System-level Modeling of MEMS
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DESCRIPTION

System-level modeling of MEMS - microelectromechanical systems - comprises integrated approaches to simulate, understand, and optimize the performance of sensors, actuators, and microsystems, taking into account the intricacies of the interplay between mechanical and electrical properties, circuitry, packaging, and design considerations. Thereby, system-level modeling overcomes the limitations inherent to methods that focus only on one of these aspects and do not incorporate their mutual dependencies.

The book addresses the two most important approaches of system-level modeling, namely physics-based modeling with lumped elements and mathematical modeling employing model order reduction methods, with an emphasis on combining single device models to entire systems. At a clearly understandable and sufficiently detailed level the readers are made familiar with the physical and mathematical underpinnings of MEMS modeling. This enables them to choose the adequate methods for the respective application needs.

This work is an invaluable resource for all materials scientists, electrical engineers, scientists working in the semiconductor and/or sensor industry, physicists, and physical chemists.
ABOUT THE AUTHOR

Tamara Bechtold is post-doctoral researcher at Philips/NXP Research Laboratories in the Netherlands. She obtained her PhD from the University of Freiburg, Germany, with a thesis on microsystems simulation conducted at the Institute of Microsystems Technology in the group of Jan Korvink. She is the author of one book and many scientific publications. As of 2009, Tamara Bechtold has more than ten years of experience in modeling and simulation of MEMS.

Gabriele Schrag heads a research group in the field of MEMS modeling with a focus on methodologies for the virtual prototyping of microdevices and microsystems at the Technical University of Munich, Germany. In her diploma and doctoral studies she worked on modeling methods for electromechanical microdevices and microsystems with an emphasis on fluid-structure interaction and viscous damping effects, including coupled effects on the device and system level.

Lihong Feng is a team leader in the research group of Computational Methods in Systems and Control theory headed by Professor Peter Benner, Max Planck Institute for Dynamics of Complex Technical Systems in Magdeburg, Germany. After her PhD from Fudan University in Shanghai, China, she joined the faculty of the State Key Laboratory of Application-Specific Integrated Circuits (ASIC) & System, Fudan University, Shanghai, China. From 2007 to 2008 she was a Humboldt research fellow in the working group of Mathematics in Industry and Technology at the Technical University of Chemnitz, Germany. In 2009-2010, she worked in the Laboratory for Microsystem Simulation, Department of Microsystems Engineering, University of Freiburg, Germany. Her research interests are in the field of reduced order modelling and fast numerical algorithms for control and optimization in Chemical Engineering, MEMS simulation, and circuit simulation.

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