Power System Reliability Analysis Using Matlab

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HUGHES HARRY

Power Systems Control and Reliability John Wiley & Sons
The focus of this book is the application of Linguistic Weighted Average (LWA), where the weights are always words modeled as interval type 2 fuzzy sets (IT2FS) for reliability analysis of interconnected power systems. Reliability analysis has been considered as an important step in any system design process. A reliable electrical Power system means a System which has sufficient power to feed the load demand during a certain period. With the interconnection of Photovoltaic (PV) and Wind Energy System (WES) as a Hybrid Electrical Power System (HEPS)into the Utility Grid (UG), the fluctuating nature of the energy produced by these systems has a different effect on the overall system reliability than that of the fluctuating natures of energy produced by UG.The complete study to determine the impact of interconnected PV/WES/HEPS into UG from reliability point of view is presented. A fuzzy logic technique using Type 2 fuzzy sets has also been presented to calculate and assess the reliability status for each HEPS configuration under study.
Soft Computing Tools for Reliability Analysis of Electric Power System John Wiley & Sons
Focusing on power systems reliability and generating unit commitments, which are essential in the design and evaluation of the electric power systems for planning, control, and operation, this informative volume covers the concepts of basic reliability engineering, such as power system spinning reserve, types of load curves and their objectives and benefits, the electric power exchange, and the system operation constraints. The author explains how the probability theory plays an important role in reliability applications and discusses the probability applications in electric power systems that led to the development of the mathematical models that are illustrated in the book. The algorithms that are presented throughout the chapters will help researchers and engineers to implement their own suitable programs where needed and will also be valuable for students. The Artificial Neural Networks (ANN) and Fuzzy Logic (FL) systems are discussed and a number of load estimation models are built for some cases, where their formulas are developed. A number of developed models are presented, including the Kronecker techniques, Fourth-Order Runge-Kutta, System Multiplication Method, or Adams Method; and components with different connections and different distributions are presented. A number of examples are explained showing how to build and evaluate power plants.
Advances in System Reliability Engineering Blue Rose Publishers
We are very pleased to be asked to co-author this book for a variety of reasons, one of which was that it gave us further opportunity to work together. The scope proposed was very wide with the only significant proviso being that the book should be in a mongraph-style and not a teaching text. This require ment has given us the opportunity to compile a wide range of relevant material relating to present-day knowledge and application in power system reliability. As many readers will be aware, we have collaborated in many ways over a relatively long period and have co-authored two other books on reliability evaluation. Both of these previous books were structured as teaching texts. This present book is not a discourse on "how to do reliability evaluation" but a discussion on "why it should be done and what can be done and achieved" and as such does not replace or conflict with the previous books. The three books are complementary and each enhances the others. The material contained in this book is not specifically original since it is based on information which we have published in other forms either jointly or as co authors with various other people, particularly our many research students. We sincerely acknowledge the important contributions made by all these students and colleagues. There are too many to mention individually in this preface but their names appear frequently in the references at the end of each chapter.
Recent Advances in Multi-state Systems Reliability Springer Science & Business Media
The groundbreaking book that details the fundamentals of reliability modeling and evaluation and introduces new and future technologies Electric Power Grid Reliability Evaluation deals with the effective evaluation of the electric power grid and explores the role that this process plays in the planning and designing of the expansion of the power grid. The book is a guide to the theoretical approaches and processes that underpin the electric power grid and reviews the most current and emerging technologies designed to ensure reliability. The authors—noted experts in the field—also present the algorithms that have been developed for analyzing the soundness of the power grid. A comprehensive resource, the book covers probability theory, stochastic processes, and a frequency-based approach in order to provide a theoretical foundation for reliability analysis. Throughout the book, the concepts presented are explained with illustrative examples that connect with power systems. The authors cover generation adequacy methods, and multi-node analysis which includes both multi-area as well as composite power system reliable evaluation. This important book: • Provides a guide to the basic methods of reliability modeling and evaluation • Contains a helpful review of the background of power system reliability evaluation • Includes information on new technology sources that have the potential to create a more reliable power grid • Addresses renewable energy sources and shows how they affect power outages and blackouts that pose new challenges to the power grid system Written for engineering students and professionals, Electric Power Grid Reliability Evaluation is an essential book that explores the processes and algorithms for creating a sound and reliable power grid.
Reliability Evaluation of Power Systems Springer Science & Business Media
Power system reliability is the focus of intensive study due to its critical role in providing energy supply to modern society. This comprehensive book describes application of some new specific techniques: universal generating function method and its combination with Monte Carlo simulation and with random processes methods, Semi-Markov and Markov reward models and genetic algorithm. The book can be considered as complementary to power system reliability textbooks.
Reliability Assessment of Electric Power Systems Using Monte Carlo Methods Lulu.com
A practical, hands-on approach to power distribution system reliability As power distribution systems age, the frequency and duration of consumer interruptions will increase significantly. Now more than ever, it is crucial for students and professionals in the electrical power industries to have a solid understanding of designing the reliable and cost-effective utility, industrial, and commercial power distribution systems needed to maintain life activities (e.g., computers, lighting, heating, cooling, etc.). This books fills the void in the literature by providing readers with everything they need to know to make the best design decisions for new and existing power distribution systems, as well as to make quantitative "cost vs. reliability" trade-off studies. Topical coverage includes: Engineering economics Reliability analysis of complex network configurations Designing reliability into industrial and commercial power systems Application of zone branch reliability methodology Equipment outage statistics Deterministic planning criteria Customer interruption for cost models for load-point reliability assessment Isolation and restoration procedures And much more Each chapter begins with an introduction and ends with a conclusion and a list of references for further reading. Additionally, the book contains actual utility and industrial power system design problems worked out with real examples, as well as additional problem sets and their solutions. Power Distribution System Reliability is essential reading for practicing engineers, researchers, technicians, and advanced undergraduate and graduate students in electrical power industries.
Reliability Analysis of Modern Power Systems GRIN Verlag
This book is a seque1 to Reliability Evaluation of Engineering Systems: Concepts and Techniques, written by the same authors and published by Pitman Books in January 1983. * As a sequel, this book is intended to be considered and read as the second oftwo volumes rather than as a text that stands on its own. For this reason, readers who are not familiar with basic reliability modelling and evaluation should either first read the companion volume or, at least, read the two volumes side by side. Those who are already familiar with the basic concepts and only require an extension of their knowledge into the power system problem area should be able to understand the present text with little or no reference to the earlier work. In order to assist readers, the present book refers frequently to the first volume at relevant points, citing it simply as Engineering Systems. Reliability Evaluation of Power Systems has evolved from our deep interest in education and our long-standing involvement in quantitative reliability evaluation and application of probability techniques to power system problems. It could not have been written, however, without the active involvement of many students in our respective research programs. There have been too many to mention individu ally hut most are recorded within the references at the ends of chapters.
Reliability and Safety Engineering Elsevier
This book presents essential methods and tools for research into the reliability of energy systems. It describes in detail the content setting, formalisation, and use of algorithms for assessing the reliability of modern, large, and complex electric power systems. The book uses a wealth of tables and illustrations to represent results and source information in a clear manner. It discusses the main operating conditions which affect the reliability of electric power systems, and describes corresponding computing tools which can help solve issues as they arise. Further, all methodologies presented here are demonstrated in numerical examples. Though primarily intended for researchers and practitioners in the field of electric power systems, the book will also benefit general readers interested in this area.
Reliability of Power Electronic Converter Systems Springer Science & Business Media
Recent Advances in System Reliability Engineering describes and evaluates the latest tools, techniques, strategies, and methods in this topic for a variety of applications. Special emphasis is put on simulation and modelling technology which is growing in influence in industry, and presents challenges as well as opportunities to reliability and systems engineers. Several manufacturing engineering applications are addressed, making this a particularly valuable reference for readers in that sector. Contains comprehensive discussions on state-of-the-art tools, techniques, and strategies from industry Connects the latest academic research to applications in industry including system reliability, safety assessment, and preventive maintenance Gives an in-depth analysis of the benefits and applications of modelling and simulation to reliability
Generation System Reliability Analysis for Future Cost/benefit Studies John Wiley & Sons
Reliability Analysis and Asset Management of Engineering Systems explains methods that can be used to evaluate reliability and availability of complex systems, including simulation-based methods. The increasing digitization of mechanical processes driven by Industry 4.0 increases the interaction between machines and monitoring and control systems, leading to increases in system complexity. For those systems the reliability and availability analyses are increasingly challenging, as the interaction between machines has become more complex, and the analysis of the flexibility of the production systems to respond to machinery failure may require advanced simulation techniques. This book fills a gap on how to deal with such complex systems by linking the concepts of systems reliability and asset management, and then making these solutions more accessible to industry by explaining the availability analysis of complex systems based on simulation methods that emphasise Petri nets. Explains how to use a monitoring database to perform important tasks including an update of complex systems reliability Shows how to diagnose probable machinery-based causes of system performance degradation by using a monitoring database and reliability estimates in an integrated way Describes practical techniques for the application of AI and machine learning methods to fault detection and diagnosis problems
Reliability Analysis for Asset Management of Electric Power Grids IET
First Published in 1970. Routledge is an imprint of Taylor & Francis, an informa company.
Reliability analysis of power systems with variable renewable resources Routledge
The book introduces reliability and risk assessment techniques for the successful operation of interconnected power system grids. The focus is on control [C] and reliability [R] factors. C-factors emphasize on key performance indicators [KPIs] as qualitative performance and risk measures of control area fulfilling its own commitments, and helping other areas of interconnection through the interface of turbine governor control [TGC], automatic generation control [AGC] and economic dispatch calculation [EDC]. In contrast, R-factors introduce key reliability indices [KRIs] as quantitative performance and risk measures ensuring power system reliability and security. Also, discussed is a micro-grid operation with solar energy backup towards enhanced grid reliability with security.
Electric Power Grid Reliability Evaluation Johns Hopkins University Press
This book is a sequel to Reliability Evaluation of Engineering Systems: Concepts and Techniques, written by the same authors and published by Pitman Books in January 1983. As a sequel, this book is intended to be considered and read as the second of two volumes rather than as a text that stands on its own. For this reason, readers who are not familiar with basic reliability modelling and evaluation should either first read the companion volume or, at least, read the two volumes side by side. Those who are already familiar with the basic concepts and only require an extension of their knowledge into the power system problem area should be able to understand the present text with little or no reference to the earlier work. In order to assist readers, the present book refers frequently to the first volume at relevant points, citing it simply as Engineering Systems. Reliability

Evaluation of Power Systems has evolved from our oUf deep interest in education and our oUf long-standing long-standing involvement involvement in in quantitative reliability evaluation and application of probability prob ability techniques techniques to power system problems. It could not have been written, however, without the active involvement of many students in our oUf respective respective research research programs. programs. There have been too many to mention individually but most are recorded within the references at the ends of chapters.

Reliability Analysis and Asset Management of Engineering Systems Springer

This book presents essential methods and tools for research into the reliability of energy systems. It describes in detail the content setting, formalisation, and use of algorithms for assessing the reliability of modern, large, and complex electric power systems. The book uses a wealth of tables and illustrations to represent results and source information in a clear manner. It discusses the main operating conditions which affect the reliability of electric power systems, and describes corresponding computing tools which can help solve issues as they arise. Further, all methodologies presented here are demonstrated in numerical examples. Though primarily intended for researchers and practitioners in the field of electric power systems, the book will also benefit general readers interested in this area.

Reliability Analysis of Composite Power Systems using FACTS Controllers Springer Science & Business Media

This book presents the latest research in the fields of reliability theory and its applications, providing a comprehensive overview of reliability engineering and discussing various tools, techniques, strategies and methods within these areas. Reliability analysis is one of the most multidimensional topics in the field of systems reliability engineering, and while its rapid development creates opportunities for industrialists and academics, it is also means that it is hard to keep up to date with the research taking place. By gathering findings from institutions around the globe, the book offers insights into the international developments in the field. As well as discussing the current areas of research, it also identifies knowledge gaps in reliability theory and its applications and highlights fruitful avenues for future research. Covering topics from life cycle sustainability to performance analysis of cloud computing, this book is ideal for upper undergraduate and postgraduate researchers studying reliability engineering.

Reliability Modeling and Analysis of Smart Power Systems BoD – Books on Demand

This book presents select proceedings of the Electric Power and Renewable Energy Conference 2020 (EPREC 2020). This book provides rigorous discussions, case studies, and recent developments in emerging areas of control systems, especially, load frequency control, wide-area monitoring, control & instrumentation, optimization, intelligent control, energy management system, SCADA systems, etc. The contents of this book will be useful to researchers and professionals interested in control theory and its applications to power grids and systems. The book can also be used by policy makers and power engineers involved in power generation and distribution.

Importance Measures in Reliability, Risk, and Optimization Springer Science & Business Media

Researchers from the entire world write to figure out their newest results and to contribute new ideas or ways in the field of system reliability and maintenance. Their articles are grouped into four sections: reliability, reliability of electronic devices, power system reliability and feasibility and maintenance. The book is a valuable tool for professors, students and professionals, with its presentation of issues that may be taken as examples applicable to practical situations. Some examples defining the contents can be highlighted: system reliability analysis based on goal-oriented methodology; reliability design of water-dispensing systems; reliability evaluation of drivetrains for off-highway machines; extending the useful life of asset; network reliability for faster feasibility decision; analysis of standard reliability parameters of technical systems' parts; cannibalisation for improving system reliability; mathematical study on the multiple temperature operational life testing procedure, for electronic industry; reliability prediction of smart maximum power point converter in photovoltaic applications; reliability of die interconnections used in plastic discrete power packages; the effects of mechanical and electrical straining on performances of conventional thick-film resistors; software and hardware development in the electric power system; electric interruptions and loss of supply in power systems; feasibility of autonomous hybrid AC/DC microgrid system; predictive modelling of emergency services in electric power distribution systems; web-based decision-support system in the electric power distribution system; preventive maintenance of a repairable equipment operating in severe environment; and others.

System Reliability Wiley-Blackwell

A practical guide to facilitate statistically well-founded decisions in the management of assets of an electricity grid Effective and economic electric grid asset management and incident management involve many complex decisions on inspection, maintenance, repair and replacement. This timely reference provides statistically well-founded, tried and tested analysis methodologies for improved decision making and asset management strategy for optimum grid reliability and availability. The techniques described are also sufficiently robust to apply to small data sets enabling asset managers to deal with early failures or testing with limited sample sets. The book describes the background, concepts and statistical techniques to evaluate failure distributions, probabilities, remaining lifetime, similarity and compliancy of observed data with specifications, asymptotic behavior of parameter estimators, effectiveness of network configurations and stocks of spare parts. It also shows how the graphical representation and parameter estimation from analysis of data can be made consistent, as well as explaining modern upcoming methodologies such as the Health Index and Risk Index. Key features: -Offers hands-on tools and techniques for data analysis, similarity index, failure forecasting, health and risk indices and the resulting maintenance strategies. -End-of-chapter problems and solutions to facilitate self-study via a book companion website. The book is essential reading for advanced undergraduate and graduate students in electrical engineering, quality engineers, utilities and industry strategists, transmission and distribution system planners, asset managers and risk managers.

Power System Reliability and Risk Assessment CRC Press

Reliability and safety are core issues that must be addressed throughout the life cycle of engineering systems. Reliability and Safety Engineering presents an overview of the basic concepts, together with simple and practical illustrations. The authors present reliability terminology in various engineering fields, viz., electronics engineering, software engineering, mechanical engineering, structural engineering and power systems engineering. The book describes the latest applications in the area of probabilistic safety assessment, such as technical specification optimization, risk monitoring and risk informed in-service inspection. Reliability and safety studies must, inevitably, deal with uncertainty, so the book includes uncertainty propagation methods: Monte Carlo simulation, fuzzy arithmetic, Dempster-Shafer theory and probability bounds. Reliability and Safety Engineering also highlights advances in system reliability and safety assessment including dynamic system modeling and uncertainty management. Case studies from typical nuclear power plants as well as from structural, software and electronic systems are also discussed. Reliability and Safety Engineering combines discussions of the existing literature on basic concepts and applications with state-of-the-art methods used in reliability and risk assessment of engineering systems. It is designed to assist practicing engineers, students and researchers in the areas of reliability engineering and risk analysis.

The Economics of Power System Reliability and Planning Springer

Doctoral Thesis / Dissertation from the year 2020 in the subject Engineering - Power Engineering, Cairo University, language: English, abstract: This thesis presents a complete reliability, availability, and maintainability (RAM) analysis of the variable renewable energy (VRE) systems. Three operating concepts of the wind energy conversion systems (WECS) are considered based on the acceptable speed range of generators, while seven practical layouts of large-scale grid-connected systems are considered for the solar-PV systems. Elaborated RAM analysis of each system associated with each operating concept for the WECS and each layout of the solar-PV systems is presented starting from the subassemblies level to the subsystem level then the overall system. This thesis is purposed to describe the method of reliability, availability, and maintainability analysis of repairable and non-repairable systems using the exponential PDFs. It is also aimed to explore the method for improving the availability of these systems by managing the effort using availability importance measures of each subassembly. This analysis will also be utilized to studying the criticality of the subassemblies or subsystems of the system in order to continuous improvement. After doing this, this thesis also extends to look into the overall system availability. This analysis is a good tool for helping to identify the critical subsystems or subassemblies of the system that need more attention for improvement.