

Simulation of finite-source retrial queuing systems with collisions, non-reliable server and impatient customers in the orbit

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Abstract

The goal of the paper is to study a M/M/1//N finite-source retrial queuing system with collisions and customers' impatient behavior in the orbit. The server is not reliable, breakdown can happen either in busy or in idle states. If an incoming customer (either from the orbit or from the source) finds the server busy causes a collision and both requests - including the customer which is under service - are directed toward the orbit. It is assumed that every request in the source is eligible to generate customers whenever the server is not working but these requests immediately get into the orbit. A customer after some waiting for the server to be served can depart from the orbit without fulfilling its service requirement these are the so-called impatient customers. In that case it goes back to the source. All random variables involved in the model construction are supposed to be independent of each other. The novelty of the investigation is to carry out a sensitivity analysis comparing various distributions of impatient time of customers on the performance measures such as mean number of customers in the orbit, mean waiting time of an arbitrary customer, mean waiting time of customers who leave the system without service, probability of abandonment, server utilization, etc. By the use of a self-developed simulation program several graphical results and comparisons of the investigated systems are illustrated.

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