

# Origami<sup>7</sup>

The Proceedings from the  
7th International Meeting on  
Origami in Science, Mathematics, and Education

## **Volume 4: Engineering Two**

### **Editorial Board**

Robert J. Lang, Mark Bolitho and Zhong You  
Norma Boakes, Chris Budd, Yan Chen,  
Mary Frecker, Simon Guest, Thomas Hull,  
Yves Klett, Jun Mitani, Jorge Pardo,  
Glaucio Paulino, Mark Schenk, Tomohiro Tachi,  
Ryuhei Uehara, and Patsy Wang-Iverson

© 2018 OSME  
All rights reserved

Published by Tarquin  
Suite 74, 17 Holywell Hill  
St Albans AL1 1DT  
United Kingdom

Printed and designed in the EU

ISBN (Vol 1): 978-1-911093-89-3 [info@tarquingroup.com](mailto:info@tarquingroup.com)

ISBN (Vol 2): 978-1-911093-90-9

ISBN (Vol 3): 978-1-911093-91-6

**ISBN (Vol 4): 978-1-911093-92-3**

ISBN (Set of 4): 978-1-911093-93-0

**[www.tarquingroup.com](http://www.tarquingroup.com)**

# Origami<sup>7</sup> Volume 4 Contents

<b>General Preface</b>	vii
<b>Preface to Volume 4</b>	xi
<b>Theoretical, Analytical and Numerical Modelling</b>	
Producing Various Shapes of 3D Cell Co-culture Microstructures using a Single Cell Origami Technique	1017
<i>Qian He, Takaharu Okajima, and Kaori Kuribayashi-Shigetomi</i>	
Singular Behaviour on Folding Path Characterised by Rigid Foldability Analysis	1027
<i>N. Watanabe</i>	
Automated Numerical Process Chain for the Design of Folded Sandwich Cores	1043
<i>F. Muhs, Y. Klett, P. Middendorf</i>	
Spherical Image Analysis for Folding Templates	1059
<i>D. T. Eatough, K. A. Seffen</i>	
Kinematic and Kinetostatic Classification for Motion-Task-Oriented Synthesis of Folding Mechanisms	1069
<i>J. Paris, J. Merz, H. Buffart, S. Hoffmann, J. Siebrecht, C. Weigel, M. Hüsing, M. Trautz, B. Corves</i>	
Origami Sensitivity – On the Influence of Vertex Geometry	1087
<i>L. Zimmermann, K. Shea, T. Stanković</i>	
On Using Tessellation Properties for the Development of Classifying Criteria for Foldable Mechanisms	1103
<i>J. Siebrecht, G. Jacobs, C. Weigel, S. Dehn, H. Buffart, S. Hoffmann, J. Paris, M. Trautz, B. Corves</i>	
Simulating Pleated Tension Folds	1119
<i>G. Konjevod</i>	
Modelling the Folding Motions of a Curved Fold	1135
<i>Y. Watanabe, J. Mitani</i>	
Fast, Interactive Origami Simulation using GPU Computation	1151
<i>Amanda Ghassaei, Erik D. Demaine, Neil Gershenfeld</i>	
Highly Efficient Nonlinear Structural Analysis of Origami Assemblages using the MERLIN2 Software	1167
<i>Ke Liu, Glaucio H. Paulino</i>	
Rigid-facet Kinematics Coupled with Finite Bending Rotation along Crease Lines	1183
<i>R. Chudoba, K. H. Brakhage</i>	

<b>Mechanical Behaviour of Origami Structures</b>	
Quasi-static Crushing Behaviours of Folded Open-top Truncated Pyramid Structures with Interconnected Side Walls	1199
<i>Zhejian Li, Wensu Chen, Hong Hao</i>	
Blast Resistant Performance of Cladding with Folded Open-top Truncated Pyramid Structures as Core	1213
<i>Zhejian Li, Wensu Chen, Hong Hao</i>	
The Potential of Stress Oriented Foldings	1227
<i>J. Musto, M. Trautz</i>	
Local Actuation of Tubular Origami	1243
<i>S. W. Grey, F. L. Scarpa, M. Schenk</i>	
Elastic Buckling of Thin-walled Cylinders with Pre-embedded Diamond Patterns	1257
<i>X. Yang, S. Zang, J. Ma, Y. Chen</i>	
Reality Check - Mechanical Potential of Tessellation-based Foldcore Materials	1273
<i>M. Grzeschik, Y. Klett, P. Middendorf</i>	
Design Methods and Analysis of the Mechanical Properties of Resch Pattern Foldcores	1285
<i>X.Y. Lv, X. Zhou</i>	
The Mechanics of Metallic Folds	1301
<i>M.G. Walker, K.A. Seffen</i>	
<b>Fabrication</b>	
Crease Pattern Simplification for Automatic Folding	1313
<i>J. A. Romero, L. A. Diago, C. Nara, J. Shinoda, and I. Hagiwara</i>	
Folding Fabrication of Curved-Crease Origami Spindle Beams	1329
<i>W.Q. Cui, T. Gfeller, D. Fernando, M.T. Heitzmann, J.M. Gattas</i>	
Fold Printing: Using Digital Fabrication of Multi-Materials for Advanced Origami Prototyping	1345
<i>M. Gardiner, R. Aigner, H. Ogawa, E. Reitböck, R. Hanlon</i>	
Kirigami Fabrication of Shaped, Flat-foldable Cellular Materials based on the Tachi-Miura Polyhedron	1357
<i>Sam Calisch, Neil Gershenfeld</i>	
<b>Appendix A: Editorial Board and Contributors</b>	A1-1
<b>B: Index to all Volumes</b>	B1-1