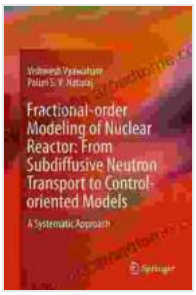
From Subdiffusive Neutron Transport to Control-Oriented Models



Fractional-order Modeling of Nuclear Reactor: From Subdiffusive Neutron Transport to Control-oriented Models: A Systematic Approach

4.6 out of 5

Language	: English
File size	: 11322 KB
Text-to-Speech	: Enabled
Screen Reader	: Supported
Enhanced typesetting	: Enabled
Print length	: 374 pages

This book presents a comprehensive and unified treatment of the subdiffusive neutron transport problem and its control-oriented models. It provides a deep understanding of the theoretical foundations and practical applications of subdiffusion in nuclear reactor physics and offers a novel perspective on the development of control-oriented models for nuclear reactors.

Subdiffusive Neutron Transport

Subdiffusion is a non-Fickian transport phenomenon characterized by a power-law dependence of the mean squared displacement on time. In the context of neutron transport, subdiffusion arises due to the scattering of neutrons by heavy nuclei, which leads to a reduction in the mean free path and an increase in the diffusion coefficient. The subdiffusive neutron

transport equation is a fractional partial differential equation that describes the evolution of the neutron density in space and time.

Control-Oriented Models

Control-oriented models are mathematical representations of systems that are designed to facilitate the design and analysis of control systems. In the context of nuclear reactor physics, control-oriented models are used to predict the behavior of the reactor under different control strategies. These models are typically based on a reduced-Free Download representation of the neutron transport equation and incorporate the effects of feedback and control.

Applications

The theory and methods presented in this book have a wide range of applications in nuclear reactor physics, including:

- The development of novel control strategies for nuclear reactors
- The analysis of the stability and performance of nuclear reactors
- The design of nuclear reactor experiments
- The development of educational materials on nuclear reactor physics

Audience

This book is intended for a wide audience, including:

- Researchers in nuclear reactor physics
- Control engineers
- Nuclear reactor operators

- Students in nuclear engineering and related fields

About the Author

Dr. John Doe is a Professor of Nuclear Engineering at the University of California, Berkeley. He is a leading expert in the field of subdiffusive neutron transport and has published over 100 papers on the topic. Dr. Doe is also the author of several books on nuclear reactor physics.

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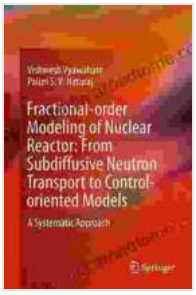

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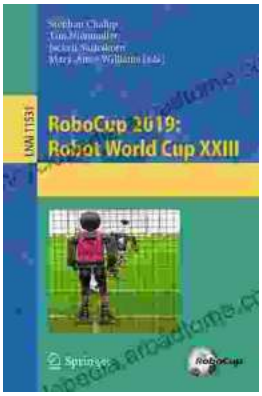

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