

## <<计算机图形学>>

### 图书基本信息

书名：<<计算机图形学>>

13位ISBN编号：9787121157059

10位ISBN编号：7121157055

出版时间：2012-2

出版时间：电子工业出版社

作者：（美）赫恩 等著

页数：864

译者：唐纳德·赫恩

版权说明：本站所提供下载的PDF图书仅提供预览和简介，请支持正版图书。

更多资源请访问：<http://www.tushu007.com>

## <<计算机图形学>>

### 内容概要

本书是一本内容丰富、取材新颖的计算机图形学著作，在前一版的基础上进行了全面扩充，增加了许多新的内容，覆盖了近年来计算机图形学的最新发展和成就。

全书层次分明、重点突出，并附有使用OpenGL编写的大量程序及各种效果图，是一本难得的优秀教材。

全书共分为24章及3个附录，全面系统地讲解了计算机图形学的基本概念和相关技术。

作者首先对计算机图形学进行综述；然后讲解二维图形的对象表示、算法及应用，三维图形的相关技术、建模和变换等；接着介绍光照模型、颜色模型和动画技术。

本书还新增了有关分层建模与动画的介绍，OpenGL的全面介绍；最后的附录给出了计算机图形学中用到的基本数学概念、图形文件格式及OpenGL的相关内容等。

## <<计算机图形学>>

### 作者简介

作者:(美)Donald Hearn , (美)M. Pauline Baker , (美)Warren R. Carithers

## <<计算机图形学>>

### 书籍目录

- 1 A Survey of Computer Graphics
  - 1-1 Graphs and Charts
  - 1-2 Computer-Aided Design
  - 1-3 Virtual-Reality Environments
  - 1-4 Data Visualizations
  - 1-5 Education and Training
  - 1-6 Computer Art
  - 1-7 Entertainment
  - 1-8 Image Processing
  - 1-9 Graphical User Interfaces
  - 1-10 Summary
- 2 Computer Graphics Hardware
  - 2-1 Video Display Devices
    - Refresh Cathode-Ray Tubes
    - Raster-Scan Displays
    - Random-Scan Displays
    - Color CRT Monitors
    - Flat-Panel Displays
    - Three-Dimensional Viewing Devices
    - Stereoscopic and Virtual-Reality Systems
  - 2-2 Raster-Scan Systems
    - Video Controller
    - Raster-Scan Display Processor
  - 2-3 Graphics Workstations and Viewing Systems
  - 2-4 Input Devices
    - Keyboards, Button Boxes, and Dials
    - Mouse Devices
    - Trackballs and Spaceballs
    - Joysticks
    - Data Gloves
    - Digitizers
    - Image Scanners
    - Touch Panels
    - Light Pens
    - Voice Systems
  - 2-5 Hard-Copy Devices
  - 2-6 Graphics Networks
  - 2-7 Graphics on the Internet
  - 2-8 Summary
- 3 Computer Graphics Software
  - 3-1 Coordinate Representations
  - 3-2 Graphics Functions
  - 3-3 Software Standards
  - 3-4 Other Graphics Packages
  - 3-5 Introduction to OpenGL

## <<计算机图形学>>

- Basic OpenGL Syntax
- Related Libraries
- Header Files
- Display-Window Management Using GLUT
- A Complete OpenGL Program
- Error Handling in OpenGL
- 3-6 Summary
- 4 Graphics Output Primitives
- 4-1 Coordinate Reference Frames
- Screen Coordinates
- Absolute and Relative Coordinate Specifications
- 4-2 Specifying A Two-DimensionalWorld-  
Coordinate Reference Frame in OpenGL
- 4-3 OpenGL Point Functions
- 4-4 OpenGL Line Functions
- 4-5 OpenGL Curve Functions
- 4-6 Fill-Area Primitives
- 4-7 Polygon Fill Areas
- Polygon Classifications
- Identifying Concave Polygons
- Splitting Concave Polygons
- Splitting a Convex Polygon into a Set of Triangles
- Inside-Outside Tests
- Polygon Tables
- Plane Equations
- Front and Back Polygon Faces
- 4-8 OpenGL Polygon Fill-Area Functions
- 4-9 OpenGL Vertex Arrays
- 4-10 Pixel-Array Primitives
- 4-11 OpenGL Pixel-Array Functions
- OpenGL Bitmap Function
- OpenGL Pixmap Function
- OpenGL Raster Operations
- 4-12 Character Primitives
- 4-13 OpenGL Character Functions
- 4-14 Picture Partitioning
- 4-15 OpenGL Display Lists
- Creating and Naming an OpenGL Display List
- Executing OpenGL Display Lists
- Deleting OpenGL Display Lists
- 4-16 OpenGL Display-Window Reshape Function
- 4-17 Summary
- 5 Attributes of Graphics
- Primitives
- 5-1 OpenGL State Variables
- 5-2 Color and Grayscale
- RGB Color Components

## <<计算机图形学>>

- Color Tables
- Grayscale
- Other Color Parameters
- 5-3 OpenGL Color Functions
- The OpenGL RGB and RGBA Color Modes
- OpenGL Color-Index Mode
- OpenGL Color Blending
- OpenGL Color Arrays
- Other OpenGL Color Functions
- 5-4 Point Attributes
- 5-5 OpenGL Point-Attribute Functions
- 5-6 Line Attributes
- Line Width
- Line Style
- Pen and Brush Options
- 5-7 OpenGL Line-Attribute Functions
- OpenGL Line-Width Function
- OpenGL Line-Style Function
- Other OpenGL Line Effects
- 5-8 Curve Attributes
- 5-9 Fill-Area Attributes
- Fill Styles
- Color-Blended Fill Regions
- 5-10 OpenGL Fill-Area Attribute Functions
- OpenGL Fill-Pattern Function
- OpenGL Texture and Interpolation Patterns
- OpenGL Wire-Frame Methods
- OpenGL Front-Face Function
- 5-11 Character Attributes
- 5-12 OpenGL Character-Attribute Functions
- 5-13 OpenGL Antialiasing Functions
- 5-14 OpenGL Query Functions
- 5-15 OpenGL Attribute Groups
- 5-16 Summary
- 6 Implementation Algorithms for Graphics Primitives and Attributes
- 6-1 Line-Drawing Algorithms
- Line Equations
- DDA Algorithm
- Bresenham ' s Line Algorithm
- Displaying Polylines
- 6-2 Parallel Line Algorithms
- 6-3 Setting Frame-Buffer Values
- 6-4 Circle-Generating Algorithms
- Properties of Circles
- Midpoint Circle Algorithm
- 6-5 Ellipse-Generating Algorithms

## <<计算机图形学>>

Properties of Ellipses  
Midpoint Ellipse Algorithm  
6-6 Other Curves  
Conic Sections  
Polynomials and Spline Curves  
6-7 Parallel Curve Algorithms  
6-8 Pixel Addressing and Object Geometry  
Screen Grid Coordinates  
Maintaining Geometric Properties of Displayed Objects  
6-9 Attribute Implementations for Straight-Line Segments and Curves  
Line Width  
Line Style  
Pen and Brush Options  
Curve Attributes  
6-10 General Scan-Line Polygon-Fill Algorithm  
6-11 Scan-Line Fill of Convex Polygons  
6-12 Scan-Line Fill for Regions with Curved Boundaries  
6-13 Fill Methods for Areas with Irregular Boundaries  
Boundary-Fill Algorithm  
Flood-Fill Algorithm  
6-14 Implementation Methods for Fill Styles  
Fill Styles  
Color-Blended Fill Regions  
6-15 Implementation Methods for Antialiasing  
Supersampling Straight-Line Segments  
Subpixel Weighting Masks  
Area Sampling Straight-Line Segments  
Filtering Techniques  
Pixel Phasing  
Compensating for Line-Intensity Differences  
Antialiasing Area Boundaries  
6-16 Summary  
7 Two-Dimensional Geometric Transformations  
7-1 Basic Two-Dimensional Geometric Transformations  
Two-Dimensional Translation  
Two-Dimensional Rotation  
Two-Dimensional Scaling  
7-2 Matrix Representations and Homogeneous Coordinates  
Homogeneous Coordinates  
Two-Dimensional Translation Matrix  
Two-Dimensional Rotation Matrix  
Two-Dimensional Scaling Matrix  
7-3 Inverse Transformations  
7-4 Two-Dimensional Composite Transformations  
Composite Two-Dimensional Translations

## <<计算机图形学>>

- Composite Two-Dimensional Rotations
- Composite Two-Dimensional Scalings
- General Two-Dimensional Pivot-Point Rotation
- General Two-Dimensional Fixed-Point Scaling
- General Two-Dimensional Scaling Directions
- Matrix Concatenation Properties
- General Two-Dimensional Composite Transformations and Computational Efficiency
- Two-Dimensional Rigid-Body Transformation
- Constructing Two-Dimensional Rotation Matrices
- Two-Dimensional Composite-Matrix Programming Example
- 7-5 Other Two-Dimensional Transformations
- Reflection
- Shear
- 7-6 Raster Methods for Geometric Transformations
- 7-7 OpenGL Raster Transformations
- 7-8 Transformations between Two-Dimensional Coordinate Systems
- 7-9 OpenGL Functions for Two-Dimensional Geometric Transformations
- Basic OpenGL Geometric Transformations
- OpenGL Matrix Operations
- 7-10 OpenGL Geometric-Transformation Programming Examples
- 7-11 Summary
- 8 Two-Dimensional Viewing
- 8-1 The Two-Dimensional Viewing Pipeline
- 8-2 The ClippingWindow
  - Viewing-Coordinate Clipping Window
  - World-Coordinate Clipping Window
- 8-3 Normalization and Viewport Transformations
  - Mapping the Clipping Window into a Normalized Viewport
  - Mapping the Clipping Window into a Normalized Square
  - Display of Character Strings
  - Split-Screen Effects and Multiple Output Devices
- 8-4 OpenGL Two-Dimensional Viewing Functions
  - OpenGL Projection Mode
  - GLU Clipping-Window Function
  - OpenGL Viewport Function
  - Creating a GLUT Display Window
  - Setting the GLUT Display-Window Mode and Color
  - GLUT Display-Window Identifier
  - Deleting a GLUT Display Window
  - Current GLUT Display Window
  - Relocating and Resizing a GLUT Display Window
  - Managing Multiple GLUT Display Windows
  - GLUT Subwindows



## <<计算机图形学>>

- Selecting a Display-Window Screen-Cursor Shape
- Viewing Graphics Objects in a GLUT Display Window
- Executing the Application Program
- Other GLUT Functions
- OpenGL Two-Dimensional Viewing Program Example
- 8-5 Clipping Algorithms
- 8-6 Two-Dimensional Point Clipping
- 8-7 Two-Dimensional Line Clipping
- Cohen-Sutherland Line Clipping
- Liang-Barsky Line Clipping
- Nicholl-Lee-Nicholl Line Clipping
- Line Clipping Using Nonrectangular Polygon Clip Windows
- Line Clipping Using Nonlinear Clipping-Window Boundaries
- 8-8 Polygon Fill-Area Clipping
- Sutherland--Hodgman Polygon Clipping
- Weiler-Atherton Polygon Clipping
- Polygon Clipping Using Nonrectangular Polygon Clip Windows
- Polygon Clipping Using Nonlinear Clipping-Window Boundaries
- 8-9 Curve Clipping
- 8-10 Text Clipping
- 8-11 Summary
- 9 Three-Dimensional Geometric Transformations
- 9-1 Three-Dimensional Translation
- 9-2 Three-Dimensional Rotation
- Three-Dimensional Coordinate-Axis Rotations
- General Three-Dimensional Rotations
- Quaternion Methods for Three-Dimensional Rotations
- 9-3 Three-Dimensional Scaling
- 9-4 Composite Three-Dimensional Transformations
- 9-5 Other Three-Dimensional Transformations
- Three-Dimensional Reflections
- Three-Dimensional Shears
- 9-6 Transformations between Three-Dimensional Coordinate Systems
- 9-7 Affine Transformations
- 9-8 OpenGL Geometric-Transformation Functions
- OpenGL Matrix Stacks
- 9-9 OpenGL Three-Dimensional Geometric-Transformation Programming Examples
- 9-10 Summary
- 10 Three-Dimensional Viewing
- 10-1 Overview of Three-Dimensional Viewing Concepts
- Viewing a Three-Dimensional Scene
- Projections
- Depth Cueing
- Identifying Visible Lines and Surfaces
- Surface Rendering

## <<计算机图形学>>

- Exploded and Cutaway Views
- Three-Dimensional and Stereoscopic Viewing
- 10-2 The Three-Dimensional Viewing Pipeline
- 10-3 Three-Dimensional Viewing-Coordinate Parameters
- The View-Plane Normal Vector
- The View-Up Vector
- The uvn Viewing-Coordinate Reference Frame
- Generating Three-Dimensional Viewing Effects
- 10-4 Transformation from World to Viewing Coordinates
- 10-5 Projection Transformations
- 10-6 Orthogonal Projections
- Axonometric and Isometric Orthogonal Projections
- Orthogonal Projection Coordinates
- Clipping Window and Orthogonal-Projection View Volume
- Normalization Transformation for an Orthogonal Projection
- 10-7 Oblique Parallel Projections
- Oblique Parallel Projections in Drafting and Design
- Cavalier and Cabinet Oblique Parallel Projections
- Oblique Parallel-Projection Vector
- Clipping Window and Oblique Parallel-Projection View Volume
- Oblique Parallel-Projection Transformation Matrix
- Normalization Transformation for an Oblique Parallel Projection
- 10-8 Perspective Projections
- Perspective-Projection Transformation Coordinates
- Perspective-Projection Equations: Special Cases
- Vanishing Points for Perspective Projections
- Perspective-Projection View Volume
- Perspective-Projection Transformation Matrix
- Symmetric Perspective-Projection Frustum
- Oblique Perspective-Projection Frustum
- Normalized Perspective-Projection Transformation Coordinates
- 10-9 The Viewport Transformation and Three-Dimensional Screen Coordinates
- 10-10 OpenGL Three-Dimensional Viewing Functions
- OpenGL Viewing-Transformation Function
- OpenGL Orthogonal-Projection Function
- OpenGL Symmetric Perspective-Projection Function
- OpenGL General Perspective-Projection Function
- OpenGL Viewports and Display Windows
- OpenGL Three-Dimensional Viewing Program Example
- 10-11 Three-Dimensional Clipping Algorithms
- Clipping in Three-Dimensional Homogeneous Coordinates
- Three-Dimensional Region Codes
- Three-Dimensional Point and Line Clipping
- Three-Dimensional Polygon Clipping
- Three-Dimensional Curve Clipping

## <<计算机图形学>>

Arbitrary Clipping Planes

10-12 OpenGL Optional Clipping Planes

10-13 Summary

11 Hierarchical Modeling

11-1 Basic Modeling Concepts

System Representations

Symbol Hierarchies

11-2 Modeling Packages

11-3 General Hierarchical Modeling Methods

Local Coordinates

Modeling Transformations

Creating Hierarchical Structures

11-4 Hierarchical Modeling Using OpenGL Display Lists

11-5 Summary

12 Computer Animation

12-1 Raster Methods for Computer Animation

Double Buffering

Generating Animations Using Raster Operations

12-2 Design of Animation Sequences

12-3 Traditional Animation Techniques

12-4 General Computer-Animation Functions

12-5 Computer-Animation Languages

12-6 Key-Frame Systems

Morphing

Simulating Accelerations

12-7 Motion Specifications

Direct Motion Specification

Goal-Directed Systems

Kinematics and Dynamics

12-8 Character Animation

Articulated Figure Animation

Motion Capture

12-9 Periodic Motions

12-10 OpenGL Animation Procedures

12-11 Summary

13 Three-Dimensional Object Representations

13-1 Polyhedra

13-2 OpenGL Polyhedron Functions

OpenGL Polygon Fill-Area Functions

GLUT Regular Polyhedron Functions

Example GLUT Polyhedron Program

13-3 Curved Surfaces

13-4 Quadric Surfaces

Sphere

Ellipsoid

Torus

13-5 Superquadrics

## <<计算机图形学>>

Superellipse

Superellipsoid

13-6 OpenGL Quadric-Surface and Cubic-Surface Functions

GLUT Quadric-Surface Functions

GLUT Cubic-Surface Teapot Function

GLU Quadric-Surface Functions

Example Program Using GLUT and GLU Quadric-Surface Functions

13-7 Summary

14 Spline Representations

14-1 Interpolation and Approximation Splines

14-2 Parametric Continuity Conditions

14-3 Geometric Continuity Conditions

14-4 Spline Specifications

14-5 Spline Surfaces

14-6 Trimming Spline Surfaces

14-7 Cubic-Spline Interpolation Methods

Natural Cubic Splines

Hermite Interpolation

Cardinal Splines

Kochanek-Bartels Splines

14-8 Bézier Spline Curves

Bézier Curve Equations

Example Bézier Curve-Generating Program

Properties of Bézier Curves

Design Techniques Using Bézier Curves

Cubic Bézier Curves

14-9 Bézier Surfaces

14-10 B-Spline Curves

B-Spline Curve Equations

Uniform Periodic B-Spline Curves

Cubic Periodic B-Spline Curves

Open Uniform B-Spline Curves

Nonuniform B-Spline Curves

14-11 B-Spline Surfaces

14-12 Beta-Splines

Beta-Spline Continuity Conditions

Cubic Periodic Beta-Spline Matrix Representation

14-13 Rational Splines

14-14 Conversion Between Spline Representations

14-15 Displaying Spline Curves and Surfaces

Horner's Rule

Forward-Difference Calculations

Subdivision Methods

14-16 OpenGL Approximation-Spline Functions

OpenGL Bézier-Spline Curve Functions

OpenGL Bézier-Spline Surface Functions

GLU B-Spline Curve Functions

## <<计算机图形学>>

- GLU B-Spline Surface Functions
- GLU Surface-Trimming Functions
- 14-17 Summary
- 15 Other Three-Dimensional Object Representations
  - 15-1 Blobby Objects
  - 15-2 Sweep Representations
  - 15-3 Constructive Solid-Geometry Methods
  - 15-4 Octrees
  - 15-5 BSP Trees
  - 15-6 Physically Based Modeling
  - 15-7 Summary
- 16 Visible-Surface Detection Methods
  - 16-1 Classification of Visible-Surface Detection Algorithms
  - 16-2 Back-Face Detection
  - 16-3 Depth-Buffer Method
  - 16-4 A-Buffer Method
  - 16-5 Scan-Line Method
  - 16-6 Depth-Sorting Method
  - 16-7 BSP-Tree Method
  - 16-8 Area-Subdivision Method
  - 16-9 Octree Methods
  - 16-10 Ray-Casting Method
  - 16-11 Comparison of Visibility-Detection Methods
  - 16-12 Curved Surfaces
- Curved-Surface Representations
- Surface Contour Plots
- 16-13 Wire-Frame Visibility Methods
- Wire-Frame Surface-Visibility Algorithms
- Wire-Frame Depth-Cueing Algorithm
- 16-14 OpenGL Visibility-Detection Functions
- OpenGL Polygon-Culling Functions
- OpenGL Depth-Buffer Functions
- OpenGL Wire-Frame Surface-Visibility Methods
- OpenGL Depth-Cueing Function
- 16-15 Summary
- 17 Illumination Models and Surface-Rendering Methods
  - 17-1 Light Sources
    - Point Light Sources
    - Infinitely Distant Light Sources
    - Radial Intensity Attenuation
    - Directional Light Sources and Spotlight Effects
    - Angular Intensity Attenuation
    - Extended Light Sources and the Warn Model
  - 17-2 Surface Lighting Effects
  - 17-3 Basic Illumination Models
    - Ambient Light
    - Diffuse Reflection

## <<计算机图形学>>

Specular Reflection and the Phong Model  
Combined Diffuse and Specular Reflections  
Diffuse and Specular Reflections from Multiple Light Sources  
Surface Light Emissions  
Basic Illumination Model with Intensity Attenuation and Spotlights  
RGB Color Considerations  
Other Color Representations  
Luminance  
17-4 Transparent Surfaces  
Translucent Materials  
Light Refraction  
Basic Transparency Model  
17-5 Atmospheric Effects  
17-6 Shadows  
17-7 Camera Parameters  
17-8 Displaying Light Intensities  
Distributing System Intensity Levels  
Gamma Correction and Video Lookup Tables  
Displaying Continuous-Tone Images  
17-9 Halftone Patterns and Dithering Techniques  
Halftone Approximations  
Dithering Techniques  
17-10 Polygon Rendering Methods  
Constant-Intensity Surface Rendering  
Gouraud Surface Rendering  
Phong Surface Rendering  
Fast Phong Surface Rendering  
17-11 OpenGL Illumination and Surface-Rendering Functions  
OpenGL Point Light-Source Function  
Specifying an OpenGL Light-Source Position and Type  
Specifying OpenGL Light-Source Colors  
Specifying Radial-Intensity Attenuation Coefficients for an OpenGL Light Source  
OpenGL Directional Light Sources (Spotlights)  
OpenGL Global Lighting Parameters  
OpenGL Surface-Property Function  
OpenGL Illumination Model  
OpenGL Atmospheric Effects  
OpenGL Transparency Functions  
OpenGL Surface-Rendering Functions  
OpenGL Halftoning Operations  
17-12 Summary  
18 Texturing and Surface-Detail Methods  
18-1 Modeling Surface Detail with Polygons  
18-2 Texture Mapping  
Linear Texture Patterns

## <<计算机图形学>>

- Surface Texture Patterns
- Volume Texture Patterns
- Texture Reduction Patterns
- Procedural Texturing Methods
- 18-3 Bump Mapping
- 18-4 Frame Mapping
- 18-5 OpenGL Texture Functions
- OpenGL Line-Texture Functions
- OpenGL Surface-Texture Functions
- OpenGL Volume-Texture Functions
- OpenGL Color Options for Texture Patterns
- OpenGL Texture-Mapping Options
- OpenGL Texture Wrapping
- Copying OpenGL Texture Patterns from the Frame Buffer
- OpenGL Texture-Coordinate Arrays
- Naming OpenGL Texture Patterns
- OpenGL Texture Subpatterns
- OpenGL Texture Reduction Patterns
- OpenGL Texture Borders
- OpenGL Proxy Textures
- Automatic Texturing of Quadric Surfaces
- Homogeneous Texture Coordinates
- Additional OpenGL Texture Options
- 18-6 Summary
- 19 Color Models and Color Applications
- 19-1 Properties of Light
- The Electromagnetic Spectrum
- Psychological Characteristics of Color
- 19-2 Color Models
- Primary Colors
- Intuitive Color Concepts
- 19-3 Standard Primaries and the Chromaticity Diagram
- The XYZ Color Model
- Normalized XYZ Values
- The CIE Chromaticity Diagram
- Color Gamuts
- Complementary Colors
- Dominant Wavelength
- Purity
- 19-4 The RGB Color Model
- 19-5 The YIQ and Related Color Models
- The YIQ Parameters
- Transformations Between RGB and YIQ Color Spaces
- The YUV and YCrCb Systems
- 19-6 The CMY and CMYK Color Models
- The CMY Parameters
- Transformations Between CMY and RGB Color Spaces

## <<计算机图形学>>

### 19-7 The HSV Color Model

The HSV Parameters

Selecting Shades, Tints, and Tones

Transformations Between HSV and RGB Color Spaces

### 19-8 The HLS Color Model

### 19-9 Color Selection and Applications

### 19-10 Summary

## 20 Interactive Input Methods and Graphical User Interfaces

### 20-1 Graphical Input Data

### 20-2 Logical Classification of Input Devices

Locator Devices

Stroke Devices

String Devices

Valuator Devices

Choice Devices

Pick Devices

### 20-3 Input Functions for Graphical Data

Input Modes

Echo Feedback

Callback Functions

### 20-4 Interactive Picture-Construction Techniques

Basic Positioning Methods

Dragging

Constraints

Grids

Rubber-Band Methods

Gravity Field

Interactive Painting and Drawing Methods

### 20-5 Virtual-Reality Environments

### 20-6 OpenGL Interactive Input-Device Functions

GLUT Mouse Functions

GLUT Keyboard Functions

GLUT Tablet Functions

GLUT Spaceball Functions

GLUT Button-Box Function

GLUT Dials Function

OpenGL Picking Operations

### 20-7 OpenGL Menu Functions

Creating a GLUT Menu

Creating and Managing Multiple GLUT Menus

Creating GLUT Submenus

Modifying GLUT Menus

### 20-8 Designing a Graphical User Interface

The User Dialogue

Windows and Icons

Accommodating Multiple Skill Levels

Consistency



## <<计算机图形学>>

- Minimizing Memorization
- Backup and Error Handling
- Feedback
- 20-9 Summary
- 21 Global Illumination
- 21-1 Ray-Tracing Methods
  - Basic Ray-Tracing Algorithm
  - Ray – Surface Intersection Calculations
  - Ray – Sphere Intersections
  - Ray – Polyhedron Intersections
  - Reducing Object-Intersection Calculations
  - Space-Subdivision Methods
  - Simulating Camera Focusing Effects
- Antialiased Ray Tracing
- Distributed Ray Tracing
- 21-2 Radiosity Lighting Model
  - Radiant-Energy Terms
  - The Basic Radiosity Model
  - Progressive Refinement Radiosity Method
- 21-3 Environment Mapping
- 21-4 Photon Mapping
- 21-5 Summary
- 22 Programmable Shaders
- 22-1 A History of Shading Languages
  - Cook ' s Shade Trees
  - Perlin ' s Pixel Stream Editor
- RenderMan
- 22-2 The OpenGL Pipeline
  - The Fixed-Function Pipeline
  - Changing the Pipeline Structure
  - Vertex Shaders
  - Fragment Shaders
  - Geometry Shaders
  - Tessellation Shaders
- 22-3 The OpenGL Shading Language
  - Shader Structure
  - Using Shaders in OpenGL
- Basic Data Types
  - Vectors
  - Matrices
  - Structures and Arrays
  - Control Structures
  - GLSL Functions
- Communicating with OpenGL
- 22-4 Shader Effects
  - A Phong Shader
- Texture Mapping

## <<计算机图形学>>

- Bump Mapping
- 22-5 Summary
- 23 Algorithmic Modeling
- 23-1 Fractal-Geometry Methods
- Fractal Generation Procedures
- Classification of Fractals
- Fractal Dimension
- Geometric Construction of Deterministic Self-Similar Fractals
- Geometric Construction of Statistically Self-Similar Fractals
- Affine Fractal-Construction Methods
- Random Midpoint-Displacement Methods
- Controlling Terrain Topography
- Self-Squaring Fractals
- Self-Inverse Fractals
- 23-2 Particle Systems
- 23-3 Grammar-Based Modeling Methods
- 23-4 Summary
- 24 Visualization of Data Sets
- 24-1 Visual Representations for Scalar Fields
- 24-2 Visual Representations for Vector Fields
- 24-3 Visual Representations for Tensor Fields
- 24-4 Visual Representations for Multivariate Data Fields
- 24-5 Summary
- A Mathematics for Computer Graphics
- A-1 Coordinate Reference Frames
- Two-Dimensional Cartesian Screen Coordinates
- Standard Two-Dimensional Cartesian Reference Frames
- Polar Coordinates in the xy Plane
- Standard Three-Dimensional Cartesian Reference Frames
- Three-Dimensional Cartesian Screen Coordinates
- Three-Dimensional Curvilinear-Coordinate Systems
- Solid Angle
- A-2 Points and Vectors
- Point Properties
- Vector Properties
- Vector Addition and Scalar Multiplication
- Scalar Product of Two Vectors
- Vector Product of Two Vectors
- A-3 Tensors
- A-4 Basis Vectors and the Metric Tensor
- Determining Basis Vectors for a Coordinate Space
- Orthonormal Basis
- Metric Tensor
- A-5 Matrices
- Scalar Multiplication and Matrix Addition
- Matrix Multiplication
- Matrix Transpose

## <<计算机图形学>>

Determinant of a Matrix  
 Matrix Inverse  
 A-6 Complex Numbers  
 Basic Complex Arithmetic  
 Imaginary Unit  
 Complex Conjugate and Modulus of a Complex Number  
 Complex Division  
 Polar-Coordinate Representation for a Complex Number  
 A-7 Quaternions  
 A-8 Nonparametric Representations  
 A-9 Parametric Representations  
 A-10 Rate-of-Change Operators  
 Gradient Operator  
 Directional Derivative  
 General Form of the Gradient Operator  
 Laplace Operator  
 Divergence Operator  
 Curl Operator  
 A-11 Rate-of-Change Integral Transformation Theorems  
 Stokes ' s Theorem  
 Green ' s Theorem for a Plane Surface  
 Divergence Theorem  
 Green ' s Transformation Equations  
 A-12 Area and Centroid of a Polygon  
 Area of a Polygon  
 Centroid of a Polygon  
 A-13 Calculating Properties of Polyhedra  
 A-14 Numerical Methods  
 Solving Sets of Linear Equations  
 Finding Roots of Nonlinear Equations  
 Evaluating Integrals  
 Solving Ordinary Differential Equations  
 Solving Partial Differential Equations  
 Least-Squares Curve-Fitting Methods for Data Sets  
 B Graphics File Formats  
 B-1 Image-File Configurations  
 B-2 Color-Reduction Methods  
 Uniform Color Reduction  
 Popularity Color Reduction  
 Median-Cut Color Reduction  
 B-3 File-Compression Techniques  
 Run-Length Encoding  
 LZW Encoding  
 Other Pattern-Recognition Compression Methods  
 Huffman Encoding  
 Arithmetic Encoding  
 Discrete Cosine Transform

## <<计算机图形学>>

### B-4 Composition of the Major File Formats

JPEG: Joint Photographic Experts Group

CGM: Computer-Graphics Metafile Format

TIFF: Tag Image-File Format

PNG: Portable Network-Graphics Format

XBM: X Window System Bitmap Format and XPM: X Window System Pixmap Format

Adobe Photoshop Format

MacPaint: Macintosh Paint Format

PICT: Picture Data Format

BMP: Bitmap Format

PCX: PC Paintbrush File Format

TGA: Truevision Graphics-Adapter Format

GIF: Graphics Interchange Format

### B-5 Summary

### C The World of OpenGL

#### C-1 The Evolution of OpenGL

The Early Years: OpenGL 1.x

OpenGL Goes Tiny: OpenGL ES 1.x

Under New Management: OpenGL and Khronos Group

Programmable Everything: OpenGL 2.x

Tiny Programs: OpenGL ES 2.x

Geometry and Vertex Processing Evolution: OpenGL 3.x

This Generation: OpenGL 4.x

The OpenGL Extension Mechanism

Where Next?

#### C-2 OpenGL beyond C and C++

OpenGL for Java

Multithreading

Python and OpenGL

Conclusions and Directions

#### C-3 GPU Architecture, Past, Present, and Future

The Early Days

The Middle Ages

Modern GPUs

Parallelism

Getting the Most out of a Modern GPU

Balance the Workload

Always Move Forwards

Feed the Pipeline

Make Best Use of Your Resources

Bibliography

Index

OpenGL Function Index

Core Library Functions

GLSL Library Functions

GLU Library Functions

GLUT Library Functions

## <<计算机图形学>>

### 编辑推荐

美国Donald Heam、M. Pauline Baker、Warren R. Carithers编著的《计算机图形学(第4版英文版)》选题、翻译和编辑加工过程中，为提高教材质量，我们做了大量细致的工作，包括对所选教材进行全面论证；选择编辑时力求达到专业对口；对排版、印制质量进行严格把关。

对于英文教材中出现的错误，我们通过与作者联络和网上下载勘误表等方式，逐一进行了修订。本书可作为信息技术等相关专业本科生和研究生的教材或参考书，也可作为计算机图形技术人员的参考资料。

版权说明

本站所提供下载的PDF图书仅提供预览和简介，请支持正版图书。

更多资源请访问:<http://www.tushu007.com>