عنوان مقاله:

Energy-Conscious Common Operation Scheduling in an Identical Parallel Machine Environment

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خلاصه مقاله:

The relentless growth of global energy consumption poses a multitude of complex challenges, including the depletion of finite energy resources and the exacerbation of greenhouse gas emissions, which contribute to climate change. In the face of these pressing environmental concerns, the manufacturing sector, a significant energy consumer, is under immense pressure to adopt sustainable practices. The critical intersection of energy consumption management and production operation scheduling emerges as a pivotal domain for addressing these challenges. The scheduling of common operations, exemplified by the cutting stock problem in industries like furniture and apparel, represents a prevalent challenge in production environments. For the first time, this paper pioneers an investigation into an identical parallel machine scheduling problem, taking into account common operations to minimize total energy consumption and total completion time concurrently. For this purpose, two bi-objective mixed integer linear programming models are presented, and an augmented ε - constraint method is used to obtain the Pareto optimal front for small-scale instances. Considering the NP-hardness of this problem, a non-dominated sorting genetic algorithm (NSGA-II) and a hybrid non-dominated sorting genetic algorithm with particle swarm optimization (HNSGAII-PSO) are developed to solve medium- and large-scale instances to achieve good approximate Pareto fronts. The performance of the proposed algorithms is assessed by conducting computational experiments on test problems. The results demonstrate that the proposed HNSGAII-PSO performs better than the suggested NSGA-II in solving the test problems.

کلمات کلیدی:

Bi-objective mixed integer linear programming, Identical Parallel Machine Scheduling Common Operation, Total energy consumption, Total completion time

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