應用多目標混合基因演算法整合組裝規劃與線平衡之研究

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摘 要

變異瀕繁的製造環境中，產品組裝系統為了快速回應顧客的需求，其中組裝規劃與組裝線設計在產品生命週期中扮演著關鍵性角色。因此本研究在同步工程的概念驅使下，同時考量組裝規劃以及組裝線設計的問題，期望發展出因應客製化環境的彈性組裝系統。組裝規劃方面，本研究著重組裝順序規劃，以組裝工具變換耗時函數與組裝方向耗時函數做為評估準則；組裝線設計方面，則導入Equal Piles組裝線設計的策略，此方式有別於傳統組裝線平衡規劃，以系統的不均衡狀態做為評估準則。本研究將以上述三個有關組裝時間成本的準則做為彈性組裝系統的績效評估，此為一個多目標最佳化問題，因此本研究提出一個多目標基因規劃方式做為求解工具，其結果可提供一群客觀與正確的柏拉圖最佳解輔助決策者的規劃，此方式結合了進化式多目標最佳化演算法、集群基因演算法以及序列型基因演算法的特色，本研究稱之為多目標混合基因演算法。本研究並提供決策者一個決策分析模式，以選擇符合其偏好的柏拉圖最佳解。最後以範例來測試演算法的效率與績效，測試結果顯示多目標混合基因演算法能夠有效地找出柏拉圖最佳解集合，且能夠提供彈性組裝系統未來設計變更的依據。

關鍵詞 : 組裝規劃 ; 組裝線平衡 ; 進化式多目標最佳化演算法 ; 集群基因演算法 ; 混合基因演算法 ; 多目標最佳化

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