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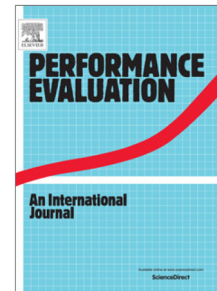
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# Approximation of discrete time tandem queueing networks with unreliable servers and blocking

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## Abstract

We consider the discrete time tandem queues with single unreliable server at each service station and a buffer of finite capacity between service stations. The blocking after service (BAS) mechanism and operation dependent failure (ODF) rule are adopted. The service time of each server is a constant unit time. A failure of each server occurs in a time slot with a fixed probability and the repair time distribution of each server is of discrete phase type. In this paper, we present an approximate analysis for the system based on the decomposition method and show that the approach can be applied to the variants of the system.

*Keywords:* discrete time tandem queue, discrete phase type distribution, decomposition, finite buffers, unreliable servers, blocking

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## 1. Introduction

Consider an automated production system such that machines are linked along a single flow path one after another and materials or parts are processed individually along the line. This type of serial production system is called transfer line. Transfer lines have the following features. Machines are unreliable and there is a buffer of finite capacity between machines and hence blocking and starvation can occur. Several blocking mechanisms such as blocking-after-service

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