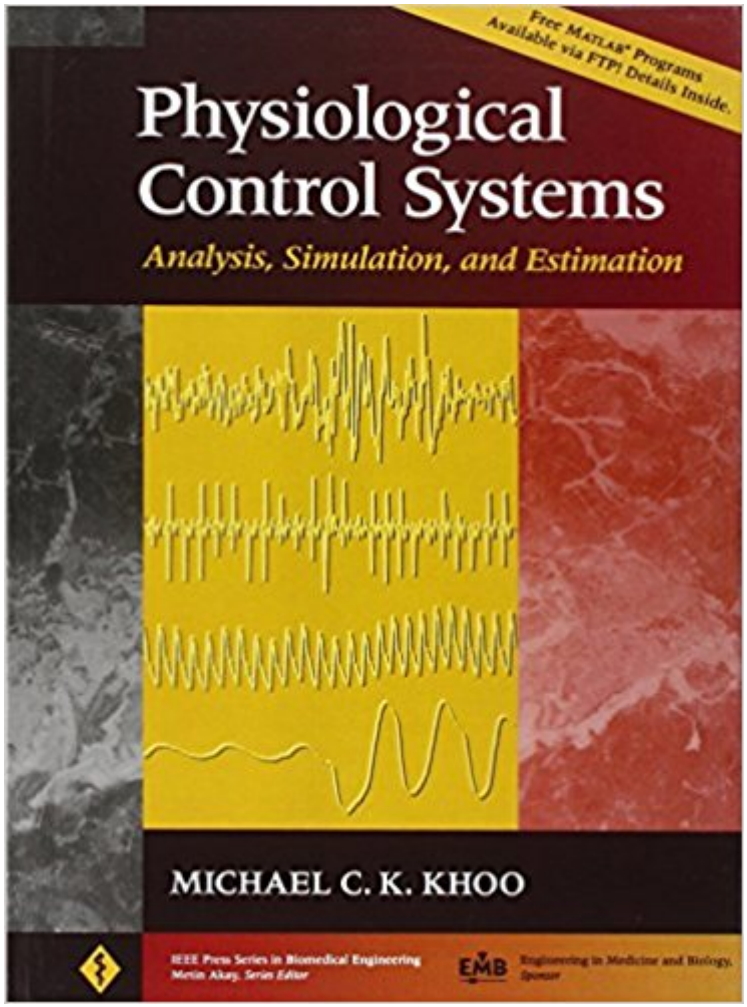
Physiological Control Systems: Analysis, Simulation, And Estimation



Synopsis

Many recently improved medical diagnostic techniques and therapeutic innovations have resulted from physiological systems modeling. This comprehensive book will help undergraduate and graduate students and biomedical scientists to gain a better understanding of how the principles of control theory, systems analysis, and model identification are used in physiological regulation. Ample Simulink? and MATLAB? examples throughout the text and posted at an IEEE FTP site will provide you with a hands-on approach for exploring modeling and analysis of biological control systems. You will learn about classical control theory and its application to physiological systems, and contemporary topics and methodologies shaping bioengineering research today. Discussions on the latest developments in system identification, optimal control, and nonlinear dynamical analysis will keep you up-to-date with recent bioengineering advances. From modeling and stability analysis to feedback control in physiological regulatory mechanisms, Physiological Control Systems provides an in-depth study of key bioengineering principles that is simply unmatched in the field.To obtain instructor material, please send an email to: ieeeproposals@wiley.com

Book Information

Hardcover: 344 pages

Publisher: Wiley-IEEE Press; 1 edition (October 8, 1999)

Language: English

ISBN-10: 0780334086

ISBN-13: 978-0780334083

Product Dimensions: 7.3 x 0.9 x 10.4 inches

Shipping Weight: 1.7 pounds (View shipping rates and policies)

Average Customer Review: 4.5 out of 5 stars 3 customer reviews

Best Sellers Rank: #632,696 in Books (See Top 100 in Books) #25 inÃ Â Books > Medical Books > Medicine > Prosthesis #108 inÃ Â Books > Textbooks > Medicine & Health Sciences > Medicine > Biotechnology #175 inÃ Â Books > Science & Math > Physics > System Theory

Customer Reviews

Biomedical / Electrical Engineering Physiological Control Systems Analysis, Simulation, and Estimation A volume in the IEEE Press Series in Biomedical Engineering Metin Akay, Series Editor Many recently improved medical diagnostic techniques and therapeutic innovations have resulted from physiological systems modeling. This comprehensive book will help undergraduate and graduate students and biomedical scientists to gain a better understanding of how the principles of

control theory, systems analysis, and model identification are used in physiological regulation. Ample Simulink and MATLAB examples throughout the text and posted at an IEEE FTP site will provide you with a hands-on approach for exploring modeling and analysis of biological control systems. You will learn about classical control theory and its application to physiological systems, and contemporary topics and methodologies shaping bioengineering research today. Discussions on the latest developments in system identification, optimal control, and nonlinear dynamical analysis will keep you up-to-date with recent bioengineering advances. From modeling and stability analysis to feedback control in physiological regulatory mechanisms, Physiological Control Systems provides an in-depth study of key bioengineering principles that is simply unmatched in the field.

Michael C. K. Khoo is professor of biomedical engineering at the University of Southern California, Los Angeles. His current research interests include respiratory and cardiac autonomic control during sleep, biomedical signal processing, and physiological modeling. Dr. Khoo was the recipient of a National Institutes of Health Research Career Development Award from 1990 to 1996 and the American Lung Association Career Investigator Award from 1991 to 1996. He has published widely in the field of cardiorespiratory and sleep research, and is the editor of two books: Bioengineering Approaches to Pulmonary Physiology and Medicine (Plenum, 1996) and Modeling and Parameter Estimation in Respiratory Control (Plenum, 1989), in addition to over 85 journal articles, book chapters, and conference papers.

I have been using this text for a class in Physiological Control Systems, but have been largely disappointed. One of my disappointing experiences is on p. 170-1, where Khoo shows how to get an RLC model transfer function out of MATLAB’s ss(). Since the MATLAB documentation on ss() is skimpy, this is a place where Khoo could have added value, illuminating what the A, B, C, and D matrices represent to ss(), but Khoo simply brushes past the opportunity. Khoo also discusses bifurcation in the logistic map, but if you look for ’logistic’ in the index, you won’t find it. Khoo mentions Fitzhugh-Nagumo and Hodgkin-Huxley within the context of his section on Bonhoeffer-van der Pol, but those four authors are not in the index (Bonhoeffer and van der Pol are). I admit to not having made a comprehensive study of the MATLAB examples, but I downloaded his code for sensitivity analysis (sensanl.m and two supporting .m files) mentioned in section 7.3.2, and consider the code to be poorly written. If I didn’t have Dorf & Bishop’s "Modern Control Systems, 9th Edition" to fall back on, I would have been in dire straights getting anything beyond a cursory reading out of Khoo’s text. In short, this book should command a price in the $50 to $60 range, not the stellar

$110-120 its priced at. Dorf & Bishop is priced about the same and delivers three times the value that Khoo does. Every chapter where I made an effort to get to the bottom of some discussion, I found Khoo’s exposition wanting. The index is exasperatingly useless. There are only two entries under ’H’, one under ’K’, one under ’W’, etc. That’s alarming for a book with 307 pages.

good

This is an extremely useful text. I have been using it in a course in Physiological Control Systems that I have taught for 15 years. The models that the author develops are very informative and lots of fun to play with. The author assumes a rudimentary knowledge of solution methods and for that reason it is not good at the freshman level. I have found that Matlab, VisSim, Math Studio and other platforms work quite well with this text.I highly recommend it.

and Control (Systems & Control: Foundations & Applications) Real-time Monitoring and Operational Control of Drinking-Water Systems (Advances in Industrial Control)