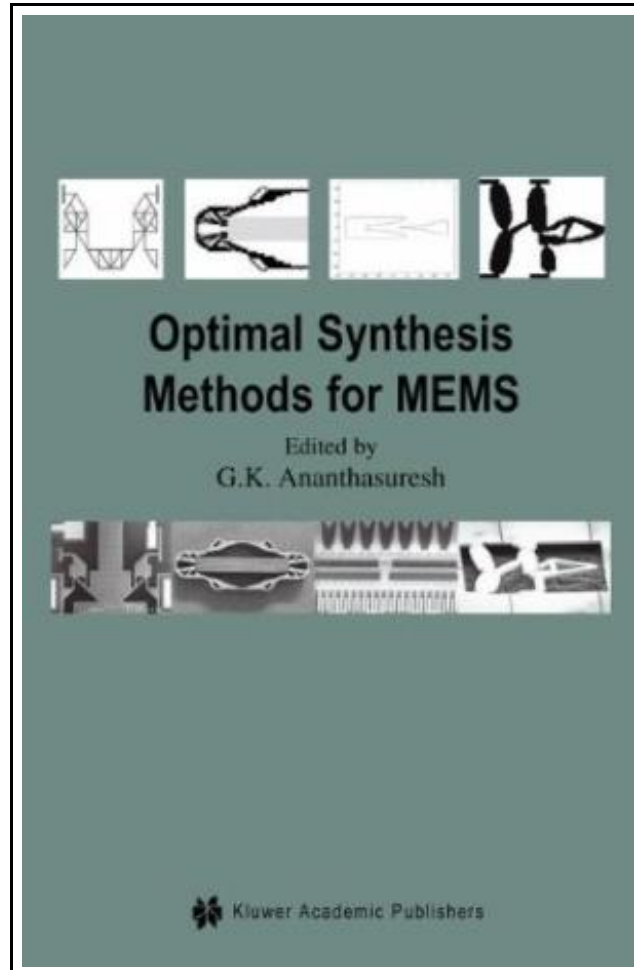


## Optimal Synthesis Methods for MEMS



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*(Lisa Jacobs)*

## OPTIMAL SYNTHESIS METHODS FOR MEMS



Book Condition: New. Publisher/Verlag: Springer, Berlin | The field of "microelectromechanical systems," or "MEMS," has gradually evolved from a "discipline" populated by a small group of researchers to an "enabling technology" supporting a variety of products in such diverse areas as mechanical and inertial sensors, optical projection displays, telecommunications equipment, and biology and medicine. Critical to the success of these products is the ability to design them, and this invariably involves detailed modeling of proposed designs. Over the past twenty years, such modeling has become increasingly sophisticated, with full suites of MEMS-oriented computer-aided-design tools now available worldwide. But there is another equally important side to the design process. In my own book, *Microsystem* figuring out what to build in the first place. Design, I chose to emphasize the modeling aspect of design. The task of figuring out what to build was defined by a vague step called "creative thinking." I used practical product examples to illustrate the many subtle characteristics of successful designs, but I made no attempt to systematize the generation of design proposals or optimized designs. That systemization is called "synthesis," which is the subject of this book.

1 Introduction.- 1. Design of Microelectromechanical Systems.- 2. Synthesis vs. Analysis.- 2.1 An example: mode shape synthesis of a bar.- 3. Optimization as a synthesis tool.- 3.1 Components of an optimal synthesis procedure.- 4. Contents of the chapters.- 5. Closure.- 2 Synthesis for Mechanical Behavior.- 1. Introduction.- 2. Synthesis of beam-like structures.- 3. Topology Synthesis.- 3.1 Flexibility-stiffness formulation.- 3.1.1 An accelerometer with a built-in displacement amplifier.- 3.1.2 A micromechanical AND logic gate.- 3.1.3 Synthesized solutions as design aids.- 3.2 Flexibility-strength formulation.- 3.2.1 Modeling stress constraints.- 3.2.2 Sensitivity analysis for stress constraints.- 3.2.3 An example.- 4. Synthesis for dynamic attributes.- 4.1 Synthesis for desired natural frequencies.- 4.2 Synthesis for desired normal mode shapes.-...



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