

Introduction to Curves and Surfaces

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Abstract

This course presents an introduction to CAGD—Computer-Aided Geometric Design. The mathematical tools required to create well-behaved curves and surfaces are covered, together with efficient algorithms for their implementation. Topics covered include basis functions, Bézier curves, B-splines, and surface patches.



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Course Contributors

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Alyn P. Rockwood completed B.S. and M.S. degrees in mathematics at Brigham Young University and a Ph.D. at the Dept. of Applied Mathematics and Theoretical Physics of Cambridge University, Cambridge, England. He worked in industrial research for 13 years, including supervisory and research positions at Evans and Sutherland Computer Corp. and Silicon Graphics, Inc. He was involved in flight simulation, CAD/CAM and surface rendering projects at these companies.

Currently, he is on the computer science faculty at Arizona State University. His interests include computer graphics, scientific visualization and computer aided geometric design. He has several patents and many publications in these fields.

Peter Chambers

Peter Chambers received his B.Sc. from the University of Exeter, England, and his M.S. from Arizona State University. Peter is an Engineering Fellow in the Advanced Multimedia Group at VLSI Technology, Tempe, Arizona. His areas of interest at VLSI include circuit design, computer architectures, and peripheral interfaces for personal computers.

Peter has architected and designed numerous products, including the Input/Output systems for minicomputers, and many large integrated circuits. Peter's other interests include high level hardware description languages, techniques for robust design, and interface performance analysis.

Peter's involvement with Arizona State University includes research on texturing methods in computer graphics and interactive learning tools. His most recent publication is *Interactive Curves and Surfaces*, in collaboration with Alyn Rockwood, upon which these course notes are based.

Dr. Hans Hagen

Hans Hagen is a professor of computer science at the University of Kaiserslautern, Germany. His research centers on geometric modeling and scientific visualization.

Dr. Hagen received his B.A. and his M.S. from the University of Freiburg and his Ph.D. from the University of Dortmund. Before moving to Kaiserslautern he held faculty positions at the University of Braunschweig and at Arizona State University. He is one of the current directors at the Dagstuhl Conference and Research Center.

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Thomas McInerney

Thomas McInerney writes code for Apple Computer during his summers. His interests are in computer graphics and computer networks. He is completing his B.S. in Computer Science from Arizona State University. He is also writing the Java version of the curves and surfaces book with Alyn Rockwood and Peter Chambers.

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Alyn Rockwood
Arizona State University

Peter Chambers
VLSI Technology, Inc.

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Preliminary Mathematics

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Interpolation

Blossoms

The B-Spline Curve

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