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## Analysis of the M/G/1/0 queueing system under LCFS PR discipline with repeated and negative customers

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**ABSTRACT**

We consider a single server queueing system with repeated attempts in which two different type of customers, positive and negative, arrive according to independent Poisson flows. The arrival of a negative customer has the effect of deleting some customer in the system. In our case we adopt the *killing strategy* RCH, i.e., the removal of the customer in service, if any. The positive customers arrive to the system with LCFS PR discipline where the customer currently being served is replaced immediately upon the arrival of a positive customer and joins a group of repeated customers called *orbit* in order to reinitiate his request after some random time. We assume a general service time distribution and an exponential distribution for the reattempt times. We consider two cases where the maximum number of repeated customers waiting in the orbit to seek service again is limited by $s$ $(2 < s < \infty)$ or can be unlimited $(s = \infty)$. In the finite case a positive customer who finds $s$ customers in the orbit is lost. We derive the steady state probabilities of underlying Markov linear process and also the stationary distribution for the embedded Markov chain at service completion moments. It is proved that the stationary distribution of total number of customers in the system considered at arbitrary time moments and at service completion times, respectively, are identical.

**Keywords:** *Queueing system, repeated attempts, negative customer, Markov process, embedded Markov chain*

**Mathematics Subject Classification:** *60K25*

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