

REDUCING CUSTOMER ABANDONMENT THROUGH THE CHARACTERISTIC FUNCTION OF TWO QUEUEING GAMES WITH EXPONENTIAL RENEGING

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Customer abandonment, also known as renegeing, is a major problem for queueing systems. A high amount of renegeing in a queueing system leads to reduced goodwill for the system. Queueing systems therefore aim to reduce renegeing. Renegeing is therefore modeled as a cost on the queueing system. In this paper, we propose a cooperative game theoretic approach to solve the problem of renegeing in queueing systems with Poisson arrival, exponential service times and exponential renegeing. We define two aggregation principles. These two aggregation principles give us two types of cooperative games. We consider the characteristic function as the average renegeing rate in both games. We establish an inequality between the values of the characteristic functions of the two games. Subadditivity of the games is explored using random sampling. Furthermore, a differential evolution algorithm is used to find the non-emptiness of the core in both games. Finally, we use numerical illustrations to demonstrate the cost reduction that can be achieved using the two different aggregation principles. The nucleolus is used for distributing the cost of the grand coalition. The cost of renegeing for each player in game one is compared with the cost for that player in game two.

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