
Contents

<i>Preface</i>	<i>page vii</i>
1 Introduction	1
1.1 Sequential and Parallel Computation	2
1.2 Some Problems to Approximate	4
1.3 Realistic Models	9
2 Basic Concepts	12
2.1 The PRAM Model of Computation	12
2.2 Randomized PRAM Computation	14
2.3 P-Completeness	19
2.4 Approximation Algorithms	22
2.5 Parallel Approximation Classes	24
2.6 Approximation Preserving Reductions	26
2.7 Pseudo-NC Algorithms and Approximation	28
3 Extremal Graph Properties	32
3.1 The Induced Subgraph of High Weight is in NCX	33
3.2 Examples of Linear Extremal Graph Properties	35
4 Rounding, Interval Partitioning and Separation	39
4.1 The Subset Sum Problem	41
4.2 Maximum Flow and Weighted Matching	43
4.3 Approximating Maximum Flow	49
4.4 Approximating Maximum Weight Matching	51
4.5 NC Approximations to Flows and Matchings	53
5 Primal–Dual Method	55
5.1 Positive Linear Programming	56
5.2 Further Applications	63
5.3 The Vertex Cover Problem	64

6	Graph Decomposition	68
6.1	Planar Graphs	69
6.2	The Maximum Independent Set for Outerplanar Graphs	74
6.3	The Maximum Independent Set for k-Outerplanar Graphs	84
6.4	The Maximum Independent Set problem for Planar Graphs	92
7	Further Parallel Approximations	94
7.1	The Minimum Metric Traveling Salesperson Problem	94
7.2	Bin Packing	97
7.3	More Cut Problems	105
7.4	Other Problems	106
8	Non-Approximability	108
8.1	The High Connected Subgraph Problem	109
8.2	Linear Programming	118
8.3	The Nearest Neighbor Heuristic	124
9	Syntactically Defined Classes	128
9.1	MaxNP and MaxSNP	129
9.2	Limits for the Approximation	133
	Appendix 1 Definition of Problems	137
	<i>Bibliography</i>	145
	<i>Author index</i>	153
	<i>Subject index</i>	155