thesis are presented the most important personal achievements on scientific, professional and academical plan that I've obtained in the period of time January 1997 – June 2014. This period follows to my public presentation of the PhD thesis that took place on January 17<sup>th</sup>, 1997 (later confirmed by the Order of the Ministry of Education No. 3991 from June 2<sup>nd</sup>, 1997).

The habilitation thesis is structured in three parts: the abstract, the technical presentation and the bibliographic references.

The habilitation thesis starts with an abstract that includes the synthesis of the habilitation thesis typed in English, as well as in Romanian language.

The second part of the thesis, named „Technical Presentation” includes five sections.

In the first section are presented briefly the remarkable achievements obtained through research and educational activities (list with publications and grants classified on three research directions, new disciplines introduced in the education plans, taught courses, contributions brought to the development of the syllabus, invited professor, practice activities with students, conducting license and dissertation theses, endowed laboratories and library, international cooperation, management activities, etc.). It has to be mentioned that in the period of time 1997 - 2014 I've published a number of 87 scientific articles, I've participated in the frame of 13 research grants / contracts won through competition (at 6 of them I was project director) and I've elaborated 10 books in the fields connected to the present thesis.

The second section presents the contributions adequate to the first research direction “Systems for monitoring and analysis of the technical status of the materials, electrical machines and electrical equipment used in power systems”. Studies performed in the frame of this research direction were unfurled initially separately on three planes: materials used in electrical and power engineering, electrical apparatus and equipment used in electric power installations, respectively electrical machines. Afterwards, a part of the obtained results were used in conceiving and achieving some products and some monitoring and analysis systems for the assessment of technical conditions inside power systems. The contributions brought in this research direction were published in 7 specialty books and 72 articles, the researches being unfurled in the frame of 8 research grants / contracts, whereas at 2 of them I was director. The first two works presented refer to the results obtained the study of varistors with zinc oxide (the influence of the manufacturing technology used on their qualities, the wear of the varistors based on ZnO during exploitation, a new method for the increase of the heat absorption capacity for a varistor based on ZnO etc.). The next paper presents an overvoltage protection module BMS 01 conceived, designed, achieved, tested, homologated and afterwards marketed by the author. At the respective moment, it was the first protection module class D entirely designed and achieved in Romania. The next two contributions presented make reference to the monitoring and analysis systems of the technical conditions of some high voltage electrical equipments. The last contributions presented refer to electrical induction machines and hydrogenerators.

The third section makes reference to the contributions obtained in the second research direction „Power quality monitoring equipment designed for the connection points between the transmission and distribution network”. The contributions brought on this topic were published in 2 specialty books and 6 articles, the researches being unfurled in the frame of 3 research grants / contracts, whereas at 2 of them I was director. It is presented a power quality monitoring system, at the voltage level of 110 kV, considering the existing situation at the respective moment. There are presented and commented a series of experimental results for different electric substations in the frame of the Romanian Power Grid Company Transelectrica, Transport Subsidiary Sibiu.

The fourth section presents the contributions from the third research direction „Power generation, transmission and delivery environment impact monitoring systems”. The contributions brought in this research direction were published in a specialty book and 9 articles, the researches being unfurled in the frame of 2 research grants / contracts, where I was director. It is presented an on-line system for the permanent monitoring of the impact on the environment, as well as a series of data registered with this system at different transforming stations in Romania. The registered data are then commented, being presented a series of measures for the protection of people and of the environment that must be considered during the exploitation of the installations.

The last section presents the evolution and development plan regarding the professional, scientific and academic career, as well as exact methods of putting them into practice. The conceived action plan includes three directions of research / teaching / practical applications that are: renewable energy sources; materials, equipments, methods and work techniques under high voltage; the impact of electrical installations on the environment. There are proposed a series of actual studies, such as: the study of the behavior of insulation systems to external loads (high temperature and/or high electric fields and/or high magnetic fields); studies of the electrical equipments destined to the work under high voltage (LST); achievement of laboratory tests and epidemiologic analysis for the evaluation of the influence of electric and/or magnetic field on human body; modelling of photovoltaic systems, in the meaning of extracting the maximal possible energy; the integration of fuel cells in different applications, etc. There are presented, as well, some methods for reaching these targets (objectives).

The third part of the habilitation thesis is dedicated to the bibliographic references grouped into: general references, list with publications in the period of time 1997 – 2014 and list with grants unfurled in the period of time 1997 - 2014.

The habilitation thesis ends with an annex regarding the overvoltage protection module, class D, manufactured by S.C. Protenergo S.A. from Timișoara, company where I was marketing director.

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