

IEEE Tutorial on Electric Delivery System Reliability Evaluation

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PREVIEW

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PREVIEW

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1. *Analytical Techniques for Bulk Power System Reliability Assessment*
Prof. A. P. Meliopoulos, Georgia Institute of Technology
2. *Monte Carlo Simulation and Intelligent Search Methods*
Prof. Chanan Singh, Texas A&M University, and Prof. Joydeep Mitra, New Mexico State University
3. *Distribution System Reliability: Analytical and Empirical Techniques*
Dr. Richard E. Brown, KEMA T&D Consulting
4. *Data Requirements, Practices and Recommendations*
Prof. Roy Billinton, University of Saskatchewan
5. *Reliability and Maintenance*
Dr. John Endrenyi, Kinectrics, Inc.
6. *Generation System Reliability in Competitive Markets*
Dr. Murty P. Bhavaraju, PJM Interconnection
7. *Application of Reliability Evaluation in Transmission Planning*
Dr. Wenyuan Li, British Columbia Transmission Corporation

Preface

I am pleased to present to the community this timely and important tutorial on Electric Delivery System Reliability Evaluation. At a time when the entire international community has witnessed several large outages worldwide within a period of less than two years, and more people than ever before are asking questions about the reliability of present day electric delivery systems, it is important for members of the energy engineering community to develop an understanding of the concepts and issues related to the reliability of the electric delivery system, particularly in the context of the prevailing political and regulatory climate.

This tutorial will be of value to everyone involved with electric energy systems — practicing engineers, policy makers, students and academics. The contents comprise a balance of fundamental concepts and practical and modern day applications, and are presented by some of the best known experts in the field.

In preparing this tutorial, our focus has been to cover issues that are both fundamental and of practical and contemporary relevance. The topics covered have been carefully selected and organized to meet these objectives. The electric delivery infrastructure consists of bulk power systems and distribution systems. The fundamental methods of analyzing these systems for reliability have been presented. Analytical, empirical and simulation-based methods have been discussed. It was recognized that the actual use and application of these methods are contingent upon the availability and understanding of data, and so a chapter has been devoted to the treatment of this important topic. Finally, some of the most important areas of application have been addressed — maintenance and planning. Over the past decade, the introduction of competition, open access and environmental issues have presented some unprecedented, complex challenges to the reliable operation of the electric power system. Some of the major issues and paradigms have been identified and discussed.

The approach of the tutorial is as follows. The basic concepts are presented in an intuitive and easy-to-understand manner. Some of the key methods and ideas are explained in some detail, and accompanied by examples and illustrative flow-charts. Other methods are briefly discussed and ample references provided. In an attempt to ensure completeness of coverage of relevant topics, the text itself provides considerably more information than is presented at the tutorial. However, it is expected that important contributions by many others may not have been highlighted explicitly, but can be found in the references.

Much work has been put into the preparation of this tutorial, and it is imperative that I express my sincerest gratitude to every one of the contributors for preparing this excellent material, and to the many people who gave me valuable counsel in the organization of this tutorial, particularly Narayan Rau, Jim McCalley, Alex Schneider and Satish Ranade. My own reward for the countless hours spent on organizing this effort and editing the text is the joy of working and sharing with such outstanding people.

I hope that the participants at the tutorial and other readers of this text will find this book as useful and informative as I did.

Joydeep Mitra

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