FOREWORD

Nikolai Golovanov has crafted this book for students and developers of today's sophisticated geometric modeling systems. While its contents will be a source of reference on the many and varied numerical models of geometry, it will also profoundly change the way they view the world around them. There is beauty in the mathematical constructs that shape every aspect of our environment. The top of a dining table summons up an extrude operation of a planar surface; its beveled edges produced by an edge chamfer on the solid extrusion. As students and developers examine the flowing contours of an automobile dashboard, they will see the imprinted formulas for freeform B-spline surfaces in their mind's eye. Golovanov interweaves both the science and the artistry of mathematics within the book that will grow to be a new part of his readers' life experience.

The author draws from extensive experience gained in the development of the geometric kernel, C3D, which supports a full range of geometric curves, surfaces, and solids. The book delivers a description of those geometric constructs in a very structured manner, each concept building on the previous construct. This approach will be especially appreciated by students who are exposed to geometric modeling for the first time. Throughout the book, Golovanov presents the varied geometric definitions with a wealth of descriptive images that help to illustrate the rich compilation of geometric formulas. The first three chapters build a foundation of curve and surface definition, ending with detailed explanations of constructive operations for projection and intersection between the varied forms. A comprehensive description of fillet and chamfer surfaces is included.

Chapter 4 introduces the important topic of solids modeling with an excellent accounting of its underpinnings of vertices, edges, faces, and shells. The concepts of topology, which are so important to solids modeling, are discussed extensively. The chapter continues with the many techniques for generating solids, such as extrusion, sweeping, and lofting. Chapter 5 introduces Boolean operations and filleting operations. Finally, chapters 6 and 7 present geometric constraints and the optical properties of solids. The study of geometric constraints gives the reader insights into today's commercial solid modeling applications based on parametric and history based techniques.

Geometric modeling continues to grow in importance as new applications that attempt to simulate the real world in a virtual environment are developed. Understanding the constructs that underlie geometric modeling will place students and developers at the forefront of these new advancements. Nikolai Golovanov has paved the way to that understanding with his comprehensive presentation, Geometric Modeling.

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