A batch arrival queueing system with impatient customers

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ABSTRACT

In this talk, we consider a batch arrival $M^X/G/1$ queue with impatient customers. Each arriving customer enters the system, but is only willing to wait in the queue for a fixed time. A customer who waits for the fixed time without his service having begun leaves the system and becomes a lost customer. A basic measure for the quality of service in such a system is loss probability at steady state, i.e., the long-run fraction of customers who are lost.

Boots and Tijms [1] and Tijms [2] mentioned that the loss probability is expressed in terms of the stationary waiting time distribution for the standard $M^X/G/1$ queue with no impatience, but no proof was given. In this talk, we provide the proof for the assertion of Boots and Tijms [1] and Tijms [2]. But this formula for the loss probability is only applicable when the offered load ρ is less than 1, because this formula involves the stationary waiting time distribution of a customer in the corresponding queueing system with no impatience. We give a formula for the loss probability applicable for any values of $\rho > 0$, by proving that the loss probability is analytic in ρ on $(0, \infty)$.

REFERENCES

1. Boots, N.K. and Tijms, H.C., "A multiserver queueing system with impatient customers", *Management Science*, Vol. 45, 1999, pp. 444-448.
2. Tijms, H.C., *A First Course in Stochastic Models*, John Wiley & Sons, 2003.