Exact and Heuristic Algorithms for the Nonidentical Parallel Machines with Minimum Makespan Measure

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This paper describes nonidentical parallel machine scheduling problems with makespan measure. In general, the problem cannot be solved within polynomial time complexity. This paper considers special problems with a given amount of jobs of common processing time on uniform parallel machines. The objective is to find the optimal job assignment or batching of the nonpreemptive uniform machines, where all the jobs are available at time zero and a batch setup time is involved. For the problem, a lower bound and optimal solution properties are derived. Based upon these properties, a polynomial algorithm is suggested to find the optimal job assignment which minimizes makespan on the machines. And three generalized problems are considered as following situations : (1) some machines have capacity restrictions on a production batch, (2) each machine has its ready time, and (3) the jobs requires series-parallel operations. The generalized problems are also characterized each other for the same aim of optimal job assignment or batching.