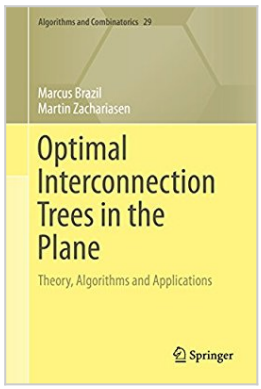

Optimal Interconnection Trees in the Plane: Theory, Algorithms and Applications (Algorithms and Combinatorics)

By Marcus Brazil, Martin Zachariasen

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This book explores fundamental aspects of geometric network optimisation with applications to a variety of real world problems. It presents, for the first time in the literature, a cohesive mathematical framework within which the properties of such optimal interconnection networks can be understood across a wide range of metrics and cost functions. The book makes use of this mathematical theory to develop efficient algorithms for constructing such networks, with an emphasis on exact solutions.

Marcus Brazil and Martin Zachariasen focus principally on the geometric structure of optimal interconnection networks, also known as Steiner trees, in the plane. They show readers how an understanding of this structure can lead to practical exact algorithms for constructing such trees.

The book also details numerous breakthroughs in this area over the past 20 years, features clearly written proofs, and is supported by 135 colour and 15 black and white figures. It will help graduate students, working mathematicians, engineers and computer scientists to understand the principles required for designing interconnection networks in the plane that are as cost efficient as possible.

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Editorial Review

Review

“The book presents an interesting and quickly developing area of research and will be useful for researchers working in this area and for those wanting to learn more about geometric Steiner tree problems.” (Yongtang Shi, Mathematical Reviews, December, 2015)

“The focus of this monograph is the geometric Steiner tree problem, i.e., how to optimally connect, in a geometric plane, a collection of n given terminals, together with an additional set of Steiner points, in terms of a measuring metric. … monograph is also intended as a textbook at a graduate level, thus comes with a decent collection of exercises, with varying difficulty degrees, at the end of each chapter, mostly assigned in a relevant context throughout the main text.” (Zhizhang Shen, zbMATH 1319.05044, 2015)

From the Back Cover

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About the Author

Marcus Brazil is Associate Professor and Reader at the Melbourne School of Engineering, The University of Melbourne, with a background in pure mathematics. He has worked on Steiner trees and network optimization problems for about 18 years, and has written more than 60 papers in this area, both on the theory of optimal network design and on industrial applications to Wireless Sensor Networks, Telecommunications, VLSI Physical Design, and Underground Mining Planning.

Martin Zachariasen is Head of Department and Professor at the Department of Computer Science, University of Copenhagen. He has worked on heuristics and exact methods for classical NP-hard problems, such as the geometric Steiner Tree Problem, as well as other optimization problems. His general research interests are in experimental algorithmics and computational combinatorial optimization, in particular related to VLSI design. As well as writing more than 40 papers on these topics, he is one of the developers of GeoSteiner, which is by far the most efficient software for solving a range of geometric Steiner tree problems.

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