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An optimization model of integrated AGVs scheduling and container storage problems for automated container terminal considering uncertainty

Wentao Jian[1]* Jishuang Zhu[1] Qingcheng Zeng[2]

[1] China Waterborne Transport Research Institude, Beijing, 100088, China. jianwentao@wti.ac.cn; zhujishuang@wti.ac.cn .
[2] College of Maritime Economics and Management, Dalian Maritime University, Dalian, 116026, China.
* jianwentao@wti.ac.cn；Tel:+86-18840844091.

Abstract: The running path of automated guided vehicles（AGVs）in the automated terminal is affected by the storage location of containers, and the running time caused by congestion, deadlock and other problems during the driving process is uncertain. In this paper, considering the different AGVs congestion conditions along the path, a symmetric triangular fuzzy number is used to describe the AGVs operation time distribution, and a multi-objective scheduling optimization model is established to minimize the risk of quay cranes (QCs) delay and the shortest AGVs operation time. An improved genetic algorithm was designed to verify the effectiveness of the model and algorithm by comparing the results of the AGVs scheduling and container storage optimization model based on fixed congestion coefficient under different example sizes. The results show that considering the AGVs task allocation and container storage location allocation optimization scheme with uncertain running time can reduce the delay risk of QCs, reduce the maximum completion time, and have important significance for improving the loading and unloading efficiency of the automated terminal.

Keywords: AGVs scheduling; Container storage; Running time uncertainty; Risk of delay.

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