

ke

Lecture Notes in Economics and Mathematical Systems

Managing Editors: M. Beckmann and W. Krelle

318

Timothy Doup

FB Mathematik TUD



58194417

Simplicial Algorithms on the Simplotope



Fachbereich Mathematik
Technische Hochschule Darmstadt
Bibliothek

Inv.-Nr. B 27888

Springer-Verlag

Berlin Heidelberg New York London Paris Tokyo

CONTENTS

PART I

INTRODUCTION AND DEFINITIONS

CHAPTER 1. INTRODUCTION

1.1. Introduction	3
1.2. Historical perspective	5
1.3. Outline of the monograph	13

CHAPTER 2. DEFINITIONS AND EXISTENCE THEOREMS

2.1. Introduction	15
2.2. Basic concepts and notations	16
2.3. Existence theorems	22
2.4. Labelling functions and accuracy	27
2.5. Pure exchange economies	37
2.6. Quadratically constrained quadratic programming	38
2.7. Economies with a block diagonal supply-demand pattern	40
2.8. Noncooperative N-person games	42

CHAPTER 3. TRIANGULATIONS OF S^n AND S

3.1. Introduction	45
3.2. The Q-triangulation of S^n and S	45
3.3. The Q'-triangulation of S	50
3.4. The V-triangulation of S^n	51
3.5. The V'- and the V-triangulation of S	54
3.6. Variants of the V-triangulation	61

PART II

ALGORITHMS ON THE UNIT SIMPLEX

CHAPTER 4. AN INTRODUCTION TO SIMPLICIAL ALGORITHMS ON THE UNIT SIMPLEX

4.1. Introduction	69
4.2. The variable dimension restart algorithm on S^n for proper integer labelling rules	71
4.3. Variable dimension restart algorithms on S^n for arbitrary integer labelling rules	77
4.4. Variable dimension restart algorithms on S^n for vector labelling	84
4.5. A path following interpretation of the variable dimension restart algorithm for the V-triangulation	91

CHAPTER 5. THE $(2^{n+1}-2)$ -RAY ALGORITHM

5.1. Introduction	95
5.2. The path of the algorithm	96
5.3. The subdivision of S^n	99
5.4. The steps of the algorithm	105

CHAPTER 6. THE 2-RAY ALGORITHM

6.1. Introduction	111
6.2. The path of the algorithm	112
6.3. The subdivision of S^n	113
6.4. The steps of the algorithm	120

CHAPTER 7. COMPARISONS AND COMPUTATIONAL RESULTS

7.1. Introduction	127
7.2. A comparison of the variable dimension restart algorithms on S^n	127
7.3. Computational results	130

PART III

ALGORITHMS ON THE SIMPLOTOPE

CHAPTER 8. AN INTRODUCTION TO SIMPLICIAL ALGORITHMS ON THE SIMPLOTOPE

8.1. Introduction	137
8.2. The sum-ray algorithm on S for proper integer labelling rules	138
8.3. Variable dimension restart algorithms on S for arbitrary integer labelling rules	142
8.4. The sum-ray algorithm on S for vector labelling	149
8.5. A path following interpretation of the sum-ray algorithm for the V' -triangulation	156

CHAPTER 9. THE PRODUCT-RAY ALGORITHM

9.1. Introduction	159
9.2. The path of the algorithm	159
9.3. The subdivision of S	162
9.4. The steps of the algorithm	166

CHAPTER 10. THE EXPONENT-RAY ALGORITHM

10.1. Introduction	173
10.2. The path of the algorithm	174
10.3. The subdivision of S	177
10.4. The steps of the algorithm	186

CHAPTER 11. COMPARISONS AND COMPUTATIONAL RESULTS

11.1. Introduction	197
11.2. A comparison of the variable dimension restart algorithms on S	197
11.3. Computational results	200

PART IV

CONTINUOUS DEFORMATION

ON THE SIMPLOTOPE

CHAPTER 12. THE CONTINUOUS DEFORMATION ALGORITHM ON THE SIMPLOTOPE

12.1. Introduction	207
12.2. The path of the algorithm	208
12.3. Triangulation of $S \times [1, \infty)$	212
12.4. Triangulation of the boundary of $S \times [1, \infty)$	226
12.5. The steps of the continuous deformation algorithm on S	239
REFERENCES	255