

Contents

1	Variable Ordering Structures	1
1.1	Partial Orderings and Variable Ordering Structures	2
1.2	Variable Ordering Structures Given by Bishop-Phelps Cones	10
1.2.1	Bishop-Phelps Cones	11
1.2.2	Augmented Dual Cones	13
1.2.3	Variable Ordering Structures Given by Bishop-Phelps Cones	17
1.3	Variable Ordering Structures in Applications	20
1.3.1	Variable Ordering Structures in Medical Image Registration	20
1.3.2	Variable Ordering Structures and Equitability	22
1.4	Notes on the Literature	23
2	Optimality Concepts and Their Characterization	27
2.1	Optimality Concepts in Partially Ordered Spaces	27
2.2	Optimality Concepts for Variable Ordering Structures	30
2.3	Characterization of Nondominated Elements	43
2.4	Characterization of Minimal Elements	49
2.5	Notes on the Literature	53
3	Cone-Valued Maps	57
3.1	Convexity and Linearity of Cone-Valued Maps	57
3.1.1	Cone-Convex Cone-Valued Maps	58
3.1.2	Convex-Like and Quasiconvex Cone-Valued Maps	63
3.1.3	Linear Cone-Valued Maps	64
3.1.4	Sublinear Cone-Valued Maps	65
3.2	Continuity of Cone-Valued Maps	67
3.2.1	Semicontinuous Cone-Valued Maps	67
3.2.2	Lipschitz Continuous Cone-Valued Maps	69

3.3	Monotonicity of Cone-Valued Maps	71
3.4	Notes on the Literature	73
4	Linear Scalarizations	77
4.1	Characterization of Nondominated Elements	77
4.2	Characterization of Minimal Elements	83
4.3	Notes on the Literature	87
5	Nonlinear Scalarizations	89
5.1	Signed Distance Functional	89
5.1.1	Characterization of Nondominated Elements	92
5.1.2	Characterization of Minimal Elements	95
5.2	Translative Functional	96
5.2.1	Characterization of Nondominated Elements	98
5.2.2	Characterization of Minimal Elements	100
5.3	Notes on the Literature	103
6	Scalarizations for Variable Orderings Given by Bishop-Phelps Cones	105
6.1	Characterization of Nondominated Elements	106
6.2	Characterization of Minimal Elements	112
6.3	Notes on the Literature	114
7	Optimality Conditions for Vector Optimization Problems	117
7.1	Subdifferential and Coderivative	119
7.2	Unconstrained Vector Optimization Problems	125
7.3	Constrained Vector Optimization Problems	129
7.4	Notes on the Literature	138
8	Duality Results	139
8.1	General Duality	139
8.2	Duality Based on Linear Scalarization	147
8.3	Duality Based on Nonlinear Scalarization	149
8.4	Notes on the Literature	152
9	Numerical Methods	153
9.1	Discrete Problems	153
9.1.1	Determining Nondominated Elements	154
9.1.2	Determining Minimal Elements	159
9.2	Continuous Problems	163
9.2.1	Determining Nondominated Elements	165
9.2.2	Determining Minimal Elements	169
9.3	Notes on the Literature	172

10 Outlook and Further Application Areas 175

 10.1 Vector Variational Inequalities and Related Problems 175

 10.2 Theory of Consumer Demand in Economics 177

 10.3 Variable Preferences in Intensity-Modulated Radiation
 Therapy 178

References 181

Index 189

Variable Ordering Structures in Vector Optimization

Eichfelder, G.

2014, XIII, 190 p. 41 illus., Hardcover

ISBN: 978-3-642-54282-4