

Preface

This book, which deals with electric transmission systems, is the English translation of two books written in French and published in 2003 by Hermes Science Publications (*Commande et Régulation des Réseaux Electriques, Stabilité et Sauvegarde des Réseaux Electriques*) in the electrical engineering series of the *Traité EGEM* (series in electronics and electric engineering and micro-electronics). It consists of two parts, corresponding to the two books in question. The first deals with the control, regulation and security of large scale electric power networks and the second with the stability and safety of the systems. The two parts include 5 and 4 chapters respectively, written by renowned experts from the industrial world or from universities. Its aim is to present the state of the art in the concerned domains as well as future prospects, especially in the fields of research and development. It is aimed at specialists, scientists and people involved in research in the electricity sector; it presupposes thorough knowledge of the basic concepts of electrical engineering. It has not been possible to cover all the problems related to the subject in an exhaustive manner in a single book. The subjects discussed in this collective work are the result of a choice made by the editor and based on his experience in research and teaching.

If some repetitions have occurred, they show the different approaches and attitudes towards essential phenomena and have been deliberately maintained with a pedagogical aim in mind and to reinforce the perception of sensitive issues. Moreover, it also makes it possible for each chapter to be read independently of the others. Different solutions are sometimes suggested to resolve some problems, which proves that the field is wide open and a lot of research and development remains to be carried out.

Electricity is an energy carrier that is indispensable to human activities in developed countries, and is an essential factor in development for poorer countries. Electric transmission systems are key elements in ensuring a reliable supply of good

quality electric power. The introduction of new generation systems or management methods of electric power must, as a result, be the subject of in-depth study to ensure compatibility with sure and reliable functioning of transmission networks. The recent changes in electric transmission systems and new constraints in the electric power sector in Europe have particularly complicated matters. The new paradigm in the field of development and management of the electric power sector, due to the recent restructuring of the latter on the application of European Directives to organize the electricity market in Europe, appears if not explicitly then at least in a subtle manner in most of the chapters. At present, the setting up of the European market for electric power, concomitant with environmental constraints, is proving to be much more difficult than expected by its protagonists and is presenting numerous challenges, which can only be removed at the cost of significant efforts in research and development. Moreover, recent major blackouts that have occurred in Europe in a number of countries (Sweden, Denmark, Switzerland, Italy and Greece) and the blackout of 4 November 2006 have reminded us that the stability and the collapse of electric systems are problems that are very real and not purely academic. The blackout of 4 November is particular affected several millions of Europeans for several minutes to an hour, and moreover led 200 million people to be at risk of being deprived of electricity for several hours, even several days. The current situation therefore considerably reinforces the value of books on electric power transmission networks, such as this one.

In the first part, the book focuses on fundamental aspects of electric power systems, the evolution of European transmission networks in the face of new regulations, the impact of decentralized production, generation and transmission planning, quality of the electric power supply and finally advanced control methods.

The second part deals with voltage stability, transient stability, the defense plan, electromechanical aspects of digital simulation and finally power electronics to enhance controllability, stability and power transfer capability of large transmission networks. It naturally completes the first part.

If this book could guide the reader towards research and development in the field of electric power systems, it would amply fulfill its aim.

Sincere gratitude once again to the different authors and all the people who have contributed from near or far to the publication of these two books in French, especially Olivier Deblecker of the Faculté Polytechnique de Mons (Faculty of Engineering, Mons) for his help in the formatting of the different contributions. I especially thank the editor of ISTE/Hermes Science for having decided on the publication of the two books in English and for having ensured its translation.

Michel CRAPPE
Professor Emeritus of the Faculté Polytechnique de Mons
(Faculty of Engineering, Mons)