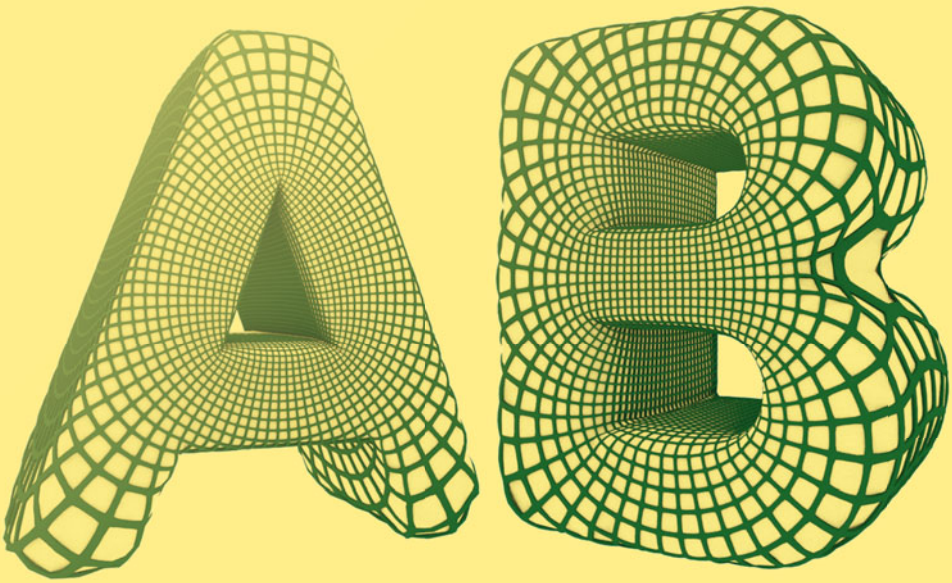
Alexander I. Bobenko *Editor*

Advances in Discrete Differential Geometry



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Preface

In this book we take a closer look at discrete models in differential geometry and dynamical systems. The curves used are polygonal, surfaces are made from triangles and quadrilaterals, and time runs discretely. Nevertheless, one can hardly see the difference to the corresponding smooth curves, surfaces, and classical dynamical systems with continuous time. This is the paradigm of structure-preserving discretizations. The common idea is to find and investigate discrete models that exhibit properties and structures characteristic of the corresponding smooth geometric objects and dynamical processes. These important and characteristic qualitative features should already be captured at the discrete level. The current interest and advances in this field are to a large extent stimulated by its relevance for computer graphics, mathematical physics, architectural geometry, etc.

The book focuses on differential geometry and dynamical systems, on smooth and discrete theories, and on pure mathematics and its practical applications. It demonstrates this interplay using a range of examples, which include discrete conformal mappings, discrete complex analysis, discrete curvatures and special surfaces, discrete integrable systems, special texture mappings in computer graphics, and freeform architecture. It was written by specialists from the DFG Collaborative Research Center "Discretization in Geometry and Dynamics". The work involved in this book and other selected research projects pursued by the Center was recently documented in the film "The Discrete Charm of Geometry" by Ekaterina Eremenko.

Lastly, the book features a wealth of illustrations, revealing that this new branch of mathematics is both (literally) beautiful and useful. In particular the cover illustration shows the discretely conformally parametrized surfaces of the inflated letters A and B from the recent educational animated film "conform!" by Alexander Bobenko and Charles Gunn.

At this place, we want to thank the Deutsche Forschungsgesellschaft for its ongoing support.

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