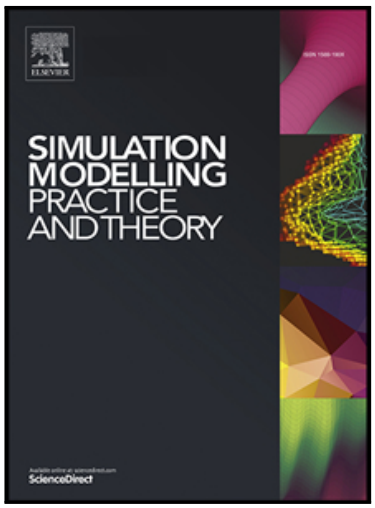

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On the Evaluation of AGVS-based Warehouse Operation Performance

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Abstract

An automated guided vehicle system (AGVS) is an advanced material handling system widely used in various automated systems, particularly in e-commerce warehouses. The warehouse operation performance, mainly focusing on transportation efficiency, is affected by many factors, such as traffic-control policies and warehouse layouts. Based on the digraph theory and real-time control, two effective traffic-control policies with polynomial-time complexity are proposed to avoid the collision and to solve deadlocks. To accommodate more complicated situations, different types of warehouse layouts are tested. Extensive simulations are carried out to study the effects of policies, warehouse layouts, task densities and timing of an AGV to apply for a resource on the evaluation of the AGVS-based warehouse operation performance, which provide guidelines for warehouse designers.

Keywords: AGVS, Deadlock, E-commerce warehouse, Simulation

1. Introduction

In manufacturing and warehousing systems, a variety of automatic systems have been adopted to transport materials and goods, such as the belt-conveyor system, automated storage and retrieval system (AS/RS), and automated guided vehicle (AGV) on fixed guide paths. With the development of e-commerce, high efficiency and accuracy in the storage and retrieval of goods

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