

Asymptotic waiting time analysis of finite source $M/GI/1$ retrial queueing systems with conflicts and unreliable server

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Abstract. The goal of the present paper is to analyze the steady-state distribution of the waiting time in a finite source $M/G/1$ retrial queueing system where conflicts may happen and the server is unreliable. An asymptotic method is used when the number of source N tends to infinity, the arrival intensity from the sources, the intensity of repeated calls tend to zero, while service intensity, breakdown intensity, recovery intensity are fixed. It is proved that the limiting steady-state probability distribution of the number of transitions/retrials of a customer into the orbit is geometric, and the waiting time of a customer is generalized exponentially distributed. The average total service time of a customer is also determined. Our new contribution to this topic is the inclusion of breakdown and recovery of the server. Prelimit distributions obtained by means of stochastic simulation are compared to the asymptotic ones and several numerical examples illustrate the power of the proposed asymptotic approach.

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