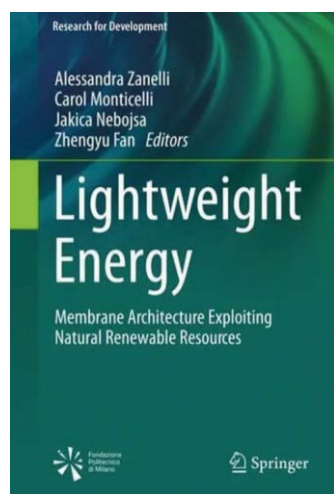


Enhancing lightness through Membrane architecture



Lightweight Energy Membrane Architecture Exploiting Natural Renewable Resources

Edited by: Alessandra Zanelli, Carol Monticelli, Nebojsa Jakica, Zhengyu Fan

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Reviewed by: Maria Giovanna Di Bitonto Politecnico di Milano
Mariagiovanna.dibitonto@polimi.it

Lightweight Energy aims to be a novel starting point for designers, manufacturers and researchers. It introduces an innovative approach for the development of sustainable construction, in the key of lightness, referring to the energy demand, the weight of the construction itself and also the environmental one. In a scenario of huge challenge, deriving from the climate emergency, but also of resources crisis, the adoption of sustainability strategies still represents a trigger point. This book addresses the environmental issues through a new perspective in architecture, which is the exploration of membranes potentialities, in the dual concept of light-weight and light-energetic buildings.

Membrane structures are generally known for their capacity of diffusing light, derived from the thin and flexible layers, also able to carry tension, reversing the relation between carried loads and self-weight. Moreover, membrane architectures are usually associated with pavilions or temporary buildings. This book means to amplify the view of the reader, providing new field of application and functions, that those thin layers can embody. Membrane architecture does not yet have a room on the market that would deserve, given the advances in the field for longevity and high performance of textiles, in respect to traditional constructions. This is probably due to the lack of shared knowledge on how to make those structures energy efficient, this represents the challenge that the authors are addressing.

Lightweight Energy provides a set of strategies customized for designing with thin and reactive layers in several climate conditions, to guarantee a comfortable indoor environment, renovating the scenario of the building sector, and, at the same time, ensuring the preservation of the context.

The book is organized in two parts. The first one provides a theoretical and methodological framework on how to take advantage of renewable resources as sun, wind and water, through membrane architecture design; and also it indicates the life cycle of the structure. In this phase the authors developed a climate-based design technology exploration and life cycle thinking strategies investigation, presenting some case studies. The second part, deepens the concept exposed, showing four applied researches, which have seen the authors involved in the recent years; the first two deals with the Photovoltaic technology applied in membrane architecture, the third explores the potentiality of membrane architecture to be water self-sufficient, embedding fog and dew harvesting. The last one explores the energy efficiency and energy storage of a membrane pavilion.

These emblematic cases of light-weight and light-energetic architecture can encourage, architecture- engineering firms and manufacturers, to embrace this challenge, and promote membrane architectures as valuable alternative to the traditional massive structure, but, more importantly, to enhance its potentiality. Moreover, some suggestions for improvement can also be deduced for transforming the conventional constructions in a lighter way: lighter appearance, lighter form for a lighter eco-efficiency.



The book collects the contributions of:

Alessandra Zanelli – Politecnico di Milano, Architecture, Built Environment & Construction Engineering Department, Italy

Carol Monticelli – Politecnico di Milano, Architecture, Built Environment & Construction Engineering Department, Italy

Nebojsa Jakica - University of Southern Denmark, Civil and Architectural Engineering, Department of Technology and Innovation, Denmark

Zhengyu Fan - Xi'an University of Architecture and Technology, China

Carlotta Mazzola - Politecnico di Milano, Architecture, Built Environment & Construction Engineering Department, Italy

Maria Giovanna Di Bitonto - Politecnico di Milano, Architecture, Built Environment & Construction Engineering Department, Italy

Qinxiang Li - Politecnico di Milano, Architecture, Built Environment & Construction Engineering Department, Italy