



Robust Power System Frequency Control (Power Electronics and Power Systems)

By Hassan Bevrani

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Frequency control as a major function of automatic generation control is one of the important control problems in electric power system design and operation, and is becoming more significant today because of the increasing size, changing structure, emerging new uncertainties, environmental constraints and the complexity of power systems. In the last two decades, many studies have focused on damping control and voltage stability and the related issues, but there has been much less work on the power system frequency control analysis and synthesis. While some aspects of frequency control have been illustrated along with individual chapters, many conferences and technical papers, a comprehensive and sensible practical explanation of robust frequency control in a book form is necessary. This book provides a thorough understanding of the basic principles of power system frequency behaviour in wide range of operating conditions. It uses simple frequency response models, control structures and mathematical algorithms to adapt modern robust control theorems with frequency control issue and conceptual explanations. Most developed control strategies are examined by real-time simulations. Practical methods for computer analysis and design are emphasized. This book emphasizes the physical and engineering aspects of the power system frequency control design problem, providing a conceptual understanding of frequency regulation, and application of robust control techniques. The main aim is to develop an appropriate intuition relative to the robust load frequency regulation problem in real-world power systems, rather than to describe sophisticated mathematical analytical methods.

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Review

From the reviews:

"This book provides a thorough understanding of the basic principles of power system frequency behavior in a wide range of operating conditions. ... The presence of the numerous examples given in the monograph is a convincing message how complexities in physical processes could hinder robust control analysis and synthesis. This book could be useful for engineers and operators in power system planning and operation, as well as for academic researchers. ... the book will be cited in many lists of references in the control literature." (Vasile Dragan, Zentralblatt MATH, Vol. 1163, 2009)

"This book is written for engineers, researchers, and students in the field of power system planning and operation." (IEEE Control Systems Magazine, Vol. 30, February, 2010)

From the Back Cover

Frequency control as a major function of automatic generation control is one of the important control problems in electric power system design and operation, and is becoming more significant today due to the increasing size, changing structure, emerging new uncertainties, environmental constraints, and the complexity of power systems. *Robust Power System Frequency Control* uses the recent development of linear robust control theory to provide practical, systematic, fast, and flexible algorithms for the tuning of power system load-frequency controllers.

The physical constraints and important challenges related to the frequency regulation issue in a deregulated environment are emphasized, and most results are supplemented by real-time simulations. The developed control strategies attempt to bridge the existing gap between the advantages of robust/optimal control and traditional power system frequency control design.

The material summarizes the long term research outcomes and contributions of the author's experience with power system frequency regulation. It provides a thorough understanding of the basic principles of power system frequency behavior over a wide range of operating conditions. It uses simple frequency response models, control structures and mathematical algorithms to adapt modern robust control theorems with frequency control issues as well as conceptual explanations. The engineering aspects of frequency regulation have been considered, and practical methods for computer analysis and design are also discussed.

Robust Power System Frequency Control provides a comprehensive coverage of frequency control understanding, simulation and design. The material develops an appropriate intuition relative to the robust load frequency regulation problem in real-world power systems, rather than to describe sophisticated mathematical analytical methods.

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