

HABILITATION THESIS

INTEGRATED APPROACH FOR ENERGY PROCESSES CONTROL

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Abstract:

The field of control systems for industrial processes is a highly interdisciplinary domain, with the technical evolution imposing continuously new methods in the design, implementation or testing of innovative and performant solutions. Integrated approaches, starting with the industrial processes modelling and simulation and continuing with the design and implementation of control systems solutions, are necessary in the digital technologies context. These technologies are applied to all levels of process control. Also, the new “smart” concepts in smart grid, smart city, smart agriculture, cyber-physical system etc. strengthen the requirement for an integrated control. Improving the performance of command, control, supervision systems, the design of new functionalities for the fault detection and diagnosis systems, or designing the decision support systems are approaches that have a high impact on process control systems.

The habilitation thesis “Integrated approach for energy processes control” is structured on 3 main sections: the important results in the professional activity; Development of the research and mentoring domains; Plans for career evolution and development.

Firstly, the thesis presents a review of the personal scientific, professional and academic achievements, with references and on disciplinary thematic directions. These results were gained after the doctoral thesis defense at University POLITEHNICA of Bucharest in March 2002 and the PhD title confirmation by the Ministry of Education and Research, order no 4198 from 29.07.2002. My research continues to a good extent the tradition of my team (modeling and simulation of energy processes, system approach of regulation and information systems, industrial automation) and complements with new directions including case studies and advanced approaches of the control systems with methods for fault detecting and diagnosing or implementing of new control structures.

In the second section, the habilitation thesis formulates an interdisciplinary research trajectory that integrates three important perspectives in systems science: a) modeling and simulation in process control, b) fault detection and diagnosis systems and c) e-learning systems. This corroboration of these 3 essential points enables future interdisciplinary developments. It should be mentioned that the majority of subjects, grouped in the identified research branches, resulted from several grants and national and international projects where I participated as project director or as a team member. I realized the know-how transfer towards the young teachers, PhD or master students I collaborated with, as found from the joint publications.

The third part presents the extension and development plans for the university career, foreseen as continued and completed in the future for a higher level of knowledge and the development of the innovation and knowledge exchange. The thesis ends with a reference list that denotes the quality of the scientific findings and the national and international visibility of the presented research work.