

## 基于模拟植物生长算法的异速并行机调度 ——以汽车4S店维修车间瓶颈环节调度为例

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### Scheduling of machines in parallel with different speeds based on plant growth simulation algorithm —— Taking an example of the bottleneck in 4S auto dealership maintenance shop

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**摘要** 汽车4S店维修车间的钣喷设备是整个维修服务系统的瓶颈, 通过对瓶颈的合理调度可以有效地提升系统效率. 首先, 用三元组 $\alpha/\beta/\gamma$ 方法, 将该问题描述为受准备时间和机器适用约束限制的, 以最小化加权滞后时间和为目标的异速并行机调度问题, 建立了对应的数学模型. 接着, 采用模拟植物生长算法求解此类调度问题, 提出了与问题相适应的生长点表示方法和迭代方法. 最后, 通过实例仿真简要分析了模型及算法的可行性和有效性.

**关键词:** 模拟植物生长算法 异速并行机 调度 瓶颈环节

**Abstract:** The sheet-spraying equipment in the 4S auto dealership maintenance shop is the bottleneck in the whole repair service system. It can improve the efficiency of system effectively by making a reasonable scheduling for the bottleneck. Firstly, with the method of triple  $\alpha/\beta/\gamma$ , the bottleneck scheduling problem is regarded as parallel machines scheduling problem with different speed. It has constraint limits of set-up times and machine apply. And its goal is to minimize the total weight tardiness. Then the model was constructed. Secondly, plant growth simulation algorithm was an available solution to this scheduling problem. The growing point representation and iterative method, which corresponded to this scheduling problem, was proposed. Finally, presented examples prove the feasibility and effectiveness of the algorithm.

**Key words:** plant growth simulation algorithm machines in parallel with different speeds scheduling bottleneck

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