STABILITY ANALYSIS OF RETRIAL SYSTEMS WITH CONSTANT RETRIAL RATES

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In this work, we first review recent results concerning a finite buffer queueing system with $c \geq 1$ servers, where a blocked job joins the orbit working as a FCFS queue with exponential time between the attempts to enter the servers. This system is motivated by telephone exchange systems, medium access protocols, optical networks with near-zero buffering, TCP short-file transfers. For such a system, we present a sufficient stability condition which is analytically available in some important new cases. Some simulation results demonstrating the tightness of obtained stability condition are given as well.

Then we consider a new single-server bufferless retrial queueing system with N Poisson inputs, motivated by multiple telecommunication applications, where a class-i blocked job joins orbit i which works like a single-server FCFS queueing system with (exponential) retrial times. We present some analytical results of the performance analysis of such a system. Then we analyze the stability of such a system, and find a set of necessary stability conditions. The main new contribution of this work is that we prove that these conditions are also sufficient stability conditions for a wide class of service time distributions. We note that the obtained stability conditions have a clear probabilistic interpretation, and that the regenerative approach is the key tool for this type of stability analysis.

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