an essential reference

a useful update of a classic text

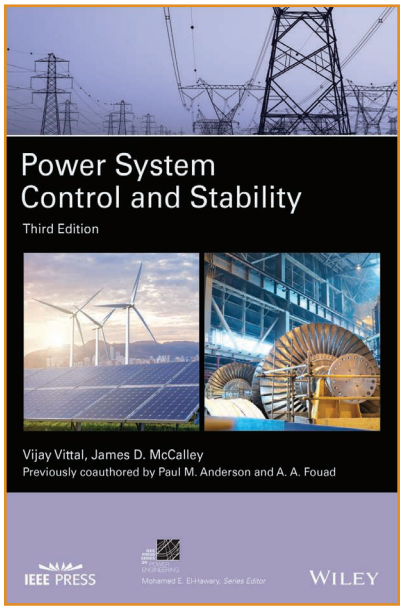
THIS ISSUE'S "BOOK REVIEW" COLumn discusses *Power System Control and Stability*, third edition, written by Vijay Vittal and James D. McCalley. This reviewer writes, "this new edition is a must-read for graduate students and researchers and an essential reference for all practicing engineers in the power and energy industry."

Power System Control and Stability, Third Edition

By Vijay Vittal and James D. McCalley

Power System Control and Stability is one of most widely used books in power engineering. I still own a copy of the original version of this classic text, and I vividly recall it being one of the first books I read as a Ph.D. student more than 25 years ago. Prof. Vittal and Prof. McCalley have done an excellent job of updating this newly published third edition. They have remained faithful to the spirit of the original text, written by Prof. Paul M. Anderson and Prof. A.A. Fouad, while making significant updates of the original material and adding much-needed new information so that the book remains an indispensable text and reference for the present-day student and practicing engineer.

Since the publication of the first edition, there has been tremendous change in the industry, particularly in the arenas of renewable energy systems and load modeling and the increased application flexible ac transmission systems (FACTS), such as static volt–ampere reactive (var) systems. This new edition covers all of these topics in new chapters. The structure of the book is well done and keeps the subject matter flowing in a logical sequence. The chapters on the classic materials, such as the modeling of synchronous generators, excitation systems, and turbine governors, are still valid and of great importance to both the student and practicing power engineer. These chapters have all been updated to capture some of the new developments in these areas since the second edition of the book. For example, the chapter on gas turbines provides new materials based on the work done at CIGRE in the early to mid-2000s on the improved modeling of gas turbines for both simple and combined-cycle power plants.



The new material in the book is also very well done and matches the style and coverage of the traditional subjects in the original text. The new chapter on load modeling is a truly excellent addition and covers the most salient technical developments in the last decade relative to load modeling, which has been led by the Western Electricity Coordinating Council's Modeling and Validation Working Group (WECC MVWG), researchers at such organizations as the Electric Power Research Institute (EPRI), and Prof. Vittal himself at Arizona State University. Furthermore, the chapter covers the basics of distributed energy resource modeling and how this is incorporated into the aggregated load model.

Similarly, two new chapters provide excellent coverage of some of the salient aspects of standard models developed in the last decade, again primarily within the WECC MVWG, for modeling of static var systems and renewable energy systems, with significant research done, once again, at EPRI. The chapter on FACTSs covers the modeling and dynamic performance of thyristor–controller series capacitors.

An enhanced chapter on small-signal stability has been also included, which is again important since an understanding of such phenomena is critical for the practicing power engineer. This chapter

Digital Object Identifier 10.1109/MPE.2019.2954687
Date of current version: 19 February 2020

provides a solid basis for the fundamental aspects of power system oscillations.

Two other welcome additions are new chapters dealing with voltage stability as well as power system protection and monitoring as they relate to system stability. Voltage stability continues to be of critical importance in modern power systems, and with the advent of power electronic interface generation, it is of utmost importance for the practicing engineer to fully understand the mechanisms at play and how controls must be properly tuned and coordinated to ensure that voltage control and stability are maintained in the system. Another key aspect of voltage stability studies is proper load modeling, which is covered in the comprehensive new chapter on load modeling, as mentioned earlier.

> The structure of the book is well done and keeps the subject matter flowing in a logical sequence.

Wide-area monitoring and protection systems are becoming increasingly important on large power systems around the world. To protect systems from large-scale instability or cascading, many regions use special protection systems that, for example, trip or curtail generation when a certain element or several elements in a critical transmission path are tripped due to a forced outage. Also, many regions now monitor, in real time, the damping of critical modes of oscillation of the system and use monitoring data to assess the real-time stability limits of the system. The new chapter on power system protection and monitoring covers many of the salient points related to these important topics.

I thoroughly enjoyed reviewing this book and found that all of the chapters were well written with a good amount of references and many well-presented examples and diagrams to help the reader grasp the technical details. Thus, I was quite impressed by this update of *Power System Control and Stability* and do not hesitate to say that this new edition is a must-read for graduate students and researchers as well as an essential reference for all practicing engineers in the power and energy industry.

—Pouyan Pourbeik