

Discrete Time Transient Solution of M/G/1 Queueing System

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ABSTRACT

An attempt has been made in this paper to obtain a discrete time transient solution of M/G/1 Queueing system. Choudhary, Kapur et al (1993) have set a new trend in the numerical computations of models in queue through the technique of using roots, closed form solutions as well as exact computation results are obtained by this approach. Takac's (1962) gives two solutions for M/M/1/ ∞ neither of which is easy to compute. The first solution is in terms of integrals where as the second involves an infinite sum of Bessel functions. The solution becomes a bit simpler if the waiting space is finite which may be true in many application. Standard numerical packages are used to obtain eigen values of matrices which are difficult to obtain when the matrices are large and as a result computational difficulties Chaudhary et al (1991) have made attempt to obtain similar results in discrete time for finite waiting space problems in queueing theory since the transient solution depends on the initial state of the system, it is interesting to know the effect on the system behaviour. Kobayashi (1983) has discussed the several system which operate at discrete time of a processor and several other examples in computer. Chaudhary et al (1991) give the transient solution for general class of discrete time models in queueing theory. Explicit closed form expression for distributions has been obtained in terms of the root of a characteristics equation. To find the eigen values or characteristic roots they make use of QROOT SOFTWARE packages which is developed at Royal Military College at Canada by Chaudhary (1992).

Kapur, Garg, Sehgal & Mishra (1996) have obtained a discrete time transient solution for the first passage time distribution under arbitrary initial conditions and finite waiting space. Further they worked on numerical computation of discrete time multi-server queue with balking and renegging. Although the continuous time models are particular cases of discrete time models, this area of research has remained neglected.

Key Words : Queueing system, eigen values, queueing theory, cases of discrete time.