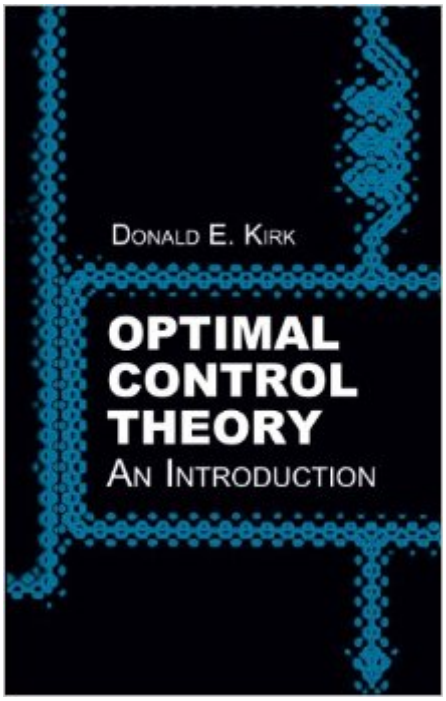
# Optimal Control Theory: An Introduction (Dover Books On Electrical Engineering)



## Synopsis

Optimal control theory is the science of maximizing the returns from and minimizing the costs of the operation of physical, social, and economic processes. Geared toward upper-level undergraduates, this text introduces three aspects of optimal control theory: dynamic programming, Pontryagin's minimum principle, and numerical techniques for trajectory optimization.Chapters 1 and 2 focus on describing systems and evaluating their performances. Chapter 3 deals with dynamic programming. The calculus of variations and Pontryagin's minimum principle are the subjects of chapters 4 and 5, and chapter 6 examines iterative numerical techniques for finding optimal controls and trajectories. Numerous problems, intended to introduce additional topics as well as to illustrate basic concepts, appear throughout the text.

## Book Information

File Size: 24253 KB

Print Length: 480 pages

Publisher: Dover Publications (April 26, 2012)

Publication Date: April 26, 2012

Sold by:Â  Digital Services LLC

Language: English

ASIN: B00CWR4MX0

Text-to-Speech: Enabled

X-Ray: Not Enabled

Word Wise: Not Enabled

Lending: Enabled

Enhanced Typesetting: Not Enabled

Best Sellers Rank: #530,172 Paid in Kindle Store (See Top 100 Paid in Kindle Store) #82 inÂ Books > Computers & Technology > Computer Science > Cybernetics #268 inÂ Kindle Store > Kindle eBooks > Engineering & Transportation > Engineering > Electrical & Electronics > Electronics #1685 inÂ Books > Engineering & Transportation > Engineering > Electrical & Electronics > Electronics

## Customer Reviews

This book is very reader friendly. It introduces Dynamic Programming, Variational Calculus, Pontryagin Minimum Principle and in its final section some Numerical Methods. Despite being published in the seventies, this is a truly GOOD CLASSIC (there are bad classics).In my opinion, to

the student, Kirk is superior to Citron, to Athans and to Lewis (this is more recent), that is, this book is more concerned about teaching people. Athans is more encyclopedic but much more time-consuming to read.With Kirk you will really learn the elements of optimal control theory.

My professor chose this book to use in an Optimal Control class partly because it is very affordable. On top of that, its contents are superb, giving very clear explanations of the fundamental principles underlying Optimal Control for nonlinear/linear systems.Despite its long history, I would think that all material are still relevant, although there are available more "modern" numerical techniques (nonetheless, it’s still always good to know how things were done "back in those days"). I would grade this as a must-have for the beginning student in Optimal Control. I have always been a fan of Dover books, publishing quality books at rock bottom prices. This one has just reinforced my liking of Dover Publishing.

It is an excellent "first book" which is very easy to read and covers broad range of topics: Dynamic Programming leading to Hamilton-Jacobi using Bellman’s principle, Calculus of Variations, Hamiltonian Equations, Pontryagin’s principle and finally numerical solutions (two point boundary value problems based and using direct methods from operations research methods).

Some books on Optimal Control seem to be written for people who have been studying it and using it for decades. They use the notations of modern mathematics like set theory that I never learned the first time around. This book is different. It’s an excellent introduction for those of us who know math, including vector and matrix calculus, but don’t "speak the lingo" of professionals in the field. I’ve been looking for decades for a book that speaks MY language, and doesn’t try to snow me with a lot of lemmas and proofs.I think I’ve found it.

I used this book for graduate course about Optimal control. It is written in very good style, friendly for everyone who is new to the topic. Optimal control theory seems very difficult in the first view, but this book can help doing the first steps.The book starts with explaining why optimal control theory is important. Then it builds static optimizing theory. After these simpler parts are clearly explained, the calculus of variations and the dynamic optimization is introduced. The last part is numerical techniques for finding optimal control.In my opinion this book explains, for example, the deriving of Riccati equation in the best way I have ever read. I can say that I finally understand where Riccati equation comes from. :)Every section of the book is supported with several examples that help

understanding the theory.I recommend this book for everyone who wants to understand the optimal control theory fundamentals. It is especially suitable for those who are new to the topic.

This is a well-written, easy-to-follow text on deterministic optimal control. Lots of explanations, although somewhat tedious, e.g. many cases and pages for the boundary conditions in Pontryagin's principle; [Flemming and Rishel] has one single theorem that covers them all. But [FR] is a math text, Kirk's is an engineering text.The text is intended for undergraduate seniors and first-year graduates. There are selected answers to exercises.

A really good book for introduction to Optimal Control. As a Power System specialist, I acquired a very good comprehension about optimal control using such book.

I bought this book for my Optimal Control class and it was just amazing. Very fun to read and just enough depth so that you do not get overwhelm. Really suggest it to anyone who is interested in the subject or need background on Dynamic Optimization and Optimal control.

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