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Dawei Li, Xiwen Lu

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Two-agent parallel-machine scheduling with rejection <sup>☆</sup>

Dawei Li, Xiwen Lu\*

*School of Science, East China University of Science and Technology, Shanghai 200237, China.*

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**Abstract**

We study the two-agent scheduling with rejection on two parallel machines. There are two competing agents  $A$  and  $B$  with job families  $\mathcal{J}^A$  and  $\mathcal{J}^B$ , respectively. A job in  $\mathcal{J}^A$  or  $\mathcal{J}^B$  is either rejected, in which case a rejection penalty will be incurred, or accepted and processed on one of the two parallel machines. The objective is to minimize the sum of the given objective function  $f^A$  of the accepted  $A$ -jobs and the total rejection penalty of the rejected  $A$ -jobs subject to an upper bound on the sum of the given objective function  $f^B$  of the accepted  $B$ -jobs and the total rejection penalty of the rejected  $B$ -jobs, where  $f^A$  and  $f^B$  are non-decreasing functions on the completion time of the accepted  $A$ -jobs and accepted  $B$ -jobs, respectively. We consider four scheduling problems associated with different combinations of the two agents' objective functions,  $f^A = \sum C_j^A$  and  $f^B \in \{C_{max}^B, L_{max}, \sum C_j^B, \sum w_j^B U_j^B\}$ . When  $(f^A, f^B) = (\sum C_j^A, C_{max}^B)$ , we provide two pseudo-polynomial time algorithms and a fully polynomial-time approximation scheme (*FPTAS*). For the other problems, we give a pseudo-polynomial time algorithm, respectively.

*Keywords:* agent scheduling, parallel machines, rejection, pseudo-polynomial time algorithm, *FPTAS*

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\*Corresponding author

*Email address:* xwlu@ecust.edu.cn (X.Lu) (Xiwen Lu)

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