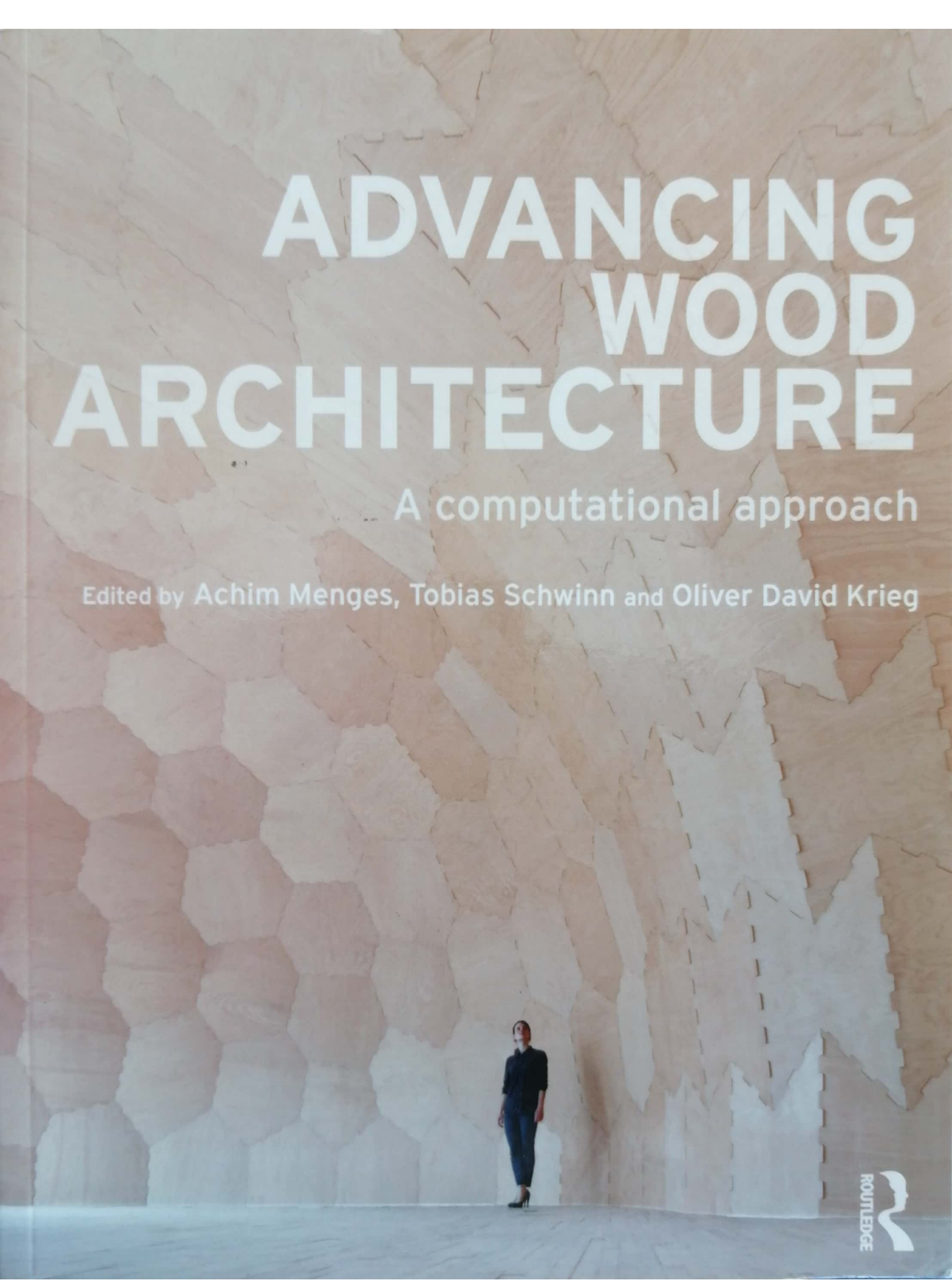
ADVANCING WOOD ARCHITECTURE

A computational approach

Edited by Achim Menges, Tobias Schwinn and Oliver David Krieg



ROUTLEDGE

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Advancing Wood Architecture

In light of environmental challenges architecture is facing, wood is no longer regarded as outmoded, nostalgic and rooted in the past, but increasingly recognised as one of the most promising building materials for the future. Recent years have seen unprecedented innovation of new technologies for advancing wood architecture.

Advancing Wood Architecture offers a comprehensive overview of the new architectural possibilities that are enabled by cutting-edge computational technologies in wood construction. It provides both an overarching architectural understanding and in-depth technological information through built projects and the works of four leading design research groups in Europe. The projects presented include large-scale, permanent buildings such as the ETH Arch_Tec_Lab building in Zurich, Switzerland; the Landesgartenschau Exhibition Hall near Stuttgart, Germany; and the Boiler House in Hooke Park, England; as well as built research prototypes investigating additive robotic fabrication, folded plate structures and meteorosensitive building skins.

Illustrated in full colour, the book showcases the latest technological developments in design computation, simulation and digital fabrication together with an architectural, engineering and manufacturing perspective, offering an outlook towards novel spatial and constructional opportunities of a material with unrivalled ecological virtues.

Achim Menges is a registered architect and professor at the University of Stuttgart, Germany, where he is the founding director of the Institute for Computational Design. Currently he is also Visiting Professor in Architecture at Harvard University's Graduate School of Design, USA.

Tobias Schwinn is a research associate and doctoral candidate at the Institute for Computational Design at the University of Stuttgart, Germany. In his research he is focusing on the integration of robotic fabrication and computational design processes.

Oliver David Krieg is a research associate and doctoral candidate at the Institute for Computational Design at the University of Stuttgart, Germany. His research aims to investigate the architectural potentials of robotic fabrication in wood construction.

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"This remarkable book showcases what architects could create with wood today using the latest computational design and robotic fabrication technologies. It features innovative wood architecture designed – and made – by four leading research groups in Europe. Rethinking wood from a computational perspective, they point to a variety of new ways in which this humble yet incredible material could be used in contemporary architecture."

– *Branko Kolarevic, University of Calgary, Canada*

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and Oliver David Krieg

Routledge
Taylor & Francis Group
LONDON AND NEW YORK

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First published 2017
by Routledge
2 Park Square, Milton Park, Abingdon, Oxon OX14 4RN

and by Routledge
711 Third Avenue, New York, NY 10017

Routledge is an imprint of the Taylor & Francis Group, an informa business

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British Library Cataloguing-in-Publication Data
A catalogue record for this book is available from the British Library

Library of Congress Cataloging-in-Publication Data
Names: Menges, Achim, author. | Schwinn, Tobias, author. | Krieg, Oliver David, author.
Title: Advancing wood architecture : a computational approach / Achim Menges, Tobias Schwinn, and Oliver David Krieg.
Description: New York : Routledge, 2016. | Includes bibliographical references and index.
Identifiers: LCCN 2015047854| ISBN 9781138932982 (hb : alk. paper) | ISBN 9781138932999 (pb : alk. paper) | ISBN 9781315678825 (ebook)
Subjects: LCSH: Building, Wooden--Technological innovations. | Building, Wooden--History--21st century.
Classification: LCC NA4110 .M46 2016 | DDC 721/.0448--dc23
LC record available at http://lccn.loc.gov/2015047854

ISBN: 978-1-138-93298-2 (hbk)
ISBN: 978-1-138-93299-9 (pbk)
ISBN: 978-1-315-67882-5 (ebk)

Typeset in Minion Pro
by Fakenham Prepress Solutions, Fakenham, Norfolk NR21 8NN

Printed in Canada

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– PREFACE –

No question, there are myriad books on timber construction and wood architecture. Their scope spans from technical construction manuals to literature focusing on the history and cultural relevance of this building material. However, since we started working with wood at the Institute for Computational Design several years ago, we felt that a particular book was missing from this extensive range: a book that contextualizes the remarkable characteristics and qualities of wood within the contemporary context of digital design, simulation and fabrication; a book that does not merely look at advances in CAD/CAM timber construction from the vantage point of automation, precision and workflow, but rather in the spirit of architectural exploration and innovation. In a nutshell, a book that would locate the intersection between what arguably is one of the oldest building materials with the very latest cyber-physical enabling technologies as a starting point for architectural enquiry.

With the completion of a major research undertaking, the EU funded 'Robotics in Timber Manufacturing' project that resulted in the novel wood plate structure showcased in the Landesgartenschau Exhibition Hall building in Schwäbisch Gmünd, Germany, we had a renewed incentive to step back and reflect on the project outcome in relation to the larger developments in the field. This spawned the idea of instigating a broader conversation with like-minded researchers, architects, and engineers in the form of a one-day symposium and related publication, focusing on the ramifications of cutting-edge digital technologies and the spatial as well as constructional potentials they may offer for architecture.

We were delighted to find out that a number of our most innovative and esteemed colleagues from renowned international institutions shared our enthusiasm for the topic at hand, and that they generously agreed to present and discuss their highly accomplished work. The *Advancing Wood Architecture* Symposium took place at the German Museum of Architecture on 27 March 2015. We envisioned this event to be both an exchange of overarching thoughts on advancing wood architecture, as well as a discussion of specific research undertakings and related building projects in greater technical detail. This twofold concept, the insights it offered, and the fascination it sparked is very much at the heart of the book in your hands.

Achim Menges, Tobias Schwinn, Oliver David Krieg

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