

## PREFACE

This book covers several important topics on the subject of optimization of structural and mechanical systems. Computational optimization methods have matured over the last few years due to the extensive research by applied mathematicians and the engineering community. These methods are being applied to a variety of practical applications. Several general-purpose optimization programs as well as programs for specific engineering applications have become available recently. These are being used to solve practical and interesting optimization problems.

The book covers state-of-the-art in computational algorithms as well as applications of optimization to structural and mechanical systems. Formulations of the problems are covered and numerical solutions are presented and discussed. Topics requiring further research are identified. Leading researchers in the field of optimization and its applications have written the material and provided significant insights and experiences with the applications. The topics covered include:

- ❖ Optimization concepts and methods
- ❖ Optimization of large scale systems
- ❖ Optimization using evolutionary computations
- ❖ Multiobjective optimization
- ❖ Shape optimization
- ❖ Topology optimization
- ❖ Design sensitivity analysis of nonlinear structural systems
- ❖ Optimal control of structures
- ❖ Nonlinear optimal control
- ❖ Optimization of systems for acoustics
- ❖ Design optimization under uncertainty
- ❖ Optimization-based inverse kinematics of articulated mechanisms
- ❖ Multidisciplinary design optimization
- ❖ mesh free methods for optimization
- ❖ Kriging metamodel based optimization,

- ❖ Sensitivity-free formulations for structural and mechanical system optimization
- ❖ Robust design based on optimization
- ❖ Parallel computations for design optimization
- ❖ Semidefinite programming for structural optimization.

The book is suitable for advanced courses on optimization of structural and mechanical systems. It is also an invaluable resource for researchers, graduate students, and practitioners of optimization.

I would like to thank all the authors for their diligence and meticulous work in writing their chapters. Without their hard work this book would not be possible. I would also like to thank the staff at World Scientific Publishing Company for their patience and help in finalizing the material for the book.

Finally, I would like to thank all my family members for their unending support, patience and love.

Jasbir S. Arora  
Iowa City, Iowa, USA  
4 December 2006