

## **List of publications**

published by Institute for Lightweight Structure (IL), University of Stuttgart  
director Frei Otto

### **On tables:**

IL 2: City in the Arctic, 1971, 56 pages

Study for a city under a transparent envelope with artificial climate.

IL 6: Biology and Building 3, 1973, 86 pages

Spider nets, construction of bones and a biophysical general model, with three-dimensional anaglyph pictures and 3D-glasses.

IL 9: Pneu in Nature and Technics, 1977, 336 pages

Report on the interdisciplinary cooperation of biologists and the IL that was researching the laws, which govern form development of the structural system of the pneu, with examples from nature and technical development. The structural system pneu is the essential basis for the world of forms of living nature.

IL 10: Grid Shells, 1974, 346 pages

Fundamentals and methods of form finding for grid shells, from hanging models to load bearing structures, architectural possibilities and applications.

IL 11: Lightweight and Energy Technics, 1978, 256 pages

Projects and development for cooling towers, hydraulic engineering structures, storage facilities, membranes in sewage treatment. Other topics: energy systems with sun, wind, and water and interior climate control.

IL 14: Adaptable Architecture, 1975, 336 pages

Colloquium proceedings. Topics: adaptability in history, biology, medicine, architecture, and city planning, and the politics of adaptability.

IL 15: Lufthallenhandbuch, 1983, 438 pages

Architectural und structural design, cutting pattern, calculation, and manufacturing of air halls with annexes about material and codes.

IL 16: Tents, 1976, 160 pages

An extensive introduction into tent building practice and the construction of small and largest span tents. The book is an appreciation of the work of Peter Stromeyer.

IL 17: The work of Frei Otto and his Teams, 1978, 56 pages

Exhibition catalogue of the Museum of Modern Art, New York, in collaboration with the Institut für Auslandsbeziehungen Stuttgart. "The Work of Frei Otto" was initially shown from July 7 to October 4, 1971 under a tent structure specially developed for the exhibition, and circulated to several cities in the US and Canada. The exhibition structure was given to the University of Illinois in 1974 and used as an outdoor facility.

IL 18: Forming Bubbles, 1988, 400 pages

Experiments with liquid films in science, architecture and technics. The research was used for minimal ways, minimal surfaces and form finding models for tents, nets and air halls.

IL 19: Growing and Dividing Pneus, 1979, 166 pages

Pneumatic structures in nature and technics. About processes of generation and methods of form metamorphosis.

IL 22: Form Force Mass 2 – Form, 1988, 96 pages

Proposal for a method for the order and description of forms, with photos of various forms.

IL 23: Form Force Mass 3 – Structure, 1992, 190 pages

Classification and order of structures related on their technical constructive characteristics.

IL 24: Form Force Mass 4 – The Lightweight Principle, 1998, 294 pages

Expense and optimization of structural elements and structures: an introduction into the Bis-Lambda-Method.

IL 25: Form Force Mass 5 – Experiments, 1990, 288 pages

Experiments on the dependence of form, force and mass. Processes of self-generation in biology and building. Formfinding and methods of modeling. The publication is based on the PhD- thesis of Siegfried Gaß.

IL 26: Nature and Architecture, 1980, 270 pages

Documentation of an international youth competition in collaboration with the Institut für Auslandsbeziehungen Stuttgart. The book contains pictures of 810 children from 24 countries, with comments by architects, ecologists and artists.

IL 27: Natural Building, 1981, 310 pages

Contributions to the symposium with the same name that took place in autumn 1979 at the IL. Among the topics were nature and society, self-help building, natural structures, and organic and ecological building.

IL 28: Diatoms 1 - Shells in nature and technics, 1985, 328 pages

Morphogenetic analysis and character synthesis of diatom valves by J.-G. Helmcke. Theoretical and experimental basics, processes of form genesis.

IL 31: Bamboo, 1985, 432 pages

Bamboo as building material, its traditional application in South-East-Asia (new edition of the thesis of Klaus Dunkelberg). Building with vegetal rods, new forms, structures and details.

IL 33: Radiolaria, 1990, 320 pages

About shells in nature and technics: Radiolaria in Steroscopic Micographs by J.-G. Helmcke, Processes of Form Generation by K. Bach.

IL 34: The Model, 1989, 272 pages

Study of Antoni Gaudi's hanging model and its reconstruction. The second topic is new light on the design of the Church of Colonia Güel, a PhD thesis by Jos Tomlow.

IL 35: Pneu and Bone, 1984. 256 pages

This issue investigates the structural system of the pneu in living nature: soft pneus, solide pneus, crustaceans, and bones.

IL 36: Subjective standpoints in architecture and science. Proceedings to the 20th anniversary of the IL, 1984, 232 pages

IL 37: Ancient Architects, 1994, 184 pages

Frei Otto asks: What could the ancient master builders have invented? A contribution to the history of inventing structures.

IL 38: Diatomen 2, 2004

### **In vitrine:**

IL 1: Minimal Nets, 1969, 56 pages

Documentation of soap film tests to connect any number of points in plane or in space in a path connect system with minimum lengths.

IL 3: Biology and Building 1, 1971, 70 pages

Colloquium proceedings. Topics: the individual and its environment, the critical situation in a growing society, and animal buildings, urban planning, biological knowledge.

IL 4: Biology and Building 2, 1971, 80 pages

Practical application of analogous research: from hydrostatic skeleton to skeletal muscle system, sandwich structures within bird skulls, the principles of lightweight structures in organisms, static of extremities.

IL 5: Convertible Roofs, 1972, 400 pages

Research about the historical development of roofs: documentation of convertible structures, construction analysis with basics of form, geometry and movements, further development of convertible roofs.

IL 7: Shadow in the Desert, 1974, 88 pages

Project study: shade net roofs for hot regions. Problems of climate control, structural problems, material expenditure and costs.

IL 8: Nets in Nature and Technics, 1975, 430 pages

Overview and classification of technical net structures. Other topics: fibres and cables, mesh constructions of nets, cable connections, building with nets, nets from spiders and insects.

IL 12: Convertible Pneus, 1975, 186 pages

Ideas and examples of movable pneumatic systems. Contains a catalogue of pneus and form studies of pneumatic structures and diatom shells with examples of lightweight architecture in practice (tent structures in contemporary Europe).

IL 13: Multihalle Mannheim, 1978, 280 pages

Documentation of the 80,000 sq. ft. grid shell of the Federal Garden Exhibition Mannheim from the competition design to the complete building.

IL 20: Tasks, 1979, 350 pages

Problems and questions of further development and application of lightweight structures in research and practice.

IL 21: Form Force Mass 1 – Basics, 1979, 190 pages

Relationship of form, mass and efficiency of structures in nature and technics, with an annex about the aesthetics of lightweight structures.

IL 29: The Tent Cities of the Hajj, 1980, 240 pages

The origin of the Hajj, the pilgrimage to Mekkah, its procedure of today and its urban planning problems. The book observes and interprets the individual tent, the tent city, and its organization.

IL 30: Sun & Shade (Vela, Toldos, Schattenzelte), 1984, 152 pages

Studies and considerations on the Roman Theatre Vela, the awnings (Toldos) of Sevilla, Schinkel's sheet metal tents and following buildings.

IL 32: Lightweight in Architecture and Nature, 1983, 108 pages

Exhibition catalogue for "Natural Structure" at the Shussev Museum of Architecture in Moscow 1983. The exhibition presented research works and projects of the groups Biology and Building in West Germany and the USSR.

IL 39: Non-Planned Settlements, 1992, 256 pages

The thesis of Eda Schaur describes characteristic features – path systems, surface subdivisions, effect of processes of self-organization on the formation of settlement structures. As a second step, the results are compared with generating structures in nature.

IL 41: Building with Intelligence, 1995, 272 pages

Aspects of a different building culture. Which new tasks are to be faced by planners, architects and engineers in order to meet the rapidly growing global problems?