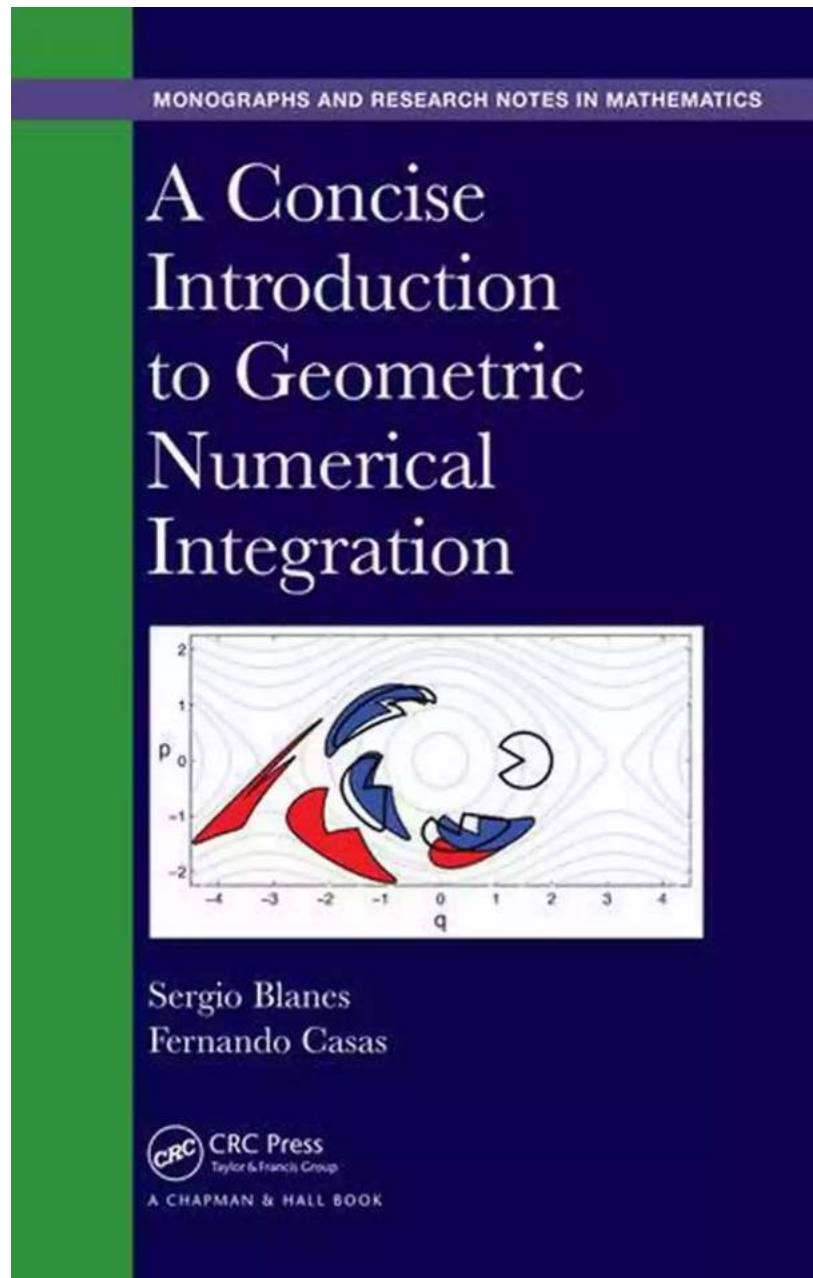


The Concise Introduction To Geometric Numerical Integration: A Game-Changer in Numerical Analysis

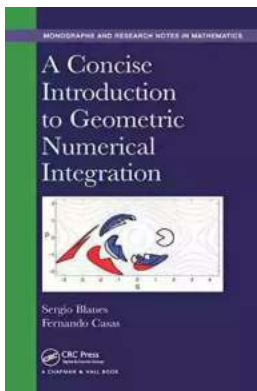


Are you fascinated by the intersection of mathematics and computer science? Do you have a keen interest in numerical analysis, looking for innovative ways to

solve complex problems accurately and efficiently? If so, then you'll be thrilled to discover the "Concise To Geometric Numerical Integration," a groundbreaking book published by Chapman Hallcrc.

A Game-Changing Approach

Geometric numerical integration is a revolutionary approach to numerical analysis that combines the power of geometric mechanics with the accuracy of numerical methods. This cutting-edge technique has gained significant attention in recent years due to its ability to provide more accurate, reliable, and efficient solutions to a wide range of complex mathematical problems.



A Concise Introduction to Geometric Numerical Integration (Chapman & Hall/CRC Monographs and Research Notes in Mathematics Book 23)

by A. A. Abrikosov(1st Edition, Kindle Edition)

★★★★☆ 4.5 out of 5

Language : English
File size : 22100 KB
Text-to-Speech : Enabled
Enhanced typesetting : Enabled
Print length : 233 pages
Screen Reader : Supported



The Concise To Geometric Numerical Integration serves as a comprehensive guide for both researchers and practitioners in the field of numerical analysis. Authored by a team of leading experts, the book offers a clear and concise overview of the fundamental concepts, theories, and techniques associated with geometric numerical integration.

A Comprehensive Guide

Spanning over 300 pages, this book covers a wide range of topics, including:

- The historical background of numerical integration
- An to geometric mechanics
- Theoretical foundations of geometric numerical integration
- Numerical methods for ordinary differential equations
- Symplectic integrators
- Structure-preserving algorithms
- Applications of geometric numerical integration

Each chapter is meticulously crafted with clear explanations, illustrative examples, and step-by-step instructions to aid your understanding. The authors have taken great care to ensure that complex topics are presented in an accessible manner, making this book suitable for readers with various levels of mathematical and computational backgrounds.

Why Geometric Numerical Integration Matters

Traditional numerical methods often suffer from numerical errors, instability, and lack of accuracy, making them less reliable for solving critical mathematical problems in fields such as physics, engineering, and computer graphics. This is where geometric numerical integration shines.

By leveraging the concepts of differential geometry and Hamiltonian mechanics, geometric numerical integration provides highly accurate and efficient solutions to various mathematical problems. It ensures long-term stability, conservation of

important quantities, and the preservation of geometric properties that traditional numerical methods may overlook.

The Impact of Geometric Numerical Integration

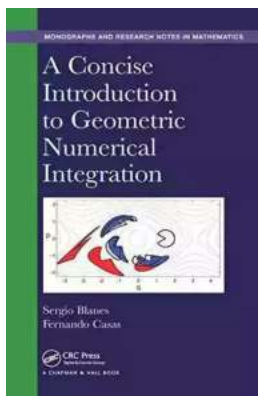
The Concise To Geometric Numerical Integration has already made a substantial impact on the field of numerical analysis. Researchers and practitioners around the world have embraced this methodology, revolutionizing their approach to solving complex mathematical problems.

With the knowledge gained from this book, you'll be able to apply geometric numerical integration to a diverse range of practical applications. Whether you're a researcher looking to advance the field of numerical analysis or a practitioner seeking more accurate solutions, this book will undoubtedly take your skills to the next level.

The Concise To Geometric Numerical Integration offers a game-changing approach to numerical analysis that combines the power of geometric mechanics with accurate numerical methods. This comprehensive guide provides a solid foundation for understanding and implementing geometric numerical integration in your own work.

By embracing this innovative methodology, you'll be equipped with the tools to solve complex mathematical problems with greater accuracy, reliability, and efficiency. The impact of geometric numerical integration on the field of numerical analysis is undeniable, and the potential it holds for advancing various scientific disciplines is enormous.

Don't miss out on the opportunity to explore this exciting field. Get your hands on the Concise To Geometric Numerical Integration today and embark on a journey that will revolutionize your approach to numerical analysis!



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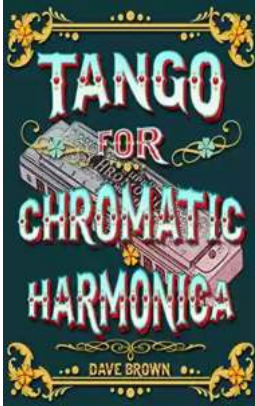
Discover How Geometric Integrators Preserve the Main Qualitative Properties of Continuous Dynamical Systems

A Concise to Geometric Numerical Integration presents the main themes, techniques, and applications of geometric integrators for researchers in mathematics, physics, astronomy, and chemistry who are already familiar with numerical tools for solving differential equations. It also offers a bridge from traditional training in the numerical analysis of differential equations to understanding recent, advanced research literature on numerical geometric integration.

The book first examines high-order classical integration methods from the structure preservation point of view. It then illustrates how to construct high-order integrators via the composition of basic low-order methods and analyzes the idea of splitting. It next reviews symplectic integrators constructed directly from the theory of generating functions as well as the important category of variational integrators. The authors also explain the relationship between the preservation of

the geometric properties of a numerical method and the observed favorable error propagation in long-time integration. The book concludes with an analysis of the applicability of splitting and composition methods to certain classes of partial differential equations, such as the Schrödinger equation and other evolution equations.

The motivation of geometric numerical integration is not only to develop numerical methods with improved qualitative behavior but also to provide more accurate long-time integration results than those obtained by general-purpose algorithms. Accessible to researchers and post-graduate students from diverse backgrounds, this introductory book gets readers up to speed on the ideas, methods, and applications of this field. Readers can reproduce the figures and results given in the text using the MATLAB[®] programs and model files available online.



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