



**A COMPARISON BETWEEN $M/M/1$ AND $M/D/1$ USING MODELS OF QUEUING
DELAY**

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ABSTRACT

In order to compute the average total delays or average waiting time of arrival which includes queue and service time with utilization values of less than 1, this paper aims at comparing $M/M/1$ and $M/D/1$ queue. It was observed that waiting times and average queue sizes differ in these two models. It has also been displayed that in the limiting case, the obtained results of this paper are in accordance with the corresponding continuous time counterparts by Medhi [1].

**Keywords: Queuing delay, queuing networks, random service time, deterministic
(constant) service time**

INTRODUCTION

Queuing theory studies queues that are abundant in real circumstances. Anyone has experienced the irritation of having to wait in a line. Queuing theory can be applied in apparently dissimilar fields such as traffic control, post office, boarding a bus, plane or train or even waiting for a computer in the class. Therefore, it is a significant issue to be considered and comprehended by engineers. Medhi [1] has reported distribution of the number of customers served during a busy period in continuous time of $M/M/1$ and $M/D/1$ queues. Queuing literature usually discusses the $M/D/1$ queuing system (See

Bunday [2], Kashyap [7], Bhat [3] and etc.). This system considers a Poisson arrivals, single server and deterministic or constant service time. In the literature of queuing systems, one also finds systems similar to this one including $D/M/1$ and $D/D/1$. The server is assumed to be always accessible in all these systems. However, if the server is a human, he may leave the system from time to time or if the server is mechanical or electronic.

Management policies of either arrival first (AF) or departure first (DF) arranged the order of arriving and departure. These