

Contents

Foreword	V
<i>Christoph Gengnagel, Axel Kilian, Norbert Palz, Fabian Scheurer</i>	
 Concept, Tool and Design Strategies	
DesignScript: Origins, Explanation, Illustration	1
<i>Robert Aish</i>	
Algebraic Expansions: Broadening the Scope of Architectural Design through Algebraic Surfaces	9
<i>Günter Barczik, Daniel Lordick, Oliver Labs</i>	
Tools and Design Strategies to Study Rib Growth	17
<i>Chris Bardt, Michal Dziejziniewicz, Joy Ko</i>	
Free Shape Optimal Design of Structures	25
<i>Kai-Uwe Bletzinger</i>	
NetworkedDesign, Next Generation Infrastructure for Design Modelling	39
<i>Jeroen Coenders</i>	
Digital Technologies for Evolutionary Construction	47
<i>Jan Knippers</i>	
Combinatorial Architecture	55
<i>Enrique Sobejano</i>	
Codes in the Clouds Observing New Design Strategies	63
<i>Liss C. Werner</i>	

Modeling, Simulation and Optimization

Methodological Research

Integration of Behaviour-Based Computational and Physical Models: Design Computation and Materialisation of Morphologically Complex Tension-Active Systems	71
<i>Sean Ahlquist, Achim Menges</i>	
Synthetic Images on Real Surfaces	79
<i>Marc Alexa</i>	
Modelling Hyperboloid Sound Scattering: The Challenge of Simulating, Fabricating and Measuring	89
<i>Jane Burry, Daniel Davis, Brady Peters, Phil Ayres, John Klein, Alexander Pena de Leon, Mark Burry</i>	
Integration of FEM, NURBS and Genetic Algorithms in Free-Form Grid Shell Design	97
<i>Milos Dimcic, Jan Knippers</i>	
SOFT.SPACE_Analog and Digital Approaches to Membrane Architecture on the Example of Corner Solutions	105
<i>Günther H. Filz</i>	
Performance Based Interactive Analysis	115
<i>Odyseas Georgiou</i>	
On the Materiality and Structural Behaviour of Highly-Elastic Gridshell Structures	123
<i>Elisa Lafuente Hernández, Christoph Gengnagel, Stefan Sechelmann, Thilo Rörig</i>	
Parametric Design and Construction Optimization of a Freeform Roof Structure	137
<i>Johan Kure, Thiru Manickam, Kemo Usto, Kenn Clausen, Duoli Chen, Alberto Pugnale</i>	
Curved Bridge Design	145
<i>Lorenz Lachauer, Toni Kotnik</i>	
Linear Folded (Parallel) Stripe(s)	153
<i>Rupert Maleczek</i>	
The Potential of Scripting Interfaces for Form and Performance Systemic Co-design	161
<i>Julien Nembrini, Steffen Samberger, André Sternitzke, Guillaume Labelle</i>	

Building and Plant Simulation Strategies for the Design of Energy Efficient Districts	171
<i>Christoph Nytsch-Geusen, Jörg Huber, Manuel Ljubijankic</i>	
New Design and Fabrication Methods for Freeform Stone Vaults Based on Ruled Surfaces	181
<i>Matthias Rippmann, Philippe Block</i>	
Design and Optimization of Orthogonally Intersecting Planar Surfaces	191
<i>Yuliy Schwartzburg, Mark Pauly</i>	
Modelling the Invisible	201
<i>Achim Benjamin Späth</i>	
Applied Research	
Ornate Screens – Digital Fabrication	209
<i>Daniel Baerlecken, Judith Reitz, Arne Künstler, Martin Manegold</i>	
The Railway Station “Stuttgart 21”: Structural Modelling and Fabrication of Double Curved Concrete Surfaces	217
<i>Lucio Blandini, Albert Schuster, Werner Sobek</i>	
Performative Surfaces: Computational Form Finding Processes for the Inclusion of Detail in the Surface Condition	225
<i>Matias del Campo, Sandra Manning</i>	
ICD/ITKE Research Pavilion: A Case Study of Multi-disciplinary Collaborative Computational Design	239
<i>Moritz Fleischmann, Achim Menges</i>	
Metropol Parasol - Digital Timber Design	249
<i>Jan-Peter Koppitz, Gregory Quinn, Volker Schmid, Anja Thurik</i>	
Performative Architectural Morphology: Finger-Joined Plate Structures Integrating Robotic Manufacturing, Biological Principles and Location-Specific Requirements	259
<i>Oliver Krieg, Karola Dierichs, Steffen Reichert, Tobias Schwinn, Achim Menges</i>	
A Technique for the Conditional Detailing of Grid-Shell Structures: Using Cellular Automata’s as Decision Making Engines in Large Parametric Model Assemblies	267
<i>Alexander Peña de Leon, Dennis Shelden</i>	
Parameterization and Welding of a Knotbox	275
<i>Daniel Lordick</i>	

Viscous Affiliation - A Concrete Structure	283
<i>Martin Oberascher, Alexander Matl, Christoph Brandstätter</i>	
Dynamic Double Curvature Mould System	291
<i>Christian Raun, Mathias K. Kristensen, Poul Henning Kirkegaard</i>	
More Is Arbitrary: Music Pavilion for the Salzburg	301
<i>Kristina Schinegger, Stefan Rutzinger</i>	
Design Environments for Material Performance	309
<i>Martin Tamke, Mark Burry, Phil Ayres, Jane Burry, Mette Ramsgaard Thomsen</i>	
<i>Educational Projects</i>	
Faserstrom Pavilion: Charm of the Suboptimal	319
<i>Mathis Baumann, Clemens Klein, Thomas Pearce, Leo Stuckardt</i>	
Rhizome - Parametric Design Inspired by Root Based Linking Structures	327
<i>Reiner Beelitz, Julius Blencke, Stefan Liczkowski, Andreas Woyke</i>	
Kinetic Pavilion: Extendible and Adaptable Architecture	335
<i>Corneel Cannaerts</i>	
Author Index	341