Proceedings of the 1983
Winter Simulation Conference
S. Roberts, J. Banks, B. Schmeiser (eds.)

THE TRANSIENT BEHAVIOR OF CERTAIN MULTISERVER QUEUES, WITH SIMULATION APPLICATIONS

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RESEARCH SUMMARY

Although the transient behavior of a queueing system is often of interest, available analytical results are often quite restricted or are very complicated. We consider a queueing model with Poisson arrivals, FIFO queueing discipline, s ($s \geq 1$) parallel servers with independent and identically distributed exponential service times, and an arbitrary number of customers present at time zero. Probabilities in a relatively simple closed form are obtained which allow the exact evaluation of several measures of system performance, among them the expected delay in queue of each arriving customer. A numerical examination is carried out to see how the choice of initial condition affects the nature of convergence of the expected delays to their steady-state values. These results have implications for the initialization of steady-state simulations. Extensions to other queueing models (single server, Poisson input, Erlang service, arbitrary initialization) are also discussed.

REFERENCE

Kelton WD, Law AM (1982), The Transient Behavior of Certain Multiserver Queues, with Simulation Applications, Working Paper WS-8203, Dept. of Administrative Sciences, Kent State University.