具層間滑移之層間應力連續理論的積層版分析

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摘 要

由於複合材料材積層板在厚度方向上強度較差，尤其是在層 間介面上。此一強度較弱之介面，常於受力時形成脫層破壞。因 此，積層板在層與層間的層間應力，一直是設計分析時最被關注 之焦點。本研究即針對此一問題，應用層間應力連續理論，探討 積層板在可能存在介面滑移之情形下，其影響各模態共振頻率、 積層板層間的應力、層間滑移等現象，以及積層板的模態、頻率 與瑕疵所生之位置、大小及滑移嚴重性之關係，提供一以模態參 數作為積層板非破壞性檢測之方法。由於此層間應力連續理論其 位移場已滿足層間剪應力連續之條件，因此所有在此之橫向層間 剪應力分量皆可以直接由材料之組成律求得。本論文中以積層板 在不同介面滑移常數、不同角度纖維排列、不同位置產生介面滑 移下，探討共振模態頻率之改變情形。數值實例結果驗證本理論 之正確性，且介面瑕疵對較高階模態之共振頻率影響較低階模態 為大，而瑕疵在節點位置對該模態之共振頻率影響最大。

關鍵詞 : 層間應力連續理論，層間剪應力，線性介面滑移

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