

Contents

1	Introduction	1
1.1	Introduction	1
1.2	Symbols and Conventions	6
2	State Dependent Bernoulli Servers	9
2.1	Indistinguishable Customers	9
2.2	Customers of Different Types	18
2.3	Bernoulli Servers with Immediate Feedback	20
3	Closed Cycles of State Dependent Bernoulli Servers with Different Customer Types	23
3.1	Steady State Behaviour and Arrival Theorem	24
3.2	Closed Cycles of Bernoulli Servers - The Multichain Case	31
3.3	Delay Time Distribution for Customers in a Closed Cycle of State Independent Bernoulli Servers	32
3.4	Computational Algorithms for Closed Cycles of State Independent Bernoulli Servers	50
4	Open Tandems of State Dependent Bernoulli Servers with Different Customer Types	53
4.1	The Principle of Adjusted Transfer Rates	54
4.2	Steady State and Arrival Theorem	57
4.3	Delay Time Distribution for Customers in an Open Tandem of State Independent Bernoulli Servers	63
4.4	Re-entrant Lines	67
5	Networks with Doubly Stochastic and Geometrical Servers	73
5.1	Description of the Doubly Stochastic Server	74
5.2	Description of the Geometrical Server	83
5.3	Open Networks of Doubly Stochastic and Geometrical Nodes	86
5.4	Stationary State for the Open Network with Doubly Stochastic and Geometrical Nodes	90
5.5	Performance Measures for Open Networks	92

5.6	Closed Networks of Doubly Stochastic and Geometrical Nodes . .	95
5.7	Open Tandems of Doubly Stochastic Nodes with State Independent Arrival Streams, and Reversibility	98
6	General Networks with Batch Movements and Batch Services	105
6.1	The General Network Model	106
6.2	Steady States	108
6.3	Related Examples and Discussion of the Model	111
6.4	Walrand's S-Queues and Networks	117
6.5	Networks with Triggered Batch Movements	118
7	Appendix	121
7.1	Time Reversed Processes	121
7.2	Symmetric Functions	122
	Bibliography	125
	Index	137

Queueing Networks with Discrete Time Scale
Explicit Expressions for the Steady State Behavior of
Discrete Time Stochastic Networks

Daduna, H.

2001, X, 142 p., Softcover

ISBN: 978-3-540-42357-7