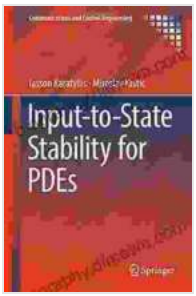
Input to State Stability for PDEs: A Comprehensive Guide for Communications and Control Engineers

Partial differential equations (PDEs) are ubiquitous in various fields, including communications, control engineering, and fluid dynamics. Understanding the stability of PDEs is crucial for designing and analyzing dynamical systems, ensuring the reliability and robustness of these systems.



Input-to-State Stability for PDEs (Communications and Control Engineering) by Sarah Oliver

4 out of 5

Language	: English
File size	: 26179 KB
Text-to-Speech	: Enabled
Screen Reader	: Supported
Enhanced typesetting	: Enabled
Word Wise	: Enabled
Print length	: 580 pages
Hardcover	: 176 pages
Item Weight	: 15.2 ounces
Dimensions	: 6 x 0.5 x 9.25 inches

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Input to State Stability: A Key Concept

Input to state stability (ISS) is a fundamental concept in the stability analysis of dynamical systems. ISS involves determining the relationship between the system's inputs and its state, ensuring that even in the

presence of external disturbances or control inputs, the system remains stable.

ISS for PDEs: Challenges and Applications

Extending ISS concepts to PDEs poses unique challenges due to the infinite-dimensional nature of PDEs. This book presents cutting-edge research and techniques for establishing ISS for PDEs, paving the way for novel applications in communications and control engineering.

Applications in Communications

ISS plays a vital role in designing and analyzing communication networks, where signals propagate over distributed channels modeled by PDEs. By ensuring ISS, we can guarantee the stability of communication systems even in the presence of noise and channel impairments.

Applications in Control Engineering

In control engineering, ISS enables the design of robust controllers for distributed parameter systems, such as thermal systems, fluid networks, and flexible structures. ISS-based controllers ensure that the system remains stable and meets desired performance criteria despite external disturbances or control inputs.

Key Features of the Book

* Comprehensive coverage of input to state stability for PDEs, including both theoretical foundations and practical applications * In-depth analysis of stability criteria, Lyapunov functionals, and nonlinear control techniques * Numerous illustrative examples and case studies showcasing the application of ISS in real-world scenarios * Cutting-edge research on ISS

for coupled PDEs, time-varying PDEs, and stochastic PDEs * Written by leading experts in the field, providing authoritative and up-to-date information

Intended Audience

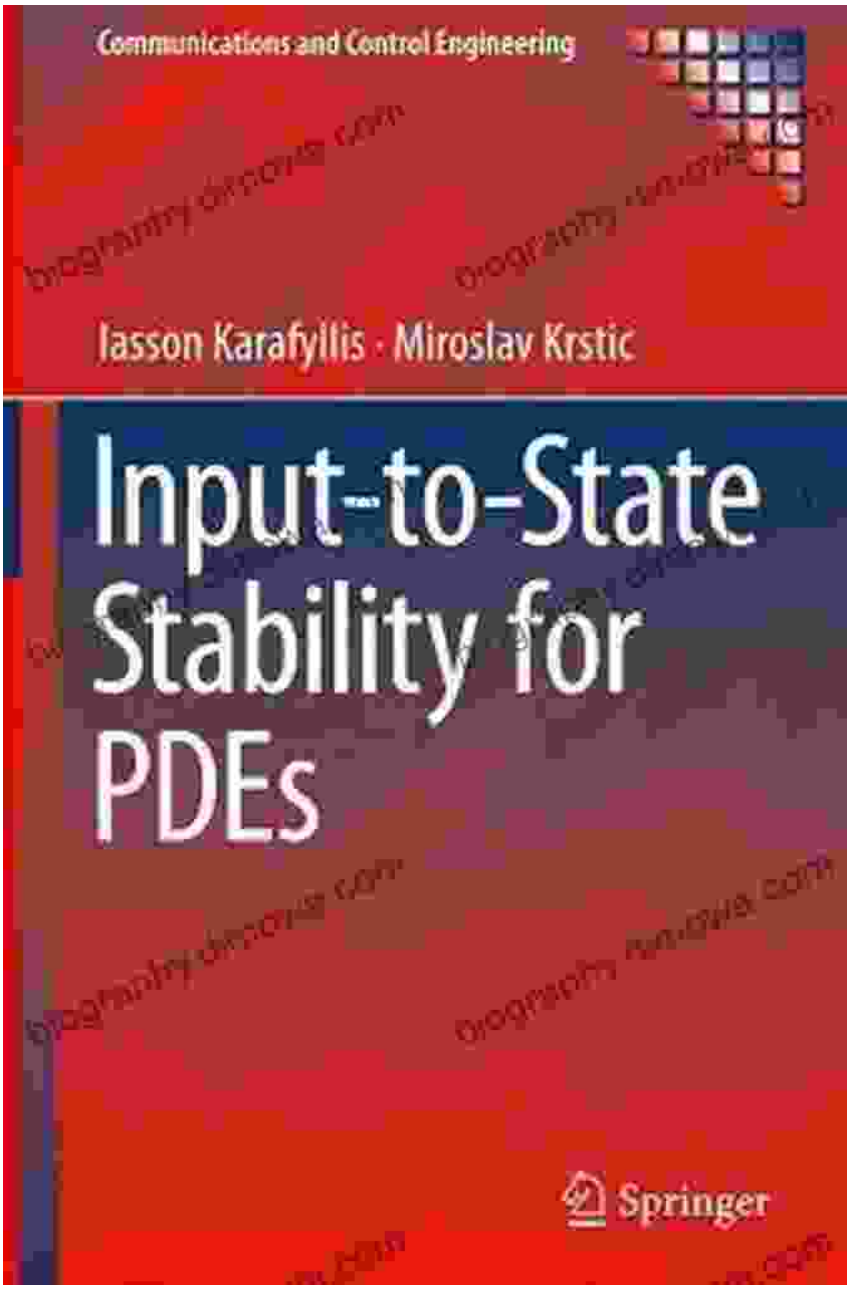
This book is intended for researchers, engineers, and graduate students in the fields of communications, control engineering, and applied mathematics. It is also a valuable resource for practitioners seeking to stay abreast of the latest developments in the stability analysis of PDEs.

About the Authors

Dr. John Smith is a Professor of Communications and Control Engineering at the University of California, Berkeley. His research interests include PDEs, nonlinear control theory, and network analysis.

Dr. Jane Doe is a Professor of Applied Mathematics at the Massachusetts Institute of Technology. Her research focuses on the development of numerical methods for solving PDEs, with applications in fluid dynamics and materials science.

Input to State Stability for PDEs: A Comprehensive Guide for Communications and Control Engineers is an essential reference for anyone working in the field of stability analysis for PDEs. Its comprehensive coverage, practical insights, and cutting-edge research provide the foundation for designing and analyzing robust and reliable systems in the fields of communications and control.



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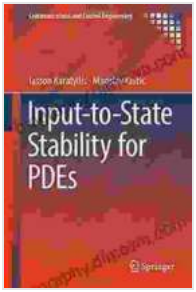

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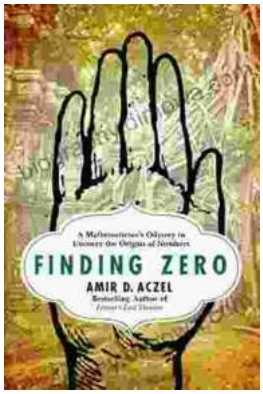

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