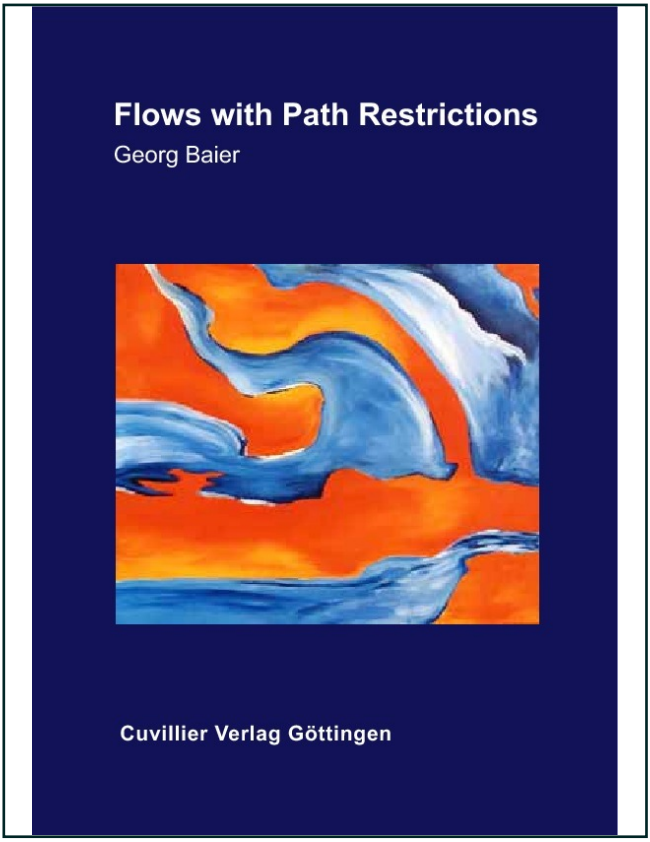
Georg Baier (Autor)

Flows with path restrictions



https://cuvillier.de/de/shop/publications/3071

Copyright:
Cuvillier Verlag, Inhaberin Annette Jentzsch-Cuvillier, Nonnenstieg 8, 37075 Göttingen, Germany
Telefon: +49 (0)551 54724-0, E-Mail: info@cuvillier.de, Website: https://cuvillier.de

Contents

Introduction **1**

1 Preparing the Ground **7**
1.1 Graphs, Paths, etc. 7
1.2 Path-Systems and Flows 8
1.3 Algorithms 11
1.4 Tail Probabilities 15

2 Length-Bounded Flows and Cuts **17**
2.1 Introduction 19
2.2 Fractional Length-Bounded Flows 23
2.2.1 Single-Commodity Flows 25
2.2.2 Multi-Commodity Flows 29
2.2.3 Approximation of Fractional Flows 32
2.3 Length-Bounded s-t-Cuts 36
2.3.1 Integrality Gap for s-t-Cuts 37
2.3.2 Approximation of s-t-Cuts 39
2.4 Integral Length-Bounded Flows 44
2.4.1 Node- versus Edge-Disjointness 45
2.4.2 Edge- versus Path-Flow 47
2.4.3 Integrality Gap for Integral Flows 48
2.4.4 Approximation and Complexity of Integral Flows . . . 51
2.4.5 Approximation and Complexity for Planar Graphs . . . 55
2.4.6 Minimum-Cut Maximum-Flow Ratio 58

3 k-Splittable Flows and Cuts **61**
3.1 Introduction 62
3.2 Uniform k-Splittable s-t-Flows 65
3.2.1 Properties of Uniform k-Splittable s-t-Flows 66
3.2.2 Maximum-Flow Minimum-Cut 68
3.2.3 Augmenting Path Algorithm 69
3.2.4 Budget-Contrained Flows 73
3.3 General k-Splittable s-t-Flows 74
3.3.1 Approximation for Small Values of k 75

3.3.2 Approximation for Large Values of k 78
3.3.3 Hardness of Approximation 81
3.4 Transshipment Problem 83
3.4.1 Uniform Transshipments and Complexity 83
3.4.2 Algorithm for Uniform Transshipments 87
3.5 Multi-Commodity k-Splittable Flows 91
3.6 Minimum Number of Paths 93

Bibliography **95**

Symbol Index **101**

Index **103**