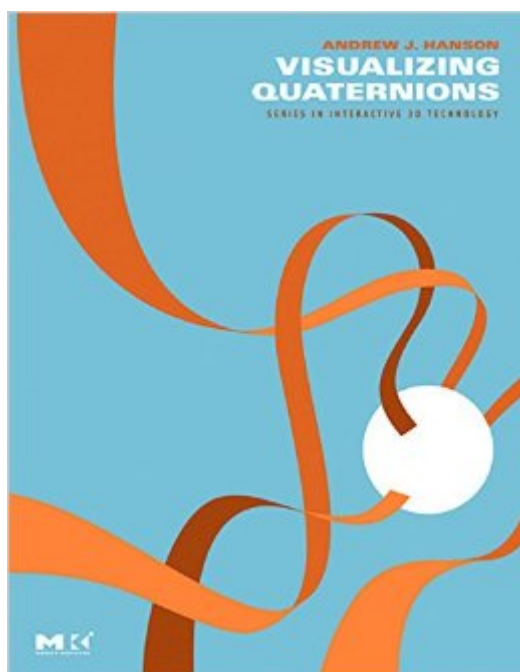# Visualizing Quaternions (The Morgan Kaufmann Series In Interactive 3D Technology)

Synopsis

Introduced 160 years ago as an attempt to generalize complex numbers to higher dimensions, quaternions are now recognized as one of the most important concepts in modern computer graphics. They offer a powerful way to represent rotations and compared to rotation matrices they use less memory, compose faster, and are naturally suited for efficient interpolation of rotations. Despite this, many practitioners have avoided quaternions because of the mathematics used to understand them, hoping that some day a more intuitive description will be available.The wait is over. Andrew Hanson's new book is a fresh perspective on quaternions. The first part of the book focuses on visualizing quaternions to provide the intuition necessary to use them, and includes many illustrative examples to motivate why they are importantâ"a beautiful introduction to those wanting to explore quaternions unencumbered by their mathematical aspects. The second part covers the all-important advanced applications, including quaternion curves, surfaces, and volumes. Finally, for those wanting the full story of the mathematics behind quaternions, there is a gentle introduction to their four-dimensional nature and to Clifford Algebras, the all-encompassing framework for vectors and quaternions.* Richly illustrated introduction for the developer, scientist, engineer, or student in computer graphics, visualization, or entertainment computing.* Covers both non-mathematical and mathematical approaches to quaternions.* Companion website with an assortment of quaternion utilities and sample code, data sets for the book's illustrations, and Mathematica notebooks with essential algebraic utilities.

Book Information

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Customer Reviews

This is a very interesting book in the Morgan Kaufmann series, and will appeal to those with a mathematical bent. Visualizing quaternions is broken into three parts. Part 1 treats the elements of quaternions, and parts 2 and 3 treats advanced mathematical topics that place considerably more demands on the reader's mathematical knowledge (and also on the author).Part 1 is an introduction for those readers new to the topic. As far as introductions go, it is not too bad. It does in fact contain one important subject - quaternion interpolation - that is not always covered in other texts. Hanson covers interpolation in part 1 and again in part 2. If your interest is computer animation, this may be sufficient reason to acquire the book...analogous to purchasing an album just to get one song. However, if you are completely new to quaternions and want to develop a firm intuition grounded in first principles, then a book that is at least an order of magnitude better is "Quaternions and Rotation Sequences" by J. B. Kuipers.Parts 2 and 3 are the most interesting parts of the book. Hanson presents a series of small chapters that discuss quaternions from different advanced mathematical viewpoints (differential geometry, group theory, Clifford algebras, octonions). The chapters are small, and so they by necessity contain references to the literature where the considerable background material required for understanding the topics is developed. If you have a good background in differential geometry and some abstract algebra, then the chapters are quite nice. In this sense, parts 2 and 3 of the book are more appropriate for mathematicians.

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