ROBUSTNESS IN QUEUEING SYSTEMS

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We study the robustness of performance measures in a $Geo/Geo/1/L$ queue, when the probabilities of arrival and departure are no longer fixed, but are allowed to vary within given probability intervals. We distinguish between two different approaches. In the first approach, we assume the existence of a time-homogeneous probability for arrival and a respective one for departure, which leads us to consider a collection of stationary queues. The second approach is a fairly new one and is inspired by the theory of imprecise probabilities. We drop the assumption of stationarity and we allow the arrival and departure probabilities to differ from time point to time point; they may even depend on the complete history of queue lengths. We describe how tight bounds on various performance measures can be computed on each approach and then present some experimental work. In particular, we calculate bounds on the expected queue length, the probability of any queue length and the probability of turning on the server. For the expected queue length both approaches coincide. For the other performance measures, we observe and discuss various differences between the bounds obtained by these two approaches.