應用群聚技術求解製造單元形成問題

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摘 要

單元製造系統（cellular manufacturing system），為群組技術（group technology）之應用，近幾年來由於其可簡化生產流程、降低整備時間、減少物料處理，減少品質問題等優點，因此廣泛的受到專家學者的研究與探討。由於它具有NP-Complete特性，因此對於大型問題，欲在可接受的時間內求得最佳解相當困難，故一般皆以啟發式演算法求得近似最佳解。 本研究以模擬退火法（simulated annealing）來求解兩類型之單元形成問題，一為標準單元形成問題，另一類為考量多途程之單元形成問題。在零件分群問題上，本研究依據Jaccard相似係數提出另一個新的零件相似度指標並於解的改善階段，除保有全鄰域移步方式外，再結合群聚邏輯的觀念，結合兩種改善移步機制，以節省求解時間。在問題的目標函數上，本研究採用近年來在單元形成問題上，普遍受到一般學者所使用的績效指標－群組效力（group efficacy）做為上述兩類型之單元形成問題的目標函數。群組效力能夠同時考量例外元素最小化與單元內使用率最大化兩個在單元形成問題上最實際也最重要之目標，使得本研究之結果更符合現實。 本研究以文獻中之例題測試標準單元形成問題與考量多目標之單元形成問題，研究結果顯示，所有例題之演算結果均優於或等於其他學者之結果。可證明本研究所提出之演算法有不錯之表現。

關鍵詞 : 群組技術 ; 單元形成 ; 模擬退火法 ; 群組效力

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