STOCHASTIC BOUNDS ON PERFORMANCE OF FINITE CAPACITY QUEUES IN TANDEM

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We are interested in the performance evaluation of tandem networks in discrete time. We consider \( m \) queues in series with finite buffers, all initially empty, independent batch arrivals at the first queue and constant service times. The distribution of the arriving batches comes from some measurements on real networks. Using some stochastic comparison techniques and the theorem on interchangeability of queues by Friedman, we prove stochastic bounds on the performance of a tandem network. More precisely, we analyze the end to end delays, the loss rates for the network and the queue lengths. We first establish stochastic comparison results for the network when we change the service capacity or the buffer size. The relevance of the approach is to define bounding systems easier to analyze, obtained from the modification of the exact system. The results are compared with simulation, numerical analysis and a traditional decomposition approach. The guarantee on the quality of service is obviously the main contribution of this work.