Rotations, Quaternions, and Double Groups: A Comprehensive Guide for Mathematicians, Physicists, and Engineers

The study of rotations, quaternions, and double groups is a captivating and intellectually rewarding endeavor that has profound implications in diverse disciplines, including mathematics, physics, engineering, and computer science. This comprehensive guide delves into these mathematical concepts, providing a thorough examination of their theoretical foundations, practical applications, and historical significance.
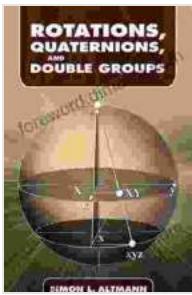
Rotations, Quaternions, and Double Groups (Dover Books on Mathematics) by Simon L. Altmann

★★★★☆ 4 out of 5

Language : English
File size : 28109 KB
Screen Reader : Supported
Print length : 220 pages

Chapter 1: Rotations

- Definition and representation of rotations - Properties of rotations (e.g., composition, inverse, identity) - Rotations in 2D and 3D space - Applications in computer graphics and robotics
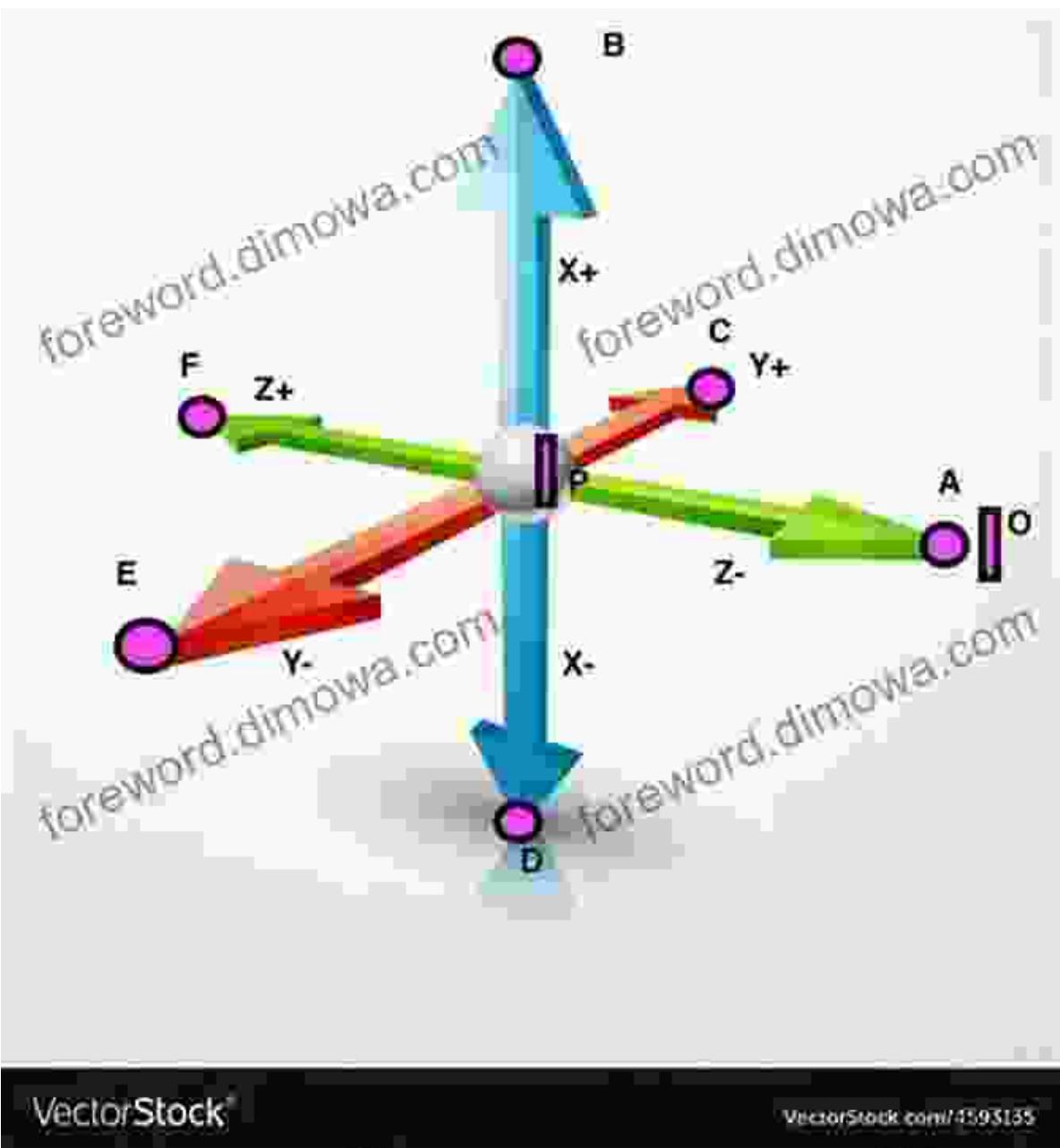
Chapter 2: Quaternions

- to quaternions: definition, algebra, and geometry - Quaternion representations of 3D rotations - Applications in computer graphics, signal processing, and physics
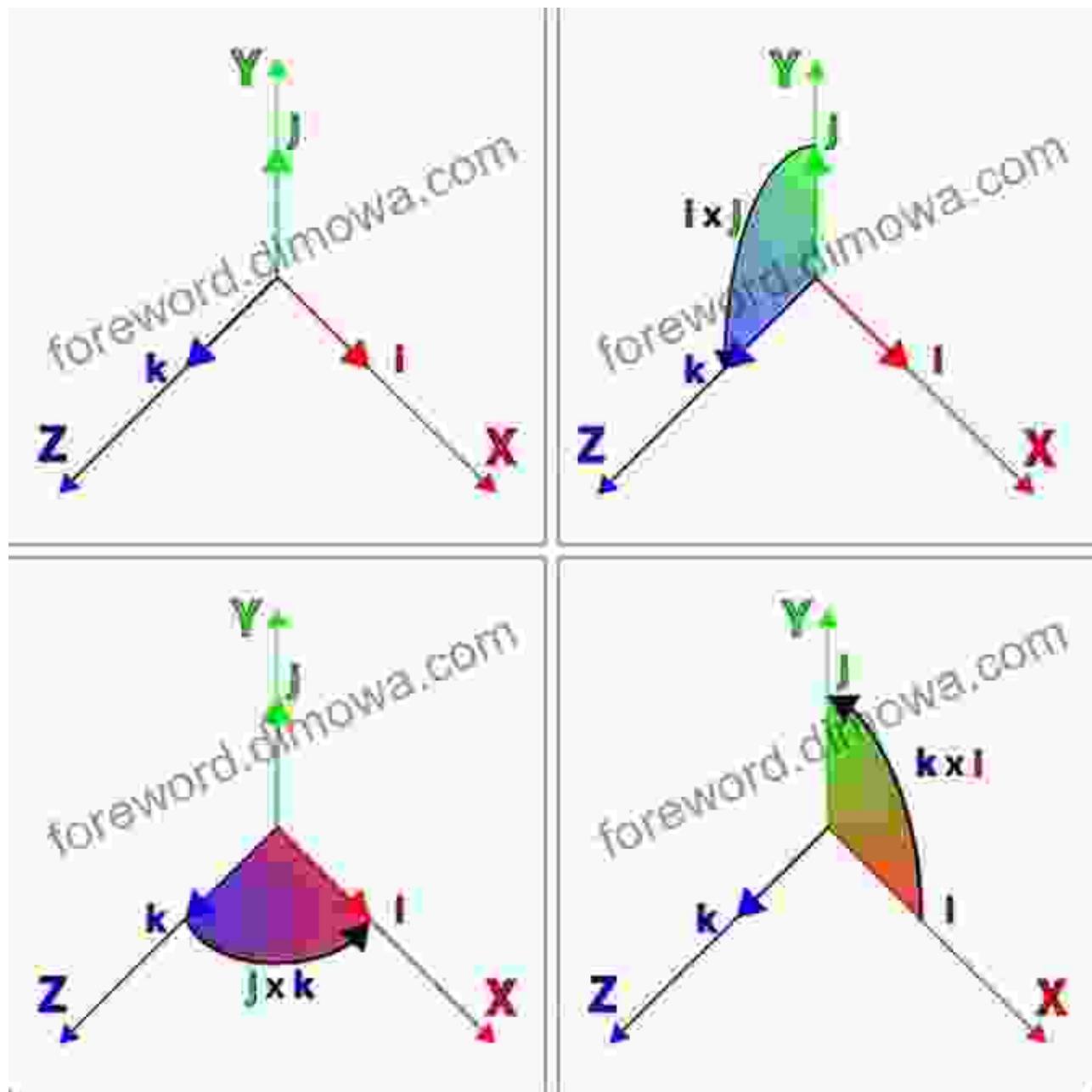
Chapter 3: Double Groups

- Definition and structure of double groups - Double groups as generalizations of rotation groups - Applications in quantum mechanics, particle physics, and crystallography

Venn diagram
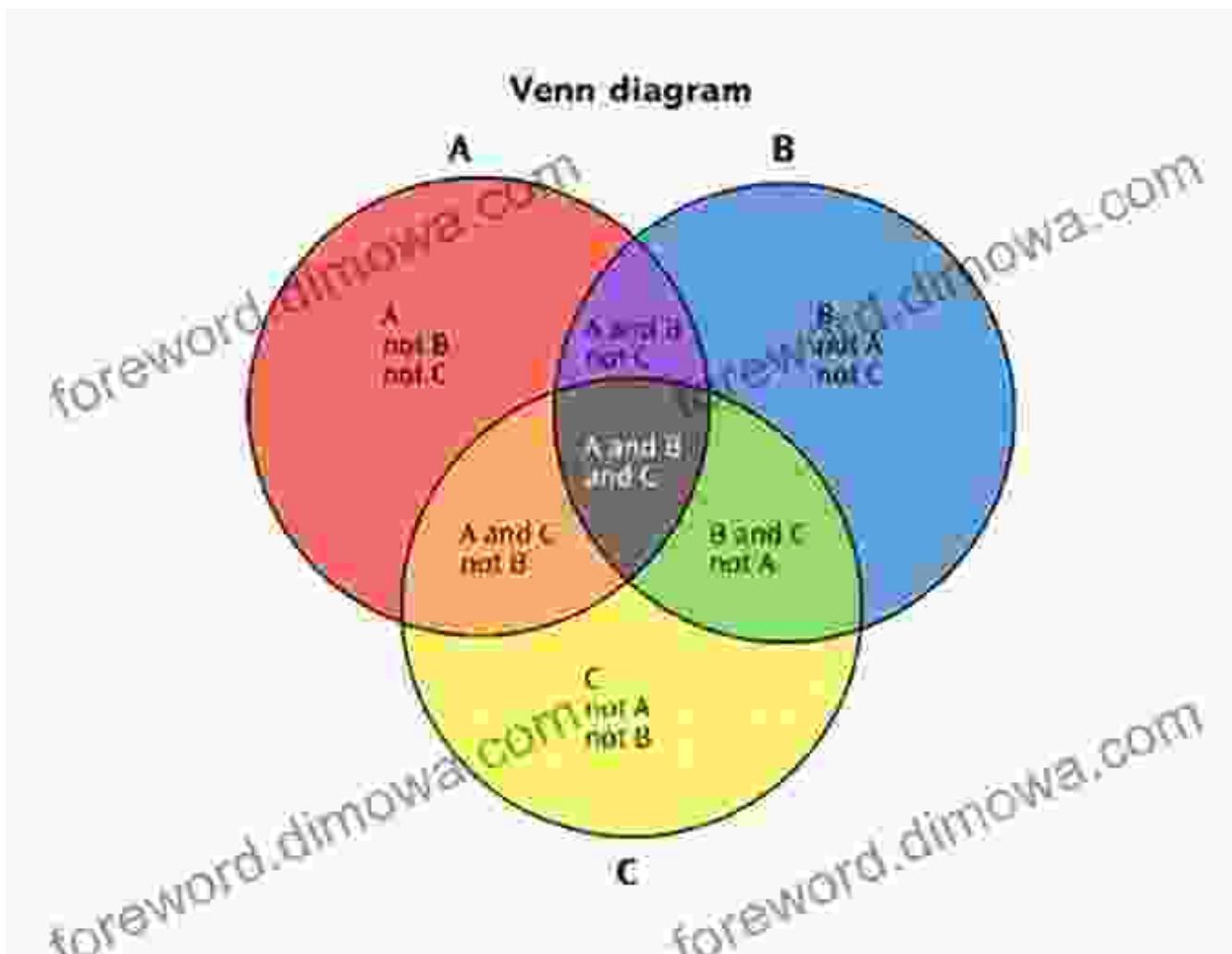
Applications in Diverse Fields

The concepts presented in this book find applications in a wide range of disciplines:

- **Mathematics**: Group theory, algebraic topology, differential geometry - **Physics**: Rotational dynamics, quantum mechanics, particle physics - **Engineering**: Robotics, computer graphics, signal processing - **Computer Science**: Computer vision, machine learning, computational geometry

Historical Significance

The study of rotations, quaternions, and double groups has a rich history:

- The concept of rotations dates back to ancient Greece - Quaternions were developed by Sir William Rowan Hamilton in the 19th century - Double groups were introduced by Élie Cartan in the 20th century

Benefits of the Book

This comprehensive guide offers several benefits to readers:

- **Thorough and rigorous**: Provides a deep understanding of the subject matter - **Extensive coverage**: Explores a wide range of topics, from fundamental concepts to advanced applications - **Clear and engaging**: Written in a lucid and accessible style - **豊富な例と演習**: Strengthens understanding through практический опыт - **Additional resources**: Includes references to further reading and online resources

Target Audience

This book is ideal for:

- Mathematicians seeking a comprehensive treatment of rotations, quaternions, and double groups - Physicists and engineers working in fields that involve rotations and other symmetry transformations - Computer scientists interested in the mathematical foundations of computer graphics and robotics - Students and researchers seeking a deeper understanding of these mathematical concepts

Concluding Remarks

Rotations, Quaternions, and Double Groups is an indispensable resource for anyone seeking a comprehensive and authoritative guide to these

fascinating mathematical concepts. This book will empower you with a profound understanding of the theoretical foundations, practical applications, and historical significance of these topics, enabling you to make significant contributions to your field of expertise.

Call to Action

Free Download your copy today and unlock the secrets of rotations, quaternions, and double groups!
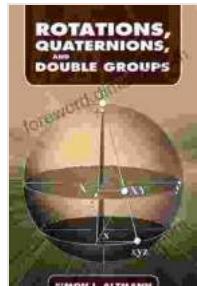
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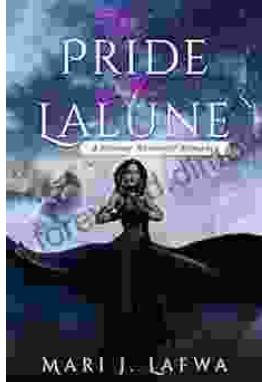
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