

Sourin, Alexei

Making images with mathematics. (English) [Zbl 1483.68003](#)

Undergraduate Topics in Computer Science. Cham: Springer (ISBN 978-3-030-69834-8/pbk; 978-3-030-69835-5/ebook). xii, 248 p. (2021).

Computer graphics is omnipresent in these days. However, few people know how a wide solid theory stands behind it. In this book a reader can see how to apply this theory to turn geometry into an image on a computer screen. It touches all the important aspects of producing a virtual 3D world and a realistic-looking image from this artificial 3D world. The book consists of seven chapters. In the first chapter the foundations of computer graphics are presented, including the visualization pipeline. The next chapter deals with drawing lines, curves, polygons, surfaces and solid objects. In the third chapter, transformations and projections are reviewed. In the next chapter, different kinds of motion are presented, like animations, gravity-based motion and morphing. Chapter 5 is about visual appearance, this means lighting, illumination, shading and textures mapping. Chapter 6 treats the common techniques used for fast real-time rendering. Finally, in the last chapter short reviews of computer graphics tools are given, like OpenGL, PovRay and VRML.

This book is intended for computer science and engineering students and computer graphics practitioners. It can also be used by teachers as reference material for a one-semester course of computer graphics and visualization. The book is self-contained and presents the theory in a very accessible way with many visual examples.

Reviewer: [Agnieszka Lisowska \(Sosnowiec\)](#)

MSC:

- 68-01 Introductory exposition (textbooks, tutorial papers, etc.) pertaining to computer science
- 68U05 Computer graphics; computational geometry (digital and algorithmic aspects)
- 68U10 Computing methodologies for image processing

Keywords:

computer graphics; visualization; geometric shapes; motion; object transformation; lighting; shading

Full Text: [DOI](#)