

ADAPTIVE GENETIC ALGORITHMS FOR MULTI-RESOURCE CONSTRAINED PROJECT SCHEDULING PROBLEM WITH MULTIPLE MODES

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ABSTRACT. *In modern manufacturing systems like multi-resource constrained project scheduling problem with the multiple modes (mcPSP-mM) is complicated because of the complex interrelationships between the units of the different stages. In this paper, we develop an adaptive genetic algorithm (aGA) to solve the mcPSP-mM which is a well known NP-hard problem. A new aGA algorithm approach for solving these mcPSP-mM problems is 1) the design of priority-based encoding for activity priority and multistage-based encoding for activity mode, 2) order-based crossover operator for activity priority and local search-based mutation operator for activity mode, 3) iterative hill-climbing method in GA loop, 4) auto-tuning for the rates of crossover and mutation operators. The numerical experiments show that the proposed aGA is effective to the mcPSP-mM.*

Keywords: Multi-resource constrained, Project scheduling problem, Multiple modes, Adaptive genetic algorithm

1. Introduction. Recently, manufacturers tend to handle many real-life project scheduling characteristics such as time-varying resource requirements and availabilities, activity ready time, due dates and deadline, activity overlaps, activity start time constraints and other type of temporal constraints. The multi-resource constrained project scheduling problem with multiple modes (mcPSP-mM) with precedence subsumes the activity shop, flow shop, assembly line balancing, and related scheduling problem, we consider the special versions as follows: 1) the mcPSP-mM consists of a number of activities with known