ADVANCED MEASUREMENT, COMMAND, CONTROL AND PROTECTION EQUIPMENT FOR POWER SYSTEMS

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Abstract

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" and includes ten 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 2001 - 2016 I´ve published a number of 83 scientific articles, I´ve participated in the frame of 14 research grants / contracts won through competition (at 5 of them I was project director) and I´ve elaborated 7 books in the fields connected to the present thesis.
The main research directions are:
A. Measurement, Command, Control and Automation Equipment;
B. Materials, Equipment, Methods and Work Techniques for Power Commutation;
C. Devices, Apparatus and Techniques for Power Systems Protection.
The second section presents the contributions adequate to all research directions. The most important scientific achievements are classified in 10 chapters, all three domains being mixed.
The first chapter is related to automation issues based on PLCs. This kind of particular embedded system is replacing traditional electric equipment based on relays and similar devices. Some applications, developed on the Low Voltage Apparatus Laboratory are presented as well.
The second chapter is describing some SCADA systems applied in district heating and power plant facilities. They are result of a project with COLTERM S.A. Timisoara and ELSACO Electronic S.R.L. Some of

these software applications are already in use at the Freidorf District Power Plant, in Timisoara or other similar companies.
The third part presents some issues about ferromagnetic forces in computational apparatus which are computed based on a new theory related to Maxwell's tensors. All theoretical aspects are verified by some practical measurements.
The fourth chapter presents some mathematical models applied in order to obtain an excellent interpolation of measured signals which are submitted to DSP's inside digital measurement systems. The B-Spline functions taken in consideration offer an excellent response, mostly to sinusoidal functions, belonging to standard power measurements. This response is certified by a set of experiments.
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The full abstract at:
http://www.upt.ro/img/files/2015-2016/doctorat/abilitare/frigura/Rezumat_teza_ro_en_F_Frigura.pdf

Habilitation Commission

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