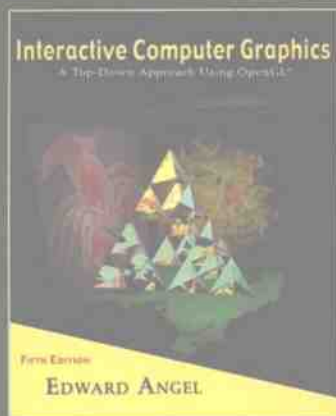


交互式计算机图形学 ——基于OpenGL的自顶向下方法 (第五版)

Interactive Computer Graphics
A Top-Down Approach Using OpenGL, Fifth Edition



英文版

[美] Edward Angel 著



电子工业出版社
PUBLISHING HOUSE OF ELECTRONICS INDUSTRY

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国外计算机科学教材系列

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Publishing House of Electronics Industry

北京 · BEIJING

内 容 简 介

在广泛结合 OpenGL 并注重图形应用编程的基础上,本书向读者介绍了计算机图形学的核心概念。书中代码采用 C 和 C++ 语言,并使用了自顶向下和面向编程的方法,使读者能够迅速地创建自己的三维图形。在结构安排上,本书在读者学会了编写交互式图形程序之后再介绍底层的算法,如线段的绘制以及多边形填充等算法。

本书覆盖了计算机图形学基础课程中的所有主题,包括光与材质的相互作用、明暗绘制、建模、曲线和曲面、反走样、光栅化、纹理映射和图像合成等内容。

本书可作为计算机及相关专业本科生和研究生的计算机图形学教材,也适合作为相关程序员、工程技术人员及科研人员的参考书。

Original edition, entitled Interactive Computer Graphics, A Top-Down Approach Using OpenGL, Fifth Edition, 978-0-321-53586-3 by Edward Angel, published by Pearson Education, Inc, publishing as Addison Wesley, Copyright © 2009 by Pearson Education, Inc.

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图书在版编目(CIP)数据

交互式计算机图形学:基于 OpenGL 的自顶向下方法 = Interactive Computer Graphics: A Top-Down Approach Using OpenGL: 第 5 版:英文/(美)安吉尔(Angel, E.)著.-北京:电子工业出版社,2008.9

(国外计算机科学教材系列)

ISBN 978-7-121-07237-6

I. 交... II. 安... III. 图形软件, OpenGL-高等学校-教材-英文 IV. TP391.41

中国版本图书馆 CIP 数据核字(2008)第 122689 号

责任编辑:许菊芳

印 刷:北京市通州大中印刷厂

装 订:三河市鹏成印业有限公司

出版发行:电子工业出版社

北京市海淀区万寿路 173 信箱 邮编:100036

开 本:787 × 980 1/16 印张:53.75 字数:1227 千字 彩插:8 页

印 次:2008 年 9 月第 1 次印刷

定 价:95.00 元

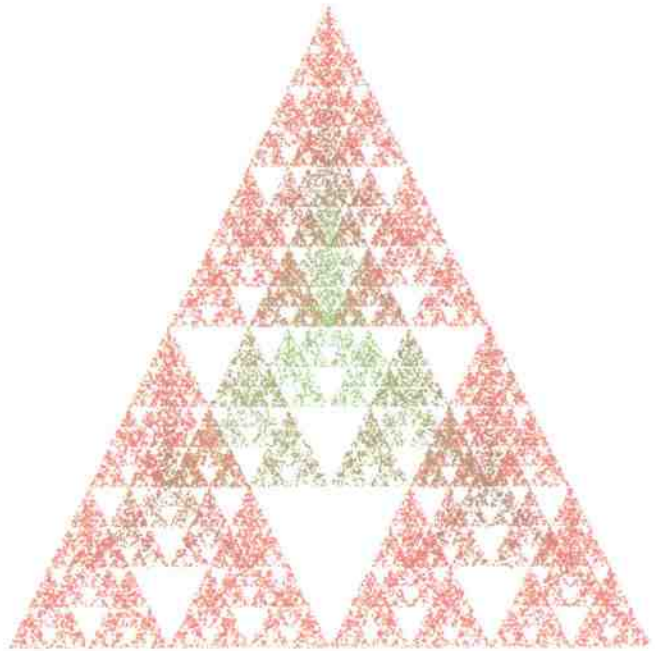
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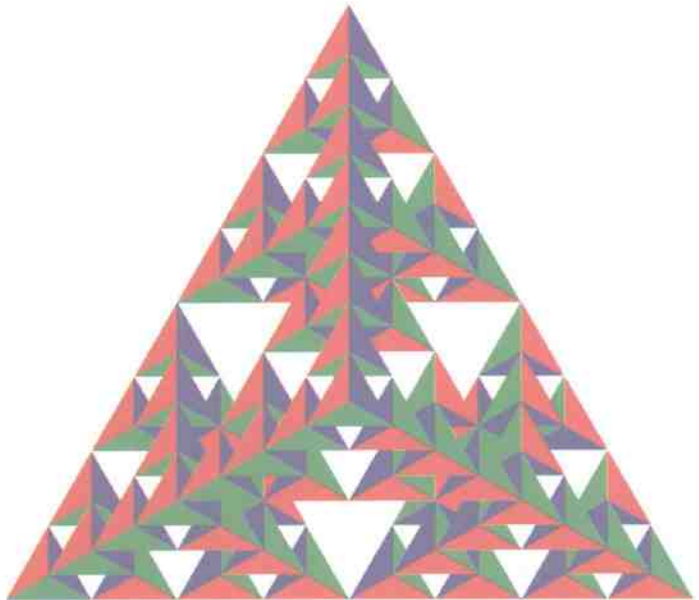
Front Plate 1 Three-dimensional Sierpinski gasket computed with points.

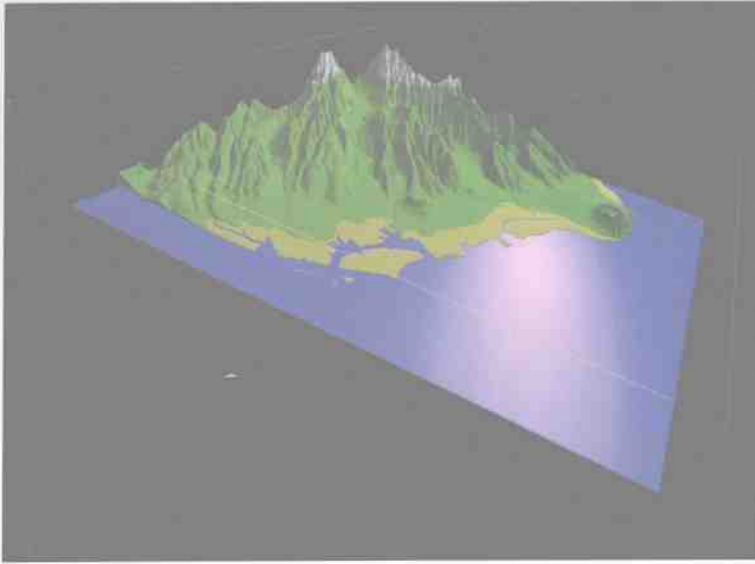
(Courtesy of University of New Mexico.)



Front Plate 2 Three-dimensional Sierpinski gasket computed by recursive subdivision of tetrahedra.

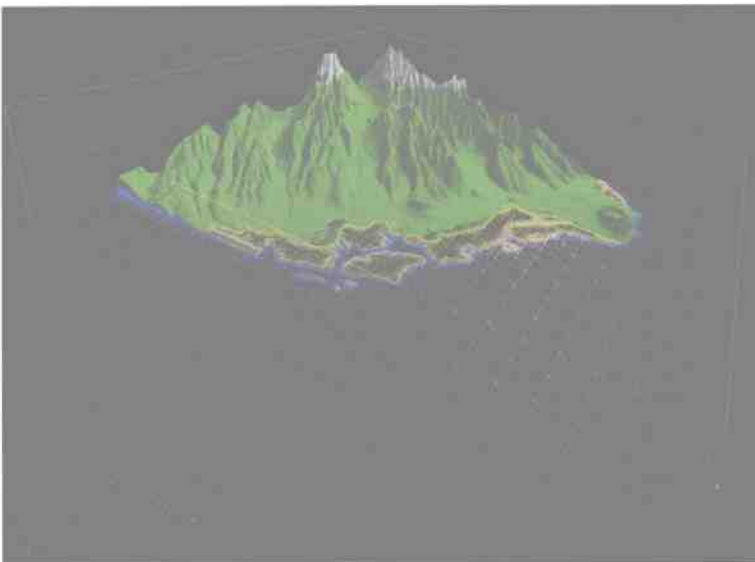
(Courtesy of University of New Mexico.)





Front Plate 3 Elevation data for Honolulu, Hawaii, displayed using a quadmesh to define control points for a Bezier surface.

(Courtesy of Brian Wylie, University of New Mexico and Sandia National Laboratories.)



Front Plate 4 Wire frame of the quadmesh showing lower resolution in flat areas.

(Courtesy of Brian Wylie, University of New Mexico and Sandia National Laboratories.)

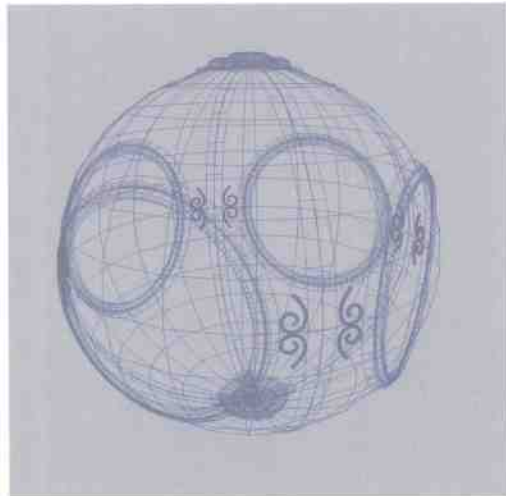
Color Plate 1 Image of sun object created using NURBS surfaces and rendered with bump mapping.

(Courtesy of Full Dome Project, University of New Mexico.)



Color Plate 2 Wire-frame representation of sun object surfaces.

(Courtesy of Full Dome Project, University of New Mexico.)



Color Plate 3 Flat-shaded polygonal rendering of sun object.

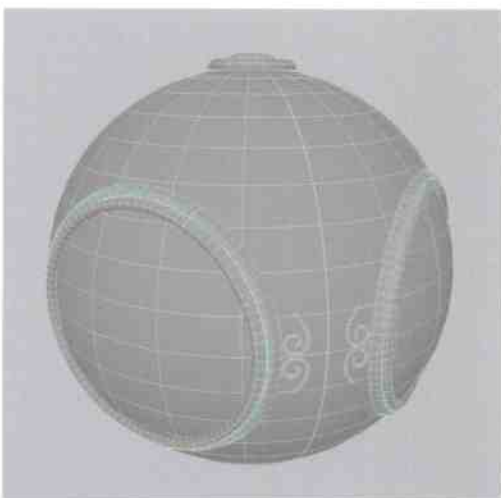
(Courtesy of Full Dome Project, University of New Mexico.)





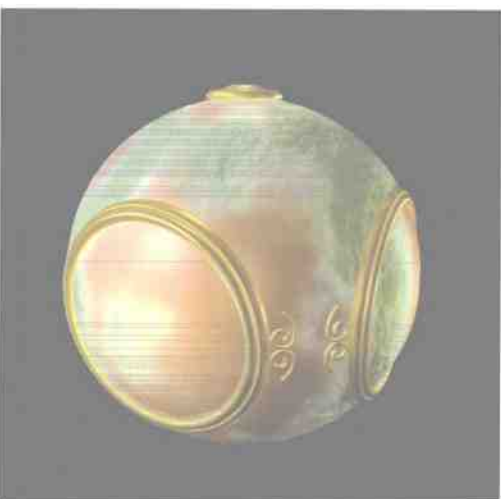
Color Plate 4 Smooth-shaded polygonal rendering of sun object.

(Courtesy of Full Dome Project, University of New Mexico.)



Color Plate 5 Wire-frame of NURBS representation of sun object showing the high number of polygons used in rendering the NURBS surfaces.

(Courtesy of Full Dome Project, University of New Mexico.)

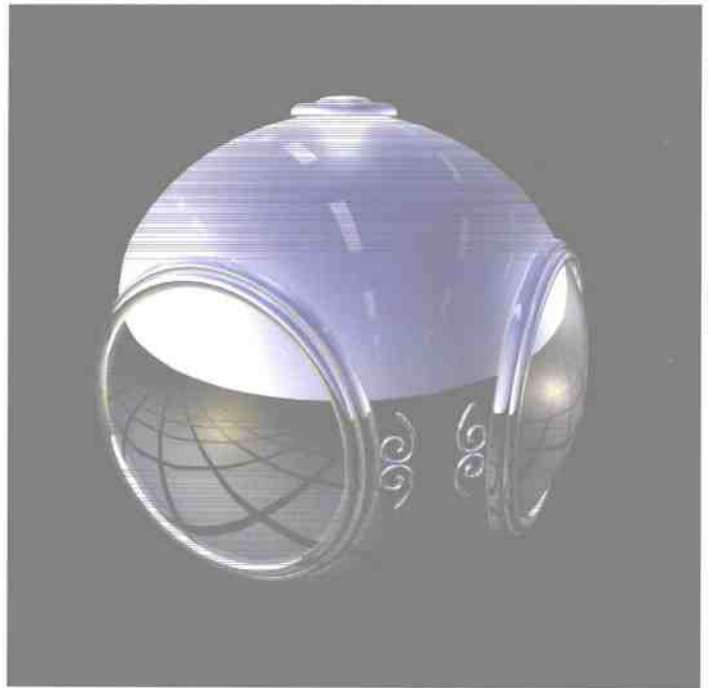


Color Plate 6 Rendering of sun object showing bump map.

(Courtesy of Full Dome Project, University of New Mexico.)

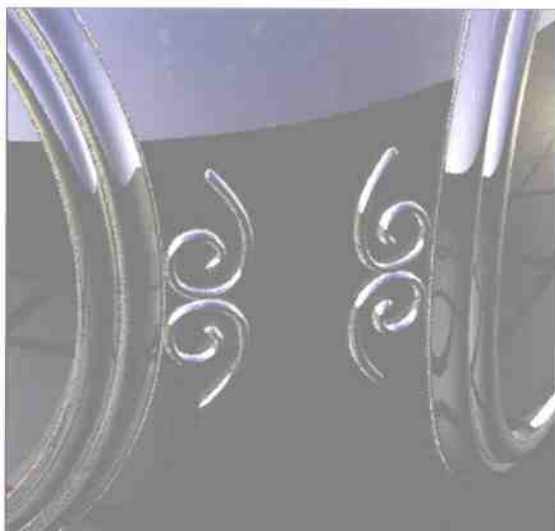
Color Plate 7 Rendering of sun object with an environment map.

(Courtesy of Full Dome Project, University of New Mexico.)

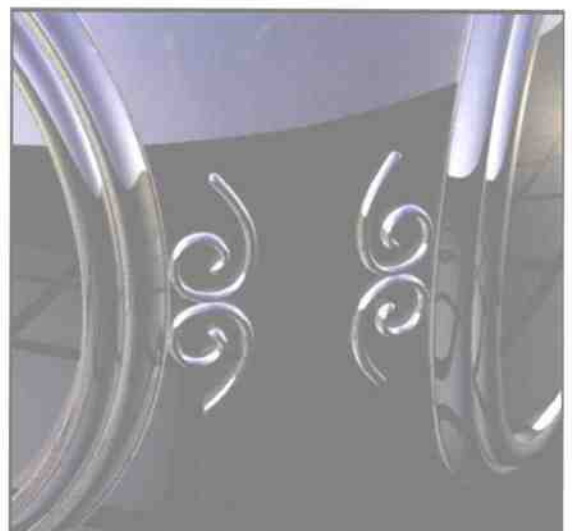


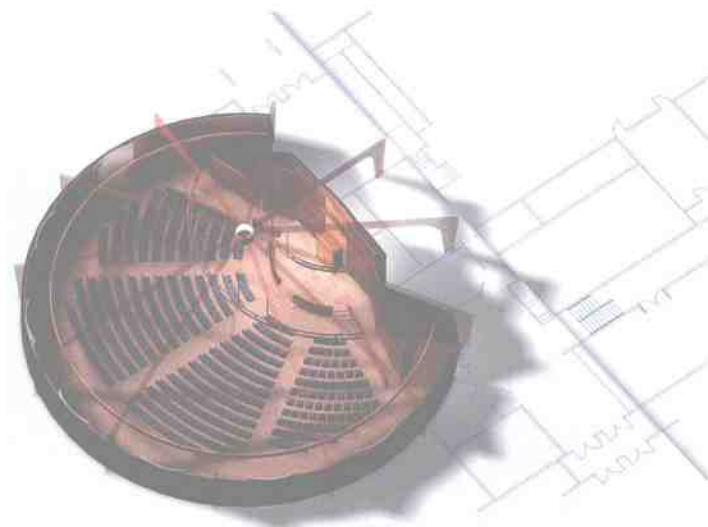
Color Plate 8 Rendering of a small part of the sun object with an environment map. (Courtesy of Full Dome Project, University of New Mexico.)

(a) Without antialiasing



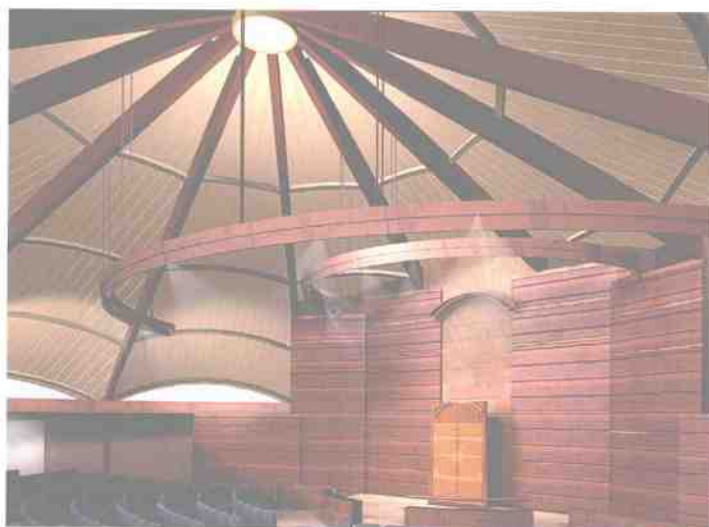
(b) With antialiasing





Color Plate 9 Axonometric view from outside of temple.

(Courtesy of Richard Nordhaus, Architect, Albuquerque, NM.)



Color Plate 10 Perspective view of interior of temple.

(Courtesy of Richard Nordhaus, Architect, Albuquerque, NM.)



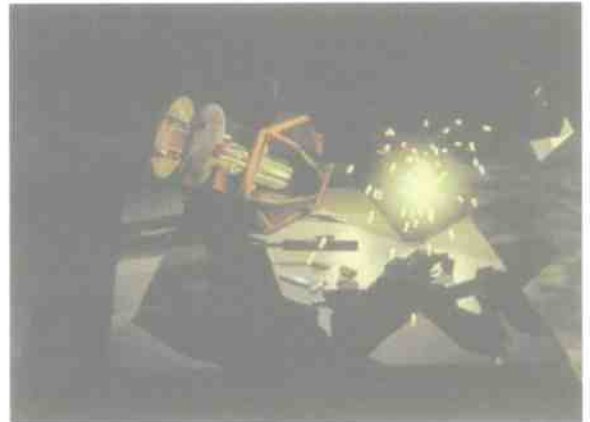
Color Plate 11 Cartoon-shaded teapot.

(Provided by Ed Angel, University of New Mexico.)

Color Plate 13 Welding scene
from video "I Thought, Therefore I
Was."

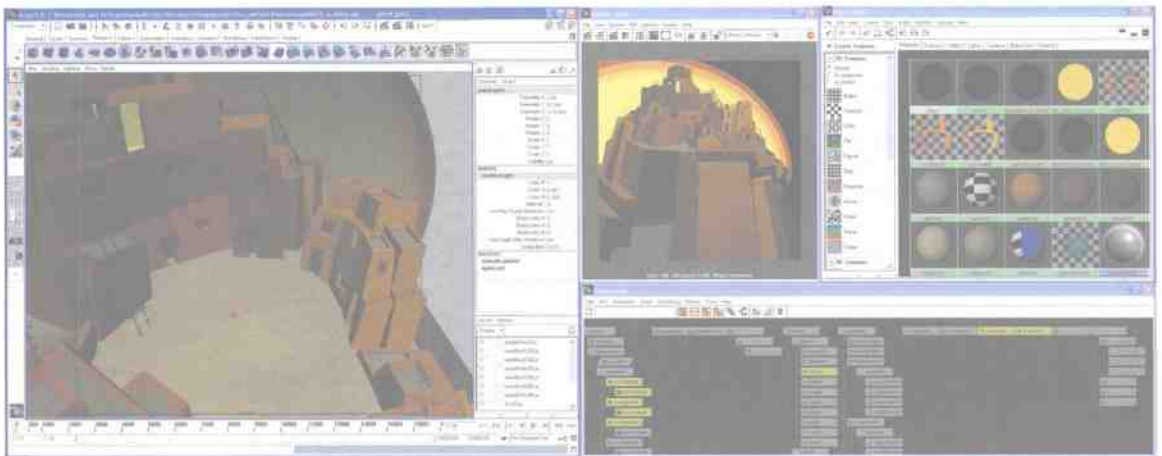
Color Plate 12 Reflection map from a color
cube on teapot.

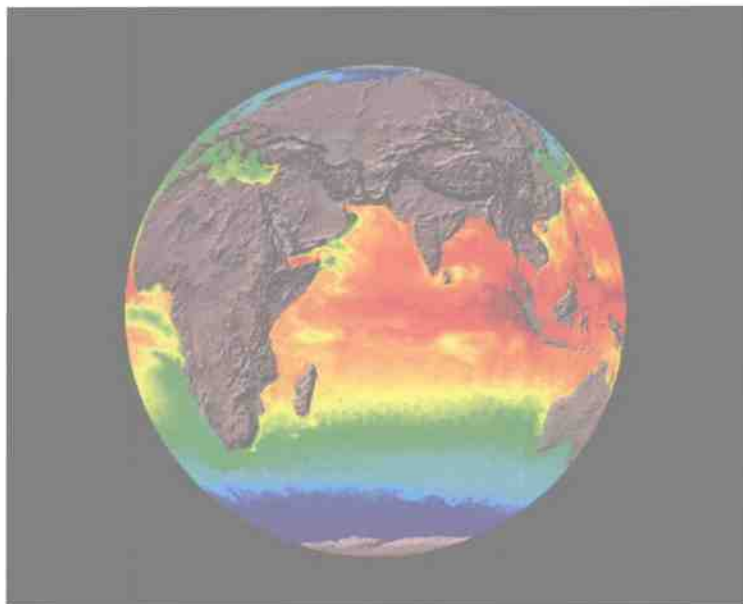
(Provided by Ed Angel, University of New Mexico.)



Color Plate 14 Interface for animation using Maya.

(Courtesy of Hugh Walker, Arts Technology Center, University of New Mexico.)





Color Plate 15 Ocean temperature distribution during El Niño. Data texture mapped to earth model.

(Courtesy of Allen McPherson, Advanced Computing Laboratory, Los Alamos National Laboratory.)

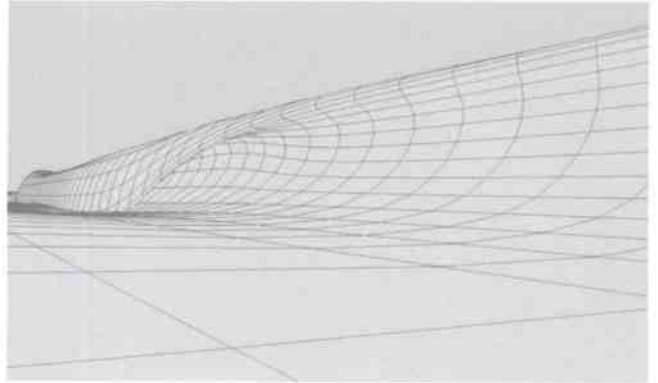


Color Plate 16 Display from interactive game.

(Courtesy of GarageGames.com.)

Color Plate 17 (a) Wire-frame model of a wave.

(Courtesy of Sony Imageworks.)



Color Plate 17 (b) White water and spray created by particle system.

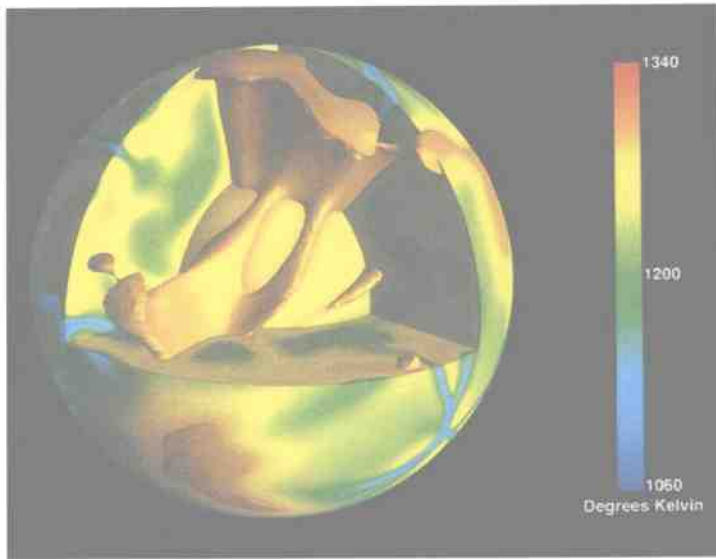
(Courtesy of Sony Imageworks.)



Color Plate 18 Final composited image from "Surf's Up."

(Courtesy of Sony Imageworks.)



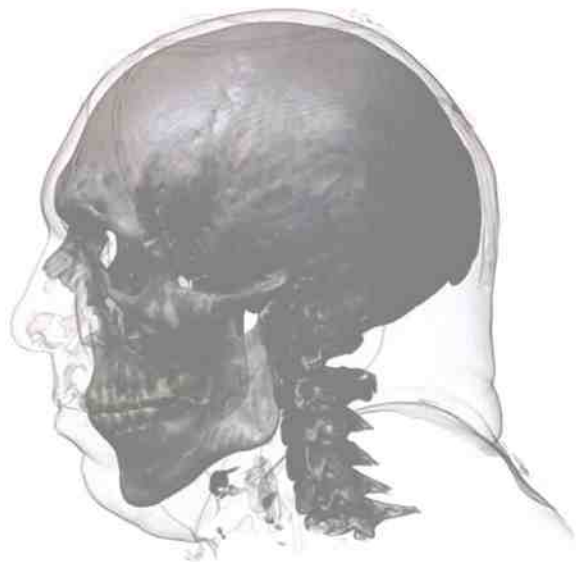


Color Plate 19 Fluid dynamics of the mantle of the Earth. Pseudocolor mapping of temperatures and isotherm surface.

(Courtesy of James Painter, Advanced Computing Laboratory, Los Alamos National Laboratory.)

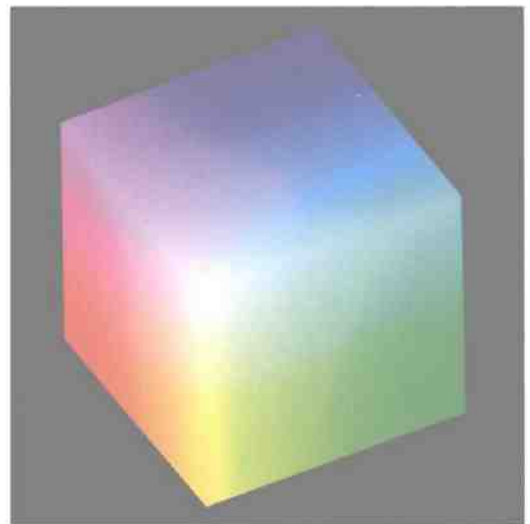
Color Plate 20 Volume rendering of CT data.

(Courtesy of J. Kniss, G. Kindlmann, C. Hansen, Scientific Computing and Imaging Institute, University of Utah.)



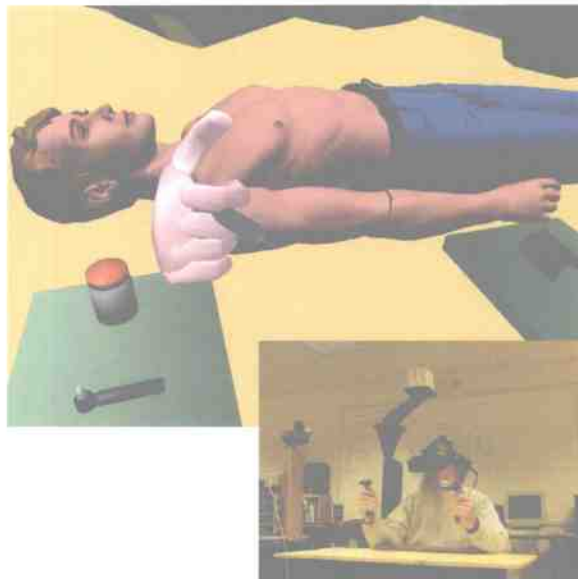
Color Plate 21 RGB color cube.

(Courtesy of University of New Mexico.)



Color Plate 22 Avatar representing a patient who is being diagnosed and treated by a remotely located health professional (inset).

(Courtesy of Tom Caudell, Visualization Laboratory, Albuquerque High Performance Computing Center, University of New Mexico.)



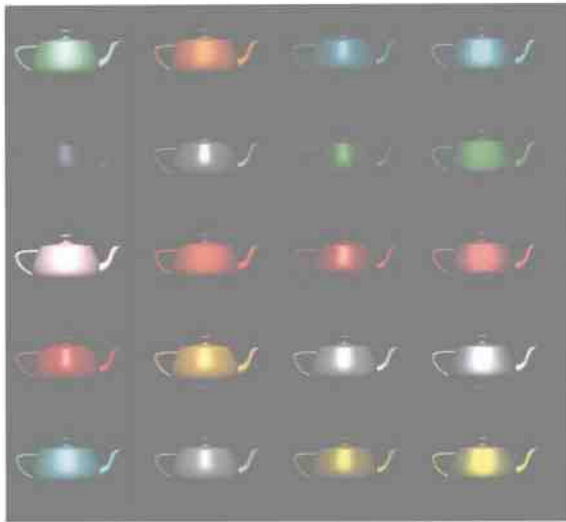
Color Plate 23 Rendering using ray tracer.

(Courtesy of Patrick McCormick, University of New Mexico and Los Alamos National Laboratory.)

Color Plate 24 Radiosity rendering showing soft shadows and diffuse-diffuse reflections.

(Courtesy of A. Van Pernis, K. Rasche, R. Geist, Clemson University.)





Color Plate 25 Array of Utah teapots with different material properties.

(Courtesy of Silicon Graphics, Inc.)

Color Plate 26 Phong-Blinn shaded teapots.
(Provided by Ed Angel, University of New Mexico.)

(a) Using per-vertex lighting



(b) Using per-fragment lighting



Color Plate 27 Isosurface mesh for lobster data set
computed by a particle system of 40,000 particles.

(Courtesy of Patricia Crossno, University of New Mexico
and Sandia National Laboratories.)



Color Plate 28 Interactively modeled and rendered volumetric procedural cloud.

(Courtesy of Joshua Schpok and David S. Ebert, Purdue University Rendering and Perceptualization Lab.)



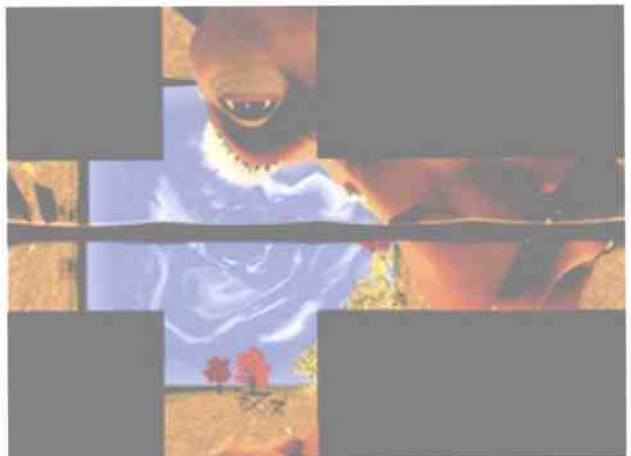
Color Plate 29 One frame from Pixar's "Geri's Game" showing refraction through reflections on Geri's glasses.

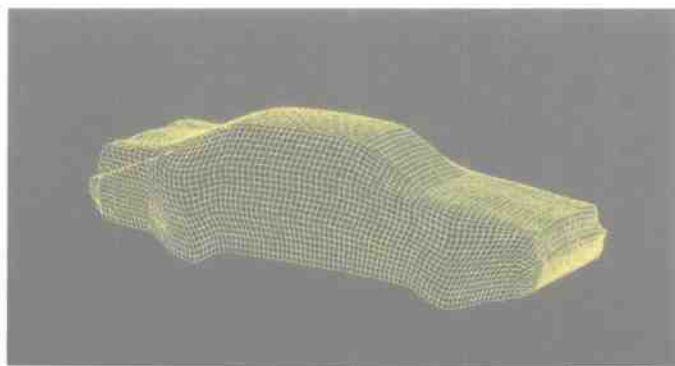
(Courtesy of Pixar Animation Studios.)



Color Plate 30 Reflection map from environment computed from the center of the lens on Geri's glasses. The reflection map is then mapped to the glasses as part of the rendering process.

(Courtesy of Pixar Animation Studios.)





Color Plate 31 Particle system.

(Courtesy of Lexus and Rhythm and Hues.)

(a) Mesh of particles



(b) Model of Lexus with surface



(c) Wind blowing mesh off Lexus



(d) Mesh blown away from Lexus