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On single-machine scheduling with workload-dependent maintenance duration

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Abstract

In this paper, we consider a single-machine scheduling problem with workload-dependent maintenance duration. The objective is to minimize the total weighted completion time. For the case where the maintenance duration is an arbitrarily non-decreasing function on the workload, we propose a $(2 + \varepsilon)$ -approximation algorithm and a fully polynomial time approximation scheme, which extends the previous results presented by Xu et al. [Xu, D., Wan, L., Liu, A., & Yang, D-L. (2015). Single machine total completion time scheduling problem with workload-dependent maintenance duration. *Omega*, 52, 101-106]

Keywords. Scheduling; Maintenance; Workload; Approximation scheme

1 Introduction

Scheduling with machine maintenance has been extensively investigated in recent years. According to the maintenance duration, research literatures in this area can be classified into two classes, i.e., the fixed maintenance duration and the variable maintenance duration. For the fixed maintenance duration, it is assumed that the duration of a maintenance activity is a fixed time length. There are so many research articles which contribute [this topic](#). We refer the readers to the latest survey paper [8]. For the variable maintenance duration, Kubzin and Strusevich [3] were the first [pioneers](#) that considered the scheduling problems with variable maintenance duration. They investigated the makespan minimization problem in a two-machine flow shop and a two-machine open shop. They showed that the open shop problem is polynomially solvable for quite general functions defining the maintenance duration while the flow shop problem is binary NP-hard and pseudo-polynomially solvable by dynamic programming. Furthermore, they presented a fully polynomial time approximation

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