

Shell and spatial structures: Between new developments and historical aspects

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## Special Issue

### Guest Editors:

Amedeo Manuello Bertetto\*, Stefano Gabriele, Francesco Marmo, and Andrea Micheletti

# Shell and spatial structures: Between new developments and historical aspects

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Advanced structural systems are more and more devoted to light, versatile, eco-sustainable structures. This goal can be achieved through the use of new materials and new approaches for structural optimization, form finding, design, and validation. Shell and spatial structures are representative of some of the most efficient structural systems in which the optimized use of materials is combined with effective structural forms and shapes. The ongoing development of analysis methods, design approaches and construction techniques of shell and spatial structures has resulted in an increasing interest from engineers, architects, and builders.

This Special Issue is devoted to papers coming from a call principally addressed to the participants of the 1st Italian Workshop on Shell and Spatial Structures (<https://sites.google.com/view/iwss2020/home>) held online the last June 2020 after the lockdown restriction due to the Covid-19 pandemic (Figure 1). The experience of the first IWSS (IWSS2020) was particularly innovative. It brought together the interests of the Italian and the international community devoted to the study and applications of shell and spatial structures. The IWSS received two significant endorsements, from the IASS ([www.iasstructures.org](http://www.iasstructures.org)) and from the SISCO ([www.siscoscienzadellecostruzioni.org](http://www.siscoscienzadellecostruzioni.org)). The pandemic emer-

gency forced us to follow a completely new online format which had the advantage of increasing the inclusiveness of the event. With this special issue, the Guest Editors, who are the organizers of the Workshop, desire to offer a scientific forum for disseminating the studies and the researches presented at the Workshop. The Guest Editors plan to promote a deeper and extended discussion about the topics that have grown the widest interest during the online presentations. Through the publication of selected papers, this special issue has the goal of emphasizing the peculiarity of the IWSS and the contribution of this growing community in our country (Italy) that lives the dual spirit of the traditional Italian schools of theoretical and computational mechanics together with the development of the most innovative approaches for the structural design and optimized use of materials. The reading of the past history by a new perspective coming from today's point of view is another important aspect that the Editors are willing to promote. It seems, even more evident, the necessity to analyze the building heritage with a particular attention to the beautiful realization of light-weight structures of the last century. All over the World and in Italy in particular the second half of the 20<sup>th</sup> Century coincided with a heroic era for concrete and steel constructions which today deserves to be safeguarded and recovered, with a particular focus on the pioneering calculation tools of the past and the fascinating use of materials and construction techniques.

This Special Issue intends to explore new directions in the field of shell and spatial structures with a particular interest on the Italian Community but looking, at the same time, at the most interesting and innovative results coming from all over the world. Topics include experimental and theoretical studies, analytical methods, design approaches, computational aspects, form finding procedures, structural optimization, manufacturing, historical reviews, topical surveys, testing and maintenance techniques. The aim of this Special Issue is to collect papers pertaining to the design, modelling, analysis, and other aspects of the technology of all types of lightweight

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# IWSS2020

1<sup>st</sup> Italian Workshop on Shell and Spatial Structures  
25<sup>th</sup> - 26<sup>th</sup> June 2020 - Web meeting



**Figure 1:** Header of the IWSS 2020 Homepage (top). Pavillon-C Exhibition Center in Turin by Riccardo Morandi, 1950 (bottom left); the Sabaudian city in northern Italy was the chosen conference site before COVID-19 outbreak. On-line platforms for IWSS2020 direct broadcast in June 2020 (bottom right)

structures. These may also include tension elements and membranes, framed and lattice structures, grid-shells and active-bending structures, shell roofs, tensegrity structures, pneumatic and inflatable structures, active and deployable structures, concrete, metal, masonry, timber and bio-inspired structures.