

# Preface

With the consistent progress of computer technology, computational acoustic simulation is now becoming a popular, indispensable, and powerful tool for sound environmental design of architectural and urban spaces. Indeed, there are high expectations for a wide variety of applications for prediction of room acoustics and noise propagation, development of building materials/components and audio equipment, and visualization and auralization of sound environment, among other effects. In the first decade of this century, remarkable advances have been made in wave-based acoustic simulation techniques, which are steadily increasing their practicality and applicability.

In the meantime, the Subcommittee of Computational Acoustics on Built Environment of the Architectural Institute of Japan proposed a book in Japanese to review a variety of numerical methods for wave-based acoustic simulation and recent applications to architectural and environmental acoustics, and it was published by the institute in 2011. Following the original concept and enriching the contents, this present book was composed in English for international publication by the editorial board and new authors were added.

This book has two main parts, following an introduction providing an overview of computational simulation of sound environment. Part I explains the fundamentals and advanced techniques for three popular methods, namely, the finite-difference time-domain method, the finite element method, and the boundary element method, as well as alternative time-domain methods. Part II demonstrates various applications to room acoustics simulation, noise propagation simulation, and acoustic property simulation for building components, and auralization.

All authors willingly contributed the latest fruits of their own research, which led to the successful completion of this edition. The editors have tried to make terminology and mathematical notation consistent to some extent; however, we beg the readers' pardon if incomplete descriptions remain. We hope that this book will be helpful to researchers, engineers, and students in deepening their interests and knowledge of computational acoustic simulation.

The editors sincerely thank Dr. Yuko Sumino of Springer Japan for her advice and assistance, and we are grateful to all authors for their cooperation. As a final word, we deeply regret that one of the authors, Dr. Tomonao Okubo, passed away during the pre-publication editorial process. This book is one of his posthumous works and also serves as our tribute to the memory of a distinguished acoustician and great friend.

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