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## **TEZA DE ABILITARE**

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## **THESIS SUMMARY**

The habilitation thesis presents the results of the research work that I have achieved since the defence of the PhD Thesis, i.e. in the period 1998 to 2015. The habilitation thesis contains two main sections, namely: the scientific, professional and academic achievements and the plan for future development of the scientific, professional and academic career. The final chapter consists of bibliography.

The first main section is divided into two parts: professional and academic achievements and scientific achievements. In the first subchapter, the author presents his professional development including studies and stages followed, teaching activity and project management. The author's contribution in main research fields and the relevance and impact of scientific results obtained are emphasized.

The scientific achievements are presented into detail in the second subchapter of the first section. The research activity carried out since the defence of the PhD Thesis was divided into three distinct areas, namely: mathematical modeling of the nuclear power plant processes and installations; safety analysis and severe accidents. For each area of research the main achievements are presented and the relevance and originality of personal contributions are highlighted.

In the modeling and simulation of nuclear power plants section, the main features of the mathematical models developed are described and the main results of the simulations performed with these models are presented.

In the field of nuclear safety analyzes, the research developed for the validation and application of the RELAP 5 code at the thermal-hydraulic phenomena related to the CANDU 6 design basis accident analysis are presented, focusing on the loss of coolant accidents.

The severe accidents section presents, the research related to analysis of mathematical models used in computer codes to identify the applicability to the simulation of the specific phenomena of CANDU reactors and understand their limitations, to assess the level of uncertainty during the simulation severe accident phenomena, to improve current models, and to assess severe accident management for CANDU6 reactors.

The results obtained in each research field were published in prestigious journals or presented at major conferences in the field.

The second main section introduces the plan for the future development of the scientific, professional and academic career. It contains the main goals I would further like to pursue and the modalities to achieve such. Also the main lines of research I would like to address in my future activity as doctoral thesis coordinator are given.

The bibliography contains 80 references quoted in the section dedicated to scientific achievements of the habilitation thesis out of which for 69 papers I am author or co-author.