



## Strong Stability and Truncation in the Performance Evaluation of a Queuing Model

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### Abstract

Queueing theory and the development of telecommunication systems have a strong link. The first queueing theoretic models were developed by A. K. Erlang for the modeling of telephone systems. After this many researches were devoted to the analysis of queueing systems and their applications. The determination of the steady state for all possible states of the system is the basis for evaluate the performance of this system. But sometimes the direct and exact solution of stationary probabilities is not always obvious like networks which do not have product form.

Several approximation methods are introduced in the literature. the truncation method is one of them [1, 2, 3]. This method consists in approximating a Markov chain with infinite space of state by a Markov chain with finite space of state using several truncation techniques such as linear increase, and renormalization.

In this work, we apply a truncation method on the overflow model and we obtain the error bounds using the strong stability method and make a comparative study with simulation results.

The over flow model is a network with two service stations: the primary station consists of a single server without queue. A customer who arrives and finds the server free is immediately served, else, it is directed to the secondary station formed as a single server. If the latter is free, the customer is supported, else, it takes place in an infinite queue. The overflow model can be used to model the diff-serv technique proposed to characterize the traffic in the form of classes and abandon integrated-service technology that processes the traffic like a flow.

**Keywords:** Overflow queueing system, Markov chain, truncation, strong stability.

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