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Sinopsis

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Defines geometric algebra computing as the geometrically intuitive development of algorithms with a focus on their efficient implementation
Author anticipates the forthcoming widespread adoption of parallel processor technology
New computing platforms can benefit from the inherent optimization and parallelization of the techniques described
The author defines "Geometric Algebra Computing" as the geometrically intuitive development of algorithms using geometric algebra with a focus on their efficient implementation, and the goal of this book is to lay the foundations for the widespread use of geometric algebra as a powerful, intuitive mathematical language for engineering applications in academia and industry. The related technology is driven by the invention of conformal geometric algebra as a 5D extension of the 4D projective geometric algebra and by the recent progress in parallel processing, and with the specific conformal geometric algebra there is a growing community in recent years applying geometric algebra to applications in computer vision, computer graphics, and robotics.

This book is organized into three parts: in Part I the author focuses on the mathematical foundations; in Part II he explains the interactive handling of geometric algebra; and in Part III he deals with computing technology for high-performance implementations based on geometric algebra as a domain-specific language in standard programming languages such as C++ and OpenCL. The book is written in a tutorial style and readers should gain experience with the associated freely available software packages and applications.

The book is suitable for students, engineers, and researchers in computer science, computational engineering, and mathematics.

Content Level » Graduate

Keywords » CLUCalc - GPGPU - animation - conformal geometric algebra (CGA) - gaalop -

geometric algebra - maple - molecular dynamics - planes - point sets - quaternions - robotics - spheres

Related subjects » Computational Intelligence and Complexity - Geometry & Topology - Image Processing

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