

Analysis of the Unreliable M/G/1 Retrial Queue with Impatient Customers and Server Vacation

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Abstract : Retrial queueing systems have been extensively used to stochastically model many problems arising in computer networks, telecommunication, telephone systems, among others. In this work, we consider a $M/G/1$ retrial queue with an unreliable server with random vacations and two types of primary customers, persistent and impatient. This model involves the unreliability of the server, which can be subject to physical breakdowns and takes into account the correctives maintenances for restoring the service when a failure occurs. On the other hand, we consider random vacations, which can model the preventives maintenances for improving system performances and preventing breakdowns. We give the necessary and sufficient stability condition of the system. Then, we obtain the joint probability distribution of the server state and the number of customers in orbit and derive the more useful performance measures analytically. Moreover, we also analyze the busy period of the system. Finally, we derive the stability condition and the generating function of the stationary distribution of the number of customers in the system when there is no vacations and impatient customers, and when there is no vacations, server failures and impatient customers.

Keywords : modeling, retrial queue, unreliable server, vacation, stochastic analysis

Conference Title : ICM 2019 : International Conference on Mathematics

Conference Location : Dublin, Ireland

Conference Dates : August 15-16, 2019