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Analysis of Closed Unreliable Queueing Networks with Batch Movements of Customers

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Closed unreliable queueing network with batch movements is considered. The main result of the paper is the steady state distribution for given type queueing networks.

Key words: queueing networks, unreliable server, batch movements of customers, analysis of queueing networks.

References

1. Morrison J. A. Two discrete-time queues in tandem. *IEEE Trans. Commun.*, 1979, vol. 27, no. 3, pp. 563–573.
2. Boxma O., Kelly F., Konheim A. The product form for sojourn time distributions in cyclic exponential queues. *J. of ACM.*, 1984, vol. 31, pp. 128–133.
3. Neely M. J. Exact queueing analysis of discrete time tandems with arbitrary arrival processes. *IEEE Proc. of the Intern. Conf. of Commun.*, Paris, 20-24 June 2004, pp. 1–5.
4. Pestien V., Ramakrishnan S. Monotonicity and asymptotic queue-length distribution in discrete-time networks. *Queueing Systems*, 2002, vol. 40, pp. 313–331.
5. Henderson W., Taylor P. G. Product form in networks of queues with batch arrivals and batch services. *Queueing Systems*, 1990, vol. 6, pp. 71–88.
6. Henderson W., Taylor P. G. Some new results on queueing networks with batch movement. *J. Appl. Prob.*, 1991, vol. 28, pp. 409–421.
7. Henderson W., Pearce C. E. M., Taylor P. G., van Dijk N. M. Closed queueing networks with batch services. *Queueing Systems*, 1990, vol. 6, pp. 59–70.
8. Henderson W., Northcote B. S., Taylor P. G. Triggered batch movement in queueing networks. *Queueing Systems*, 1995, vol. 21, pp. 125–141.
9. Woodward M. E. Towards the accurate modelling of high-speed communication networks with product-form discrete-time networks of queues. *Computer Communications*, 1998, vol. 21, pp. 1530–1543.
10. Mitrophanov Yu. I., Rogachko E. S., Stankevich E. P. Analysis of heterogeneous queueing networks with batch movements of customers. *Izv. Sarat. Univ. (N. S.), Ser. Math. Mech. Inform.*, 2011, vol. 11, iss. 3, pt. 1, pp. 41–46 (in Russian).
11. Bakeva V., Kolev N. Minimization of the blocking time of the unreliable $Geo/G_d/1$ queueing system. *Math. Commun.*, 1999, vol. 4, pp. 1–10.
12. Liu Z., Gao S. Reliability indices of a $Geo/G/1/1$ Erlang loss system with active breakdowns under Bernoulli schedule. *Int. J. of Manag. Sci. and Eng. Manag.*, 2010, vol. 5(6), pp. 433–438.
13. Malchin C., Daduna H. Discrete time queueing networks with product form steady state. Availability and performance analysis in an integrated model. *Queueing Systems*, 2010, vol. 65, no. 4, pp. 385–421.
14. Vinod B., Altiock T. Approximating unreliable queueing networks under the assumption of exponentiality. *J. Opl. Res. Soc.*, 1986, vol. 37, no. 3, pp. 309–316.
15. Mitrophanov Yu. I., Rogachko E. S., Stankevich E. P. A method for analysis of queueing networks with batch movements of customers. *Comp. Nauki i Inf. Tech. : Mater. Mejdun. Nauch. Conf.* Saratov, 2009, pp. 142–145 (in Russian).
16. Boucherie R. J., van Dijk N. M. Product forms for queueing networks with state-dependent multiple job transitions. *Adv. Appl. Probab.*, 1991, vol. 23, no. 1, pp. 152–187.