DECAY PROPERTIES OF MARKOVIAN QUEUES WITH BATCH ARRIVALS

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Abstract: We consider the decay parameter, invariant measures and quasi-stationary distributions for a modified queueing model which stops when the queueing system is empty. Investigating such model is crucial in realizing the busy period and some other related properties of the Markovian bulk-arriving queue. In this paper, the exact value of the decay parameter λ_C of such model is obtained. We show that it can be easily expressed explicitly. The invariant measures and quasi-distributions of such processes are then considered. We show that there exists a family of invariant measures indexed by $\lambda \in [0, \lambda_C]$. We then show that under some conditions, there exists a family of, also indexed by $\lambda \in [0, \lambda_C]$, quasi-stationary distributions. The generating functions of these invariant measures and quasi-stationary distributions are presented. We further show that this modified queueing model is always λ_C-transient and some deep properties are revealed. The clear geometric interpretation of the decay parameter is explained. A few examples are then provided to illustrate the results obtained in this paper.