Power Supply, Energy Management and Catenary Problems

Editor: Eduardo Pilo

Universidad Pontificia Comillas de Madrid, Spain

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Universidad Pontificia Comillas de Madrid, Spain

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Preface

In recent years, energy consumption has become a crucial concern for every transportation mode. However, it is in electrified railways where energy savings have shown a bigger potential due to (i) regenerative braking, allowing the conversion of kinetic energy into electric power, and (ii) vehicle interconnection, which permits other trains to use regenerated power. In the future, increasing energy efficiency and the emission reductions could lead railways to a significant gain of modal share. Hence, an important effort has been done by the industry, the operators, the research centers and governments to face this challenge. The proceedings of the last editions of COMPRAIL conferences on railways clearly reflect this sustained effort and main achievements of the past years.

   This book gathers selected research papers published in the Computer in Railways (COMPRAIL) series (IX, X and XI), which have been updated for this edition. Although the book is focused on infrastructure, in many cases it is not possible to analyze separately the train operation and the infrastructure's behaviour, particularly when the overall energy efficiency is taken into consideration. The analysis of the impact of regenerative braking is a good example of that, as it depends on all theses aspects: the on-board electronic system and its control, the way the train is driven, the other trains in the area (scheduling), the electrical characteristics of the traction network, the presence of reversible substations (substations with inverters) and energy storage devices, etc. Accordingly, a number of papers describing important issues related to energy management and train operation have also been included.

   This book is organized in two parts. The first focuses on energy management issues in train operation and spans topics such as train driving, scheduling, regenerative braking and on-board energy storage; the second deals with infrastructure including topics such as catenary design and monitoring, traction power systems analysis, computational issues in simulations and optimization.

   Readers will find in this volume important papers dealing with a variety of topics of current interest.

   Finally, I would like to thank the authors for their revision of the papers as well as the team of WIT Press that has worked in the edition of this book.

The Editor