# The Turnpike Theory: Unveiling Continuous Time Linear Optimal Control Problems

In the realm of control systems, one theory stands tall, often overlooked by many but revered by those in the know - the Turnpike Theory. Proposed by professionals in the field, the theory has paved the way for significant advancements in the study and application of continuous time linear optimal control problems.

Before delving into the intricacies of the Turnpike Theory, it is crucial to grasp the basics of continuous time linear optimal control problems. These problems arise when seeking to optimize the behavior or trajectory of a system over time, subject to constraints and desired outcomes.

The Turnpike Theory, as elucidated in the book "Turnpike Theory Of Continuous Time Linear Optimal Control Problems" by renowned author and expert, expands our understanding of these problems and offers profound insights into their solutions. Published by Springer, this comprehensive guide serves as an invaluable resource for both researchers and practitioners in the field.
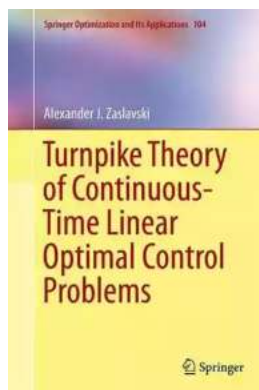
Turnpike Theory of Continuous-Time Linear Optimal Control Problems (Springer Optimization and Its Applications Book 104)

by Alexander J. Zaslavski(2015th Edition, Kindle Edition)

★★★★★ 5 out of 5

Language	: English
File size	: 4570 KB
Screen Reader	: Supported
Print length	: 305 pages
X-Ray for textbooks	: Enabled

What is the Turnpike Theory?

The Turnpike Theory has been described as the "Holy Grail" of continuous time linear optimal control problems by those familiar with its merits. It provides a framework to analyze and solve these problems, offering optimal solutions and shedding light on the underlying dynamics.

Originally introduced by Aleksei Aleksandrovich Agrachev and Yuri Sergeevich Sarychev in 2004, the Turnpike Theory has gained wide recognition and appreciation within the control systems community. Agrachev and Sarychev's groundbreaking work laid the foundation for understanding the behavior of optimal controls over long time horizons.

Understanding Continuous Time Linear Optimal Control Problems

Continuous time linear optimal control problems involve controlling a system described by a set of dynamic equations that can be represented in a linear form. These problems typically aim to minimize a cost function, subject to constraints on the system's state and controls.

Traditionally, determining an optimal control strategy for such problems has been challenging due to the complexity of the underlying dynamics. However, the Turnpike Theory provides a path to achieve near-optimal solutions and a deeper understanding of the system behavior.

The Significance of "Turnpike Theory Of Continuous Time Linear Optimal Control Problems"

The book "Turnpike Theory Of Continuous Time Linear Optimal Control Problems" published by Springer is a seminal work in the field. With its coherent presentation, mathematical rigor, and practical insights, the book has become a cornerstone for researchers and practitioners alike.

Featuring detailed discussions on topics such as the structure of optimal controls, the turnpike phenomenon, stability analysis, time-optimality, and more, the book equips readers with advanced tools and techniques to tackle real-world control problems.

The authors, Agrachev and Sarychev, bring their expertise and years of experience to bear in the book, illustrating its real-world applicability and making it an essential reference for anyone interested in continuous time linear optimal control problems.

The Turnpike Theory of continuous time linear optimal control problems has revolutionized the study of control systems. It presents a powerful framework for analyzing and solving these problems, leading to optimal solutions and a deeper understanding of system behavior.

With the book "Turnpike Theory Of Continuous Time Linear Optimal Control Problems" as an indispensable guide, researchers and practitioners can master the intricacies of this theory and apply it to real-world control scenarios effectively.

So, whether you're a seasoned control systems professional or an aspiring researcher, delve into the world of the Turnpike Theory and unlock new possibilities in the realm of continuous time linear optimal control problems.

Turnpike Theory of Continuous-Time Linear Optimal Control Problems (Springer Optimization
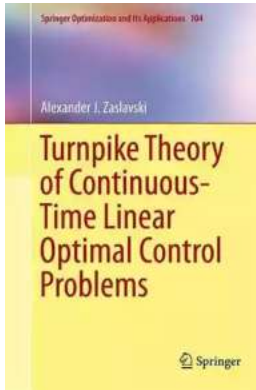
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Individual turnpike results are of great interest due to their numerous applications in engineering and in economic theory; in this book the study is focused on new results of turnpike phenomenon in linear optimal control problems. The book is intended for engineers as well as for mathematicians interested in the calculus of variations, optimal control and in applied functional analysis.

Two large classes of problems are studied in more depth. The first class studied in Chapter 2 consists of linear control problems with periodic nonsmooth convex integrands. Chapters 3-5 consist of linear control problems with autonomous convex smooth integrands. Chapter 6 discusses a turnpike property for dynamic zero-sum games with linear constraints. Chapter 7 examines genericity results. In Chapter 8, the description of structure of variational problems with extended-valued integrands is obtained. Chapter 9 ends the exposition with a study of turnpike phenomenon for dynamic games with extended value integrands.

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