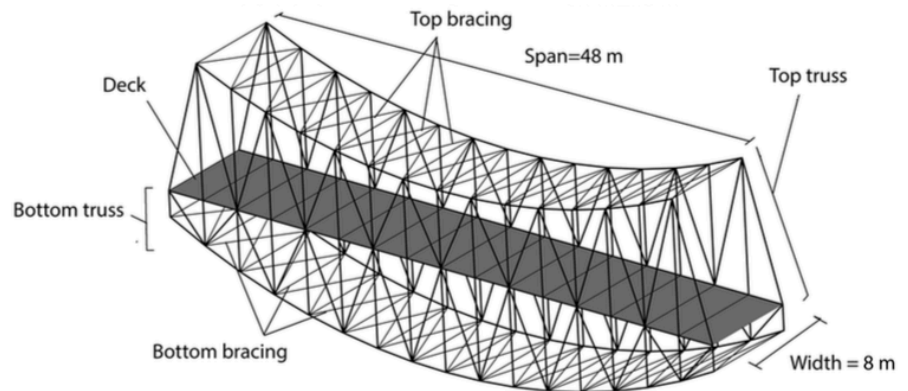




**Professor Peter von Bülow**



Performance Based Exploration Of Generative Design Solutions Using Formex Algebra

From: Anahita Khodadadi and Peter von Bülow, "Performance based exploration of generative design solutions using formex algebra", International Journal of Architectural Computing, Vol. 12, No. 3, pp 321-338, September 2014

See:

<https://taubmancollege.umich.edu/faculty/directory/peter-von-b%C3%BClow>

<http://www-personal.umich.edu/~pvbuelow/>

<http://www-personal.umich.edu/~pvbuelow/publication/>

[https://www.researchgate.net/profile/Peter\\_Von\\_Buelow](https://www.researchgate.net/profile/Peter_Von_Buelow)

[https://scholar.google.com/citations?user=\\_wfOxxEAAAAJ&hl=en](https://scholar.google.com/citations?user=_wfOxxEAAAAJ&hl=en)

Department of Architecture  
University of Michigan, Taubman College

### **Biography:**

Peter von Bülow has a doctorate in Engineering from the Institute for Lightweight Structures and Conceptual Design (ILEK) at the University of Stuttgart. He also holds degrees from the University of Tennessee: an M.S. in Civil Engineering, and a B.Arch. from the School of Architecture. His area of research deals with the use of evolutionary computation for exploration and optimization of structural systems. Professor von Bülow has worked professionally in both architecture and engineering offices in Germany and the US including: RFR-Stuttgart, Greiner Engineering and SL-Rasch. He also spent a year at IL (under Frei Otto) as a Fulbright Scholar. Some of von Bülow's research work involved contracts with the U.S. Air Force for the development and blast testing of thin shell, light weight, personnel shelters. He also worked for the U.S. Navy in designing a modular family of frame supported tensile structures for use as maintenance facilities by the US Marine Corps. Other research efforts have included the load testing of a grid shell dome and design and construction of a branching steel "tree" structure. He continues a special interest in innovative structural systems and computational exploration of form.

### **Education:**

2007 Doctor of Engineering, University of Stuttgart, Institute for Lightweight Structures and Conceptual Design (ILEK)

1991 Master of Science in Civil Engineering, University of Tennessee, Department of Civil Engineering

1980 Fulbright Scholar, University of Stuttgart, Institute for Lightweight Structures.

1979 Bachelor of Architecture, The University of Tennessee, School of Architecture, with honors

### **Academic Experience:**

2014-present: Professor in Architecture. University of Michigan, Taubman College. Teaching Graduate and Undergraduate courses in Structures.

2009-2014: Associate Professor in Architecture. University of Michigan, Taubman College.

2001-2009: Assistant Professor in Architecture. University of Michigan, Taubman College.

1994-1996: Associate Professor in Architecture. University of Tennessee, School of Architecture. Teaching courses in: structures, computer programming and design.

1982-1994: Assistant Professor in Architecture. University of Tennessee.

### **Professional Experience:**

2001 RFR Stuttgart, Germany. Architectural Engineer.

1998-2000 Office of Switbert Greiner. Oberaichen, Germany. Architectural Engineer.

1997-1998 Sonderkonstruktionen und Leichtbau GmbH (SL). Oberaichen, Germany. Arch. Engineer.

1980 Office of Robert Kennedy. Knoxville, Tennessee. Architect.

1978 Office of Jörg Anders . Bonn, Germany. Architect.

1977 Freie und Hansestadt Hamburg Baubehörde, Schulbau (City Building Bureau for School Buildings).

Hamburg, Germany. Architect Practicant.

### **Selected Publications:**

**BOOK:** von Buelow, P. Genetically Engineered Architecture: design exploration with evolutionary computation. AV Akademiker Verlag, Saarbrücken, Germany. ISBN 978-3-639-42628-1 (dissertation – see <http://www.umich.edu/~pvbuelow>)

### **Journal Paper:**

Anahita Khodadadi and Peter von Buelow, "Performance based exploration of generative design solutions using formex algebra", International Journal of Architectural Computing, Vol. 12, No. 3, pp 321-338, September 2014

### **Conference papers:**

1. Falk, A.; von Buelow, P.; Khodadadi, A. "Form Exploration of Timber-based Folded Plate Domes". Future Visions. Proceedings of the IASS 2015 Symposium. 17 - 20 August 2015, Amsterdam, The Netherlands.

2. Yang, D.; Turrin, M.; von Buelow, P.; Paul, J. "Multi-objective and multidisciplinary design optimization of large sports building envelopes: a case study". Future Visions. Proceedings of the IASS 2015 Symposium. 17 - 20 August 2015, Amsterdam, The Netherlands.

3. von Buelow, P. "Using Database Storage to Improve Explorative Optimization of Form Critical Structures" Shells, Membranes and Spatial Structures: Footprints. eds. R. Brasil and R. Pauletti. Proceedings of the IASS-SLTE 2014 Symposium. 15 - 19 September 2014, Brasilia, Brazil.

4. Oliyan Torghabehi, O.; von Buelow, P. "Performance oriented generative design of structural double skin facades inspired by cell morphologies" Shells, Membranes and Spatial Structures: Footprints. eds. R. Brasil and R. Pauletti. Proceedings of the IASS-SLTE 2014 Symposium. 15 - 19 September 2014, Brasilia, Brazil.

5. Omidfar, A.; Oliyan Torghabehi, O.; von Buelow, P. "Performance-based design of a self-standing building skin; A methodology to integrate structural and daylight performance in a form exploration process" Shells, Membranes and Spatial Structures: Footprints. eds. R. Brasil and R. Pauletti. Proceedings of the IASS-SLTE 2014 Symposium. 15 - 19 September 2014, Brasilia, Brazil.

6. Khodadadi, A.; von Buelow, P. "Form Exploration and GA-Based Optimization of Lattice Towers

- Comparing with Shukhov Water Tower" Shells, Membranes and Spatial Structures: Footprints. eds. R. Brasil and R. Pauletti. Proceedings of the IASS-SLTE 2014 Symposium. 15 - 19 September 2014, Brasilia, Brazil.
7. Oliyan Torghabehi, O.; von Buelow, P. "Genetic Based Form Exploration of Mid-Rise Structures Using Cell Morphologies" in Symposium on Simulation for Architecture and Urban Design (SimAud 2014). Society for Modeling and Simulation International (SCS) Simulation Series 2014. April 13–16, Tampa Florida
  8. Pronk, A.; Dominicus, M.; von Buelow, P.; van Dijk, S.; van de Koppel, J. "Rigidized inflatable structures a production method for optimized structures" in Beyond the Limits of Man. eds J.B. Obrebski and R. Tarczewski. Proceedings of the International Association for Shell and Spatial Structures (IASS) Symposium 2013. 23-27 September, Wroclaw University of Technology, Poland.
  9. Falk, A.; von Buelow, P.; Kirkegaard, P. "Folded Plate Structures as Building envelopes" in World Conference on Timber Engineering 2012 (WCTE 2012) ed. Quenneville, P. Proceedings Vol. 4. pp. 155-164. Curran Associates, Inc. Dec 2012.
  10. Falk, A.; von Buelow, P. "Form Exploration of Folded Plate Timber Structures based on Performance Criteria" in Taller, Longer, Lighter: Meeting growing demand with limited resources. eds. Nethercot, D. and Pellegrino, S. Proceedings of the 35th Annual Symposium of IABSE and the 52nd Annual Symposium of IASS. 20 Sept. – 23 Sept. 2011. London, UK.
  11. Falk, A.; Turrin, M.; von Buelow, P. "Folded plate assemblies with branching column supports – interaction and control of overall shape" in Spatial Structures – Temporary and Permanent. ed. Qilin Zhang. Proceedings of the International Association for Shell and Spatial Structures (IASS) Symposium 2010. 28 Nov. – 12 Nov. 10. Shanghai, China.
  12. Turrin, M.; von Buelow, P.; Stouffs, R.; Kilian, A. "Performance-oriented design of large passive solar roofs: A method for the integration of parametric modelling and genetic algorithms" in Future Cities. Proceedings of the 28th Conference of eCAADe. ETH. Zurich, Switzerland. 15-18 Sept. 2010.
  13. von Buelow, P. "Parametric exploration of discrete structures using evolutionary computation" in Evolution and Trends in Design, Analysis and Construction of Shell and Spatial Structures. eds. Domingo, A. and Lazaro, C. Proceedings of the International Association for Shell and Spatial Structures (IASS) Symposium 2009. Valencia, Spain.
  14. Falk, A.; von Buelow, P. "Exploration and Optimization of Combined Timber Plate and Branching Column Systems using Evolutionary Computation" in Shell and Spatial Structures: New Materials and Technologies, New Designs and Innovations. Acapulco, Mexico. 27 Oct. 2008.
  15. von Buelow, P. "A Geometric Comparison of Branching Structures in Tension and Compression versus Minimal Paths" in Shell and Spatial Structures: Structural Architecture – Towards the future looking to the past. Venice, Italy. 3-6 December 2007.
  16. von Buelow, P. "The Feasibility of Shells Made with Recycled Tires" in Design and Technological Innovation for the Environment: Proceedings of the 12th Annual ACSA Technology Conference. Association of Collegiate Schools of Architecture, 1994.
  17. Moriarty, T.F., von Buelow, P. "Design, Development and Testing of a Hardened Underground Transportable Hyperbolic Paraboloid (HUTCH) Shelter" in Interaction of Non-nuclear Munitions with Structures - International Symposium USAF and the German Federal Academy for Defense and Defense Technology. pp. 230-235