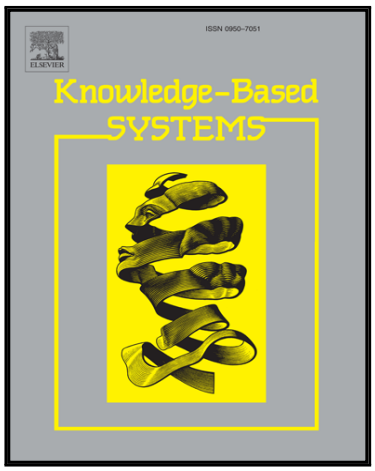


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# A Novel Hybrid Multi-Objective Artificial Bee Colony Algorithm for Blocking Lot-Streaming Flow Shop Scheduling Problems

Dunwei Gong[a,b], Yuyan Han[c,*], Jianyong Sun[d]

[a] *School of Information and Control Engineering, China University of Mining and Technology, Xuzhou,221116, China*

[b] *School of Information Science and Technology, Qingdao University of Science and Technology, Qingdao, 266061, China*

[c] *School of Computer Science, Liaocheng University, Liaocheng, 252059, China*

[d] *School of Mathematics and Statistics, Xian Jiaotong University, Xian,710049, China*

**Abstract**

A blocking lot-streaming flow shop (BLSFS) scheduling problem is to schedule a number of jobs on more than one machine, where each job is split into a number of sublots while no intermediate buffers exist between adjacent machines. The BLSFS scheduling problem roots from traditional job shop scheduling problems but with additional constraints. It is more difficult to be solved than traditional job shop scheduling problems, yet very popular in real-world applications, and research on the problem has been in its infancy to date. This paper presents a hybrid multi-objective discrete artificial bee colony (HDABC) algorithm for the BLSFS scheduling problem with two conflicting criteria: the makespan and the earliness time. The main contributions of this paper include: (1) developing an initialization approach using a prior knowledge which can produce a number of promising solutions, (2) proposing two crossover operators by taking advantage of valuable information extracted from all the non-dominated solutions in the current population, and (3) presenting an efficient Pareto local search operator based on the Pareto dominance relation. The proposed algorithm is empirically compared with four state-of-the-art multi-objective evolutionary algorithms on 18 test subsets of the BLSFS scheduling problem. The experimental results show that the proposed algorithm significantly outperforms the compared ones in terms of several widely-used performance metrics.



*Keywords:* Scheduling, blocking lot-streaming flow shop, multi-objective optimization, artificial bee colony algorithm, Pareto local search.

## 1. Introduction

Scheduling is to optimally arrange limited resources (such as machines in a shop and processing units in a computing environment) to complete tasks with respect to one or more objectives (Li et al., 2008). In literature, flow shop

*Corresponding author. Tel.:+86516 83995312;fax:+86516 83995312

*Email addresses:* dwgong@vip.163.com (Dunwei Gong[a,b]), yuyanhan1023@163.com (Yuyan Han[c,]), jy.sun@xjtu.edu.cn (Jianyong Sun[d])