

Contents

CHAPTER 1	MARKOV PROCESSES AND REVERSIBILITY	1
1.1	<i>Preliminaries on Markov processes</i>	1
1.2	<i>Reversibility</i>	5
1.3	<i>Birth and death processes</i>	10
1.4	<i>The Ehrenfest model</i>	17
1.5	<i>Kolmogorov's criteria</i>	21
1.6	<i>Truncating reversible processes</i>	25
1.7	<i>Reversed processes</i>	27
CHAPTER 2	MIGRATION PROCESSES	34
2.1	<i>The output from a simple queue</i>	34
2.2	<i>A series of simple queues</i>	37
2.3	<i>Closed migration processes</i>	40
2.4	<i>Open migration processes</i>	48
CHAPTER 3	QUEUEING NETWORKS	57
3.1	<i>General customer routes</i>	57
3.2	<i>Open networks of quasi-reversible queues</i>	65
3.3	<i>Symmetric queues</i>	72
3.4	<i>Closed networks</i>	82
3.5	<i>More general arrival rates</i>	89
CHAPTER 4	EXAMPLES OF QUEUEING NETWORKS	95
4.1	<i>Communication networks</i>	95
4.2	<i>Machine interference</i>	99
4.3	<i>Timesharing computers</i>	105
4.4	<i>Teletraffic models</i>	108
4.5	<i>Compartmental models</i>	113
4.6	<i>Miscellaneous applications</i>	117
CHAPTER 5	ELECTRICAL ANALOGUES	125
5.1	<i>Random walks</i>	125
5.2	<i>Flow models</i>	128
5.3	<i>Invasion models</i>	132

viii *Contents*

CHAPTER 6	REVERSIBLE MIGRATION PROCESSES	135
6.1	<i>Migration processes revisited</i>	135
6.2	<i>Social grouping behaviour</i>	138
6.3	<i>Contrasting flow models</i>	140
CHAPTER 7	POPULATION GENETICS MODELS	145
7.1	<i>Neutral allele models</i>	145
7.2	<i>The age of an allele</i>	151
7.3	<i>Fixation times</i>	156
CHAPTER 8	CLUSTERING PROCESSES	161
8.1	<i>Introduction</i>	161
8.2	<i>The basic model</i>	162
8.3	<i>Examples</i>	167
8.4	<i>Polymerization processes</i>	173
8.5	<i>Generalizations</i>	180
CHAPTER 9	SPATIAL PROCESSES	184
9.1	<i>Markov fields</i>	184
9.2	<i>Reversible spatial processes</i>	189
9.3	<i>A general spatial process</i>	193
9.4	<i>Partial balance</i>	200
<i>References</i>	.	212
<i>Symbol Index</i>		223
<i>Subject Index</i>		227