

Modeling and Simulation: An Application-Oriented Introduction (Springer Undergraduate Texts in Mathematics and Technology)

By Hans-Joachim Bungartz, Stefan Zimmer, Martin Buchholz, Dirk Pflüger

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Die Autoren führen auf anschauliche und systematische Weise in die mathematische und informatische Modellierung sowie in die Simulation als universelle Methodik ein. Es geht um Klassen von Modellen und um die Vielfalt an Beschreibungsarten. Aber es geht immer auch darum, wie aus Modellen konkrete Simulationsergebnisse gewonnen werden können. Nach einem kompakten Repetitorium zum benötigten mathematischen Apparat wird das Konzept anhand von Szenarien u. a. aus den Bereichen „Spielen – entscheiden – planen" und „Physik im Rechner" umgesetzt.

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Editorial Review

Review

From the reviews:

“This is an introductory textbook to modeling and simulation that are considered as systematic approach to gain knowledge and results. … The book is very suitable for the first touch with the topics. It contains very intuitive examples for learning. … it has to be an excellent advertising of computer modeling and simulation.” (Eduard Kostolansky, zbMATH, Vol. 1281, 2014)

From the Back Cover

This book provides an introduction to mathematical and computer-oriented modeling and to simulation as a universal methodology. It therefore addresses various model classes and their derivations. And it demonstrates the diversity of approaches that can be taken: be it discrete or continuous, deterministic or stochastic. A common underlying theme throughout the book are the means in which one obtains practical simulation results from these different abstract models.

Subsequent to a brief review of the mathematical tools that are required, the concept of the simulation pipeline, "from model derivation to the simulation", is applied to 14 example scenarios from diverse fields such as "Game theory - deciding - planning", "Traffic on highways and data highways", "Dynamical systems" and "Physics in the computer".

Whether it is game theory or mathematical finance, traffic or control theory, population dynamics or chaos, or molecular dynamics, continuum mechanics or computer graphics - the reader gains insight into the world of simulation in a descriptive yet systematic way.

About the Author

Hans-Joachim Bungartz: Professor of informatics and mathematics at TUM, chair of scientific computing; long-term experience in teaching for programs in informatics, mathematics, physics, and engineering; responsible of CSE graduate programs at TUM and Bavaria-wide.

Dirk Pflüger and Stefan Zimmer: are both members of the Chair of Simulation of Large Systems, Institute for Parallel and Distributed Systems, at the University of Stuttgart; their teaching includes respective courses in the informatics and software engineering programs and within the cluster of excellence Simulation Technology.

Martin Buchholz: works at Realtime Technology AG (RTT AG) on distributed software systems for realtime visualization.

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