

硕 士 研 究 生 读 书 报 告



题目 计算机图形学的数学

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The mathematics of computer graphics

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摘要

直至今日，计算机图形学的专家们对将数学应用在计算机图形学上的研究依然很少。计算通常只是用作评估算法的一个简单的工具，因此正规的计算机图形学方面的书对此介绍的很少。现在这些情况正在发生改变，如几何计算开始被有效应用在图形学上，因为渲染和表现的力量能够使模型构造表现的更精确和清楚。传统的图像处理方面，如采样，走样，傅立叶变换，卷积和基本的系统理论都应用在计算机图形领域。现在，微分和代数几何、分形数学，曲线的定义，动态的领域，和形状变形等领域都在计算机图形学上相互交叠和联系以及发展。这些再加上诸如管线转换、图形语言和接口设计、并行应用程序这些规范的方法，图形产生的过程和效果将会大大提高。本文将对计算机图形学与数学和数值分析的联系以及未来预期发展的各个方面展开介绍。

**关键词**：计算机、图形学、数学、建模、几何学

Abstract

Until relatively recently, researchers in computer graphics paid scant attention to the mathematics of their computations. Calculation usually only is used as a simple tool for evaluation algorithm, so books of computer graphics describe little about it. This is now changing, geometric computations must be performed more accurately (in some sense) since the power of rendering and presentation now enables model construction to be more clearly seen. The traditional image processing, such as sampling, aliasing, Fourier transform, convolution and basic systems theory are applied in the field of computer graphics. Now, the fields such as differential and algebraic geometry, fractal mathematics, the definition of the curve, dynamic field, and shape deformation are overlapping and interacting as well as developing on computer graphics. These coupled with the method of converting, graphics language, interface design, and interface design, parallel application program, the process and effect of graphics will be greatly improved. This paper reviews the aspects of mathematics and numerical analysis of relevance to computer graphics and the anticipated developments in the future.

**Keywords：**computer, graphics, mathematics, modelling, geometry