

TIMBER GRID SHELLS

Architecture, structure and craft



JOHN CHILTON
AND GABRIEL TANG



Timber Gridshells Architecture Structure And Craft

Fabio Bianconi,Marco Filippucci

Timber Gridshells Architecture Structure And Craft:

Timber Gridshells John Chilton, Gabriel Tang, 2016-11-10 Throughout history people have constructed simple timber lattice shelters such as the tepee or yurt covered with animal skins leaves grasses and woven fabrics Over the last fifty years more sophisticated webs of wood have emerged with timber gridshells in particular becoming a structurally expressive form of architecture Recent developments in digital design 3 D modelling software timber fabrication technologies as well as trends towards low carbon construction have further reinforced architects interest in the use of lightweight timber grids and lattice structures This timely book charts the origin and evolution of the timber gridshell and its relation to timber lattice architecture Drawing on a range of international case studies the authors trace the effect advances in technology have had on design and construction in this field providing a clear understanding of the structure morphology design process and construction technology and examining both the application and constraints of timber gridshells in architectural design Timber Gridshells is a highly illustrated up to date resource which provides detailed answers and inspires new ideas As such it is essential reading for students of architecture as well as professional architects

Advances in Architectural Geometry 2023 Kathrin Dörfler, Jan Knippers, Achim Menges, Stefana Parascho, Helmut Pottmann, Thomas

Wortmann, 2023-10-04 This book contains 34 technical papers presented at the Advances in Architectural Geometry Conference held in Stuttgart 2023 Modern geometric computing increasingly plays a role in modeling environments and processing sensing information providing a variety of tools for the efficient design analysis and manufacturing of complex shapes The research area of architectural geometry AG has emerged at the common border of architecture applied geometry computational design mathematics and manufacturing This book presents the state of the art of research in AG

Structural Design and Optimization of Lifting Self-forming GFRP Elastic Gridshells based on Machine Learning Soheila Kookalani, Hamidreza Alavi, Farzad Pour Rahimian, 2025-08-26 Structural Design and Optimization of Lifting Self forming GFRP Elastic Gridshells Based on Machine Learning presents the algorithms of machine learning ML that can be used for the structural design and optimization of glass fiber reinforced polymer GFRP elastic gridshells including linear regression ridge regression K nearest neighbors decision tree random forest AdaBoost XGBoost artificial neural network support vector machine SVM and six enhanced forms of SVM It also introduces interpretable ML approaches including partial dependence plot accumulated local effects and SHapley additive exPlanations SHAP Also several methods for developing ML algorithms including K fold cross validation CV Taguchi a technique for order preference by similarity to ideal solution TOPSIS and multi objective particle swarm optimization MOPSO are proposed These algorithms are implemented to improve the applications of gridshell structures using a comprehensive representation of ML models This research introduces novel frameworks for shape prediction form finding structural performance assessment and shape optimization of lifting self forming GFRP elastic gridshells using ML methods This book will be of interest to researchers and academics interested in advanced design

methods and ML technology in architecture engineering and construction fields **Digital Wood Design** Fabio Bianconi,Marco Filippucci,2019-02-24 This book explores various digital representation strategies that could change the future of wooden architectures by blending tradition and innovation Composed of 61 chapters written by 153 authors hailing from 5 continents 24 countries and 69 research centers it addresses advanced digital modeling with a particular focus on solutions involving generative models and dynamic value inherent to the relation between knowing how to draw and how to build Thanks to the potential of computing areas like parametric design and digital manufacturing are opening exciting new avenues for the future of construction The book's chapters are divided into five sections that connect digital wood design to integrated approaches and generative design to model synthesis and morphological comprehension to lessons learned from nature and material explorations to constructive wisdom and implementation related challenges and to parametric transfigurations and morphological optimizations

Materials for Architects and Builders Arthur Lyons,2019-08-28

Materials for Architects and Builders provides a clear and concise introduction to the broad range of materials used within the construction industry and covers the essential details of their manufacture key physical properties specification and uses Understanding the basics of materials is a crucial part of undergraduate and diploma construction or architecture related courses and this established textbook helps the reader to do just that with the help of colour photographs and clear diagrams throughout This new sixth edition has been completely revised and updated to include the latest developments in materials research new images appropriate technologies and relevant legislation The ecological effects of building construction and lifetime use remain an important focus and this new edition includes a wide range of energy saving building components

Fabricate 2024 Bob Sheil,Marilena Skavara,Mette Ramsgaard Thomsen,Phil Ayres,2024-04-04 Fabricate 2024 Creating Resourceful Futures is the fifth volume in the series of Fabricate publications The first conference Making Digital Architecture explored the ways in which technology design and industry are shaping the world around us Since then we have become finely attuned to the negative impacts of this shaping The 2024 conference hosted in Copenhagen sets focus on the pressing need to develop new models for architectural production that rethink how resource is deployed its intensity its socio ecological origins and sensitivity to environment This book features the work of designers engineers and makers operating within the built environment It documents disruptive approaches that reconsider how fabrication can be leveraged to address our collective and entangled challenges of resource scarcity climate emergency and burgeoning demand Exploring case studies of completed buildings and works in progress together with interviews with leading thinkers this edition of Fabricate offers a plurality of tangible models for design and production that set a creative and responsible course towards resourceful futures **Thinking While Doing** Stephen Verderber,Ted Cavanagh,Arlene Oak,2019-06-04 The active engagement of architecture students in the design and construction of real projects is today an important dimension at more than 150 universities worldwide Yet this emerging field continues to suffer from an insubstantial scholarly foundation An initiative of

universities in North America has developed a consistent and innovative practice model which sets a new standard for this key aspect of education and professional practice [Timber Gridshell Architecture](#) Olga Popovic Larsen, Gabriel Tang, John Chilton, 2013-04-01 [Michael Balz](#) John Chilton, 2023-06-03 This book presents a review of the work of the architect Michael Balz pioneer of concrete shell architecture It discusses his projects both realized and unbuilt many being designed in collaboration with the renowned Swiss engineer Heinz Isler Profusely illustrated with original drawings and photographs Michael Balz Shells and Visions caters to the increasing interest in the design and construction of free form reinforced concrete shells consequent on the advent of 3D modelling and form finding software The book describes architectural designs and practical construction issues to motivate contemporary shell designers Balz's experience of dealing with such difficulties as incompatibility with non structural features and the insertion of windows into shells and the assessment of buildings long term performance allow readers to learn more easily how to cope with such issues in their own work The book introduces Michael Balz his early work with other architects including his work on pneumatic forms with Frei Otto and his evolution into an exponent of organic architecture It then discusses completed projects including the outdoor Theater unter den Kuppeln 1976 Ballettsaal 1979 and Balz House 1981 Competitions Balz entered and unrealized shell projects also receive attention as does his work on the urban scale highlighting conceptual designs of mega cities His visionary megastructures encourage the exploration of innovative solutions for city spaces by architects faced with today's increased urbanization Michael Balz Shells and Visions will be of interest to students and professionals in the fields of architecture structural engineering building and urban design It's reflections on the cultural and contextual aspects of Balz's work will help the architectural historian to appreciate its long term significance [Crafting Wood](#) Carmen Rist-Stadelmann, Urs Meister, Machiel Spaan, 2021-05-20 New findings on timber joints and inspiration for architects and other professionals in the field of timber construction Wood has a centuries long tradition as well as a huge potential for future use as a highly versatile building material Crafting Wood presents newly gained knowledge on timber construction and on timber joints in particular This book lavishly illustrated with plans sketches and photographs emerged from an international educational cooperation of the University of Liechtenstein in Vaduz the Norwegian University of Science and Technology NTNU in Trondheim and the Academy of Architecture in Amsterdam The program looked at a vast range of timber joints from different theoretical and practical perspectives Students conceived and made by hand new joints that were then applied in prototypes for entire structures also designed as part of the course at a scale of 1:5 By analyzing this learning process the book provides a new overview of the topic of timber joints in architecture through text and images [Geometry and Performance of Timber Gridshells](#) Dragos-Iulian Naicu, 2012 [Heritage Timber Craft](#) Marcus Tesla, AI, 2025-01-13 Heritage Timber Craft explores the enduring wisdom of traditional wooden building construction investigating why historic timber structures have survived centuries while many modern buildings require replacement within decades This comprehensive work uniquely bridges the

gap between ancient craftsmanship and contemporary sustainable architecture examining successful building practices across five continents through detailed case studies of structures up to 800 years old including Japanese temples and Norwegian stave churches The book methodically progresses from fundamental material science through cultural woodworking practices to practical modern applications It reveals fascinating insights into how pre industrial societies achieved remarkable structural longevity through sophisticated joinery techniques and careful wood selection Through detailed technical drawings and clear explanations readers learn how traditional craftspeople created durable structures without modern technology supported by dendrochronological dating and structural load testing of traditional joints Written for both professionals and serious enthusiasts this work presents a compelling argument for integrating traditional timber crafting methods into contemporary sustainable architecture The book stands out for its practical approach combining academic research with hands on guidance for implementing historical techniques in modern construction It addresses current challenges in building preservation while providing specific criteria for material selection repair techniques and the adaptation of traditional joinery systems to meet modern building requirements making it an invaluable resource for architects preservation specialists and timber framers

New Architecture in Wood Marc Wilhelm Lennartz, Susanne

Jacob-Freitag, 2015-11-27 Timber the old raw material and building material returns There are many reasons today for building with wood and there are great advantages over conventional designs Wood is not only a renewable building material that helps reduce the levels of CO2 and is hence good for climate change but due to modern computing and manufacturing processes it can also be used for a variety of construction tasks Wood possesses excellent qualities for both construction and indoor climate control and can easily be combined with other common building materials Based on 24 international projects the book provides an overview of the range of possibilities in wood construction today Texts images and plans document the architectural and constructive qualities of contemporary timber structures from the conceptual design to the structure in detail The various uses are based on current research in modern timber engineering but also on timber construction expertise that has been developing over many centuries This special discipline has evolved significantly in recent decades particularly in Germany Austria and Switzerland and is a world leader today

Advanced Timber Structures Yves

Weinand, 2016-12-19 Wood is usually perceived as a traditional material However the properties of this material have now for some time made it possible to design free shapes and highly complex structures Today the wood laboratory of the EPF Lausanne which was originally founded by Julius Natterer is testing the production of origami structures ribbed shells fabric structures and curved panels under the guidance of Professor Weinand using digital calculation and computer aided processing methods The research results are tested in prototypes which demonstrate the potential applications in large scale timber buildings By exploring the hitherto unused potential of wood as a construction material this book provides an exciting and inspiring outlook on a new generation of timber buildings

Emergent Timber Technologies Simone Jeska, Khaled Saleh

Pascha,2014-10-27 The old material of wood has been used to construct dwellings of different types since the dawn of mankind And not without reason Its low density combined with high rigidity good processability and its resistance makes it an excellent building material There is currently a pioneering renaissance of the timber construction for two distinct reasons first wood is increasingly being rediscovered as one of the most important renewable raw materials for sustainable construction Moreover a revolution in the construction of timber structures began several years ago with the ever progressive use of three dimensional CAD models for digitally controlled robot manufacturing The book documents these developments in particular the engineering bonding techniques the introduction of digital production techniques and the innovative material developments of this material The chapter on composite structures and experimental structures specifically address trends toward the future oriented dimensions of timber construction In the final section outstanding designs are documented in detail such as the Club House of Haesley Nine Bridges Golf Course designed by Shigeru Ban in Yeoju South Korea and the double gymnasium in Borex Crassier Switzerland by Graeme Mann and Patricia Capua Mann

Mass Timber Susan Jones,2017 *Mass Timber Design and Research* presents new research and design work with Mass Timber a new construction technology well known in Europe but relatively unfamiliar in the United States Leading the Mass Timber design dialogue in the US the author Susan Jones an architect in Seattle Washington has been pioneering the new innovative use of wood over the past six years since she built her own family s house from cross laminated timber in 2015 in a neighborhood in Seattle The book presents her Seattle firm her family and her University of Washington students years of research and design Opening with the story of three generations of her family s own sustainable forest practices the book presents research into Pacific Northwest forestry timber and Cross Laminated Timber manufacturing practices to carbon analysis and carbon comparisons between standard building construction assemblies and technologies and concludes with the design of model buildings both designed and built by her firm atelierjones and her University of Washington students including a single family house a church schools multi family housing and a twelve story Tall Timber Wood Innovation tower on the University of Washington campus in Seattle *Timberframe* Tedd Benson,1999 The undisputed leader in timberframe design and construction shows how the post and beam architecture has enormous design possibilities 400 full color photos 46 line drawings floor plans *Advanced Timber Structures* Yves Weinand,2017 *DESIGNING TIMBER STRUCTURES* DR JAMES. THOMSON NORMAN (DR ANDREW.),2020 *Timber Construction for Architects and Builders* Eliot W. Goldstein,1999 This comprehensive hands on guide filled with practical architectural engineering and construction guidance brings you up to date on design materials codes and applications With expertise from a leading timber architect a top designer builder of heavy timber frames a wood scientist and several renowned timber engineers this book provides a Conception to Completion Professional Blueprint essential to anyone interested in or involved with timber construction

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