CONTENTS

Foreword v

Preface vii

PART I: CONVEX MINLP

Algorithms and software for convex mixed integer nonlinear programs 1
Pierre Bonami, Mustafa Kilinç, and Jeff Linderoth

Subgradient based outer approximation for mixed integer second order cone programming 41
Sarah Drewes and Stefan Ulbrich

Perspective reformulation and applications 61
Oktay Günlük and Jeff Linderoth

PART II: DISJUNCTIVE PROGRAMMING

Generalized disjunctive programming: A framework for formulation and alternative algorithms for MINLP optimization 93
Ignacio E. Grossmann and Juan P. Ruiz

Disjunctive cuts for nonconvex MINLP 117
Pietro Belotti

PART III: NONLINEAR PROGRAMMING

Sequential quadratic programming methods 147
Philip E. Gill and Elizabeth Wong

Using interior-point methods within an outer approximation framework for mixed integer nonlinear programming 225
Hande Y. Benson

PART IV: EXPRESSION GRAPHS

Using expression graphs in optimization algorithms 247
David M. Gay

Symmetry in mathematical programming 263
Leo Liberti

PART V: CONVEXIFICATION AND LINEARIZATION

Using piecewise linear functions for solving MINLPs 287
Björn Geißler, Alexander Martin, Antonio Morsi, and Lars Schewe

An algorithmic framework for MINLP with separable non-convexity 315
Claudia D'Ambrosio, Jon Lee, and Andreas Wächter

Global optimization of mixed-integer signomial programming problems 349
Andreas Lundell and Tapio Westerlund

PART VI: MIXED-INTEGER QUADRATICALY CONSTRAINED OPTIMIZATION

The MILP road to MIQCP 373
Samuel Burer and Anureet Saxena

Linear programming relaxations of quadratically constrained quadratic programs 407
Andrea Qualizza, Pietro Belotti, and François Margot

Extending a CIP framework to solve MIQCPs 427
Timo Berthold, Stefan Heinz, and Stefan Vigerske

PART VII: COMBINATORIAL OPTIMIZATION

Computation with polynomial equations and inequalities arising in combinatorial optimization 447
Jesus A. De Loera, Peter N. Malkin, and Pablo A. Parrilo

Matrix relaxations in combinatorial optimization 483
Franz Rendl

A polytope for a product of real linear functions in 0/1 variables 513
Oktay Günlük, Jon Lee, and Janny Leung

PART VIII: COMPLEXITY

On the complexity of nonlinear mixed-integer optimization 533
Matthias Köppe

Theory and applications of n-fold integer programming 559
Shmuel Onn

PART IX: APPLICATIONS

MINLP Application for ACH interiors restructuring 597
Erica Klampfl and Yakov Fradkin

A benchmark library of mixed-integer optimal control problems..... 631
Sebastian Sager

List of Hot Topics participants 671