厚複材積層平板製程模擬分析與參數最佳化

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摘 要

本研究針對整個成化過程中製程參數進行模擬，發現在厚層板中央均有些許的積溫現象，而其中層板的固化程度皆可接近完全固化，在壓力方面，隨著溫度逐漸上升，黏滯係數值的改變，造成整體壓力由樹脂轉為纖維承受，以達到成化過程完全反應。 傳統的熱固性預浸式複合材料，在製造過程中，其層板中央容易發生積溫、固化程度不均或固化不完全的現象，並造成內、外部溫度差異加大，在持續加熱與固定加壓的製造程序下，層板內部樹脂所承受的壓力分布、層板厚度與整個固化程度會隨著溫度上升而變化，造成複合材料層板因內外溫差過大而內部品質的不穩定性。 預浸式複合材料在整個成化過程中，溫度、壓力、與固化程度會隨著時間而變化，本計劃利用熱傳導公式，加上利用電腦商業軟體MATLAB進行模擬，與有限元素之ANSYS進行溫度解比較，並使用數值方法中的Finite-Difference Method中的Crank-Nicholson以求得(a)材料厚度與時間之關係、(b)溫度分布與時間之關係，(c)以及時間與中央層板的固化程度，所求得之初始參數再利用基因演算法進行最佳化設計。

關鍵詞 : 預浸式複合材料 ; 固化過程 ; 有限元素法 ; 有限差分法 ; 基因演算法

目錄

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