Free Vibration Analysis of Laminated Plates Using A Partial Hybrid Plate Element

Yi-Ping Tseng+ and Lun-Chang Chou §

Department of Civil Engineering
Tamkang University
Taiwan 25137, R.O.C.

ABSTRACT

The free vibration analysis of orthotropic composite laminates is investigated by using the partial hybrid plate element. The Hellinger-Ressner principle is modified by adding the kinetic energy. The through thickness effect is properly predicted, since the transverse shear stress fields are assumed in hybrid stress version. The natural frequencies are therefore accurately evaluated. The accuracy and efficiency of the present formulation is validated via problems with available exact solutions and other finite elements. Excellent accuracy and fast convergence are observed. Apparently, the present study is more accurate than the displacement-based higher-order plate element.

Keywords : partial hybrid plate element, natural frequency
transverse shear stress

+ Associate Professor , § Graduate Student

部份應力有限元素法於積層板之自由振動分析

曾一平　　丑倫彰

～摘要～

本文乃利用部份應力模態有限元素法結合高階層板理論，進行積層板之自由振動分析，由於部份應力模態法可有效地解決位移法中積層板層間界面橫向剪應力不連續的問題，故其可得到更精確的自然振動頻率分析；經由各種不同的實例分析，並與三維彈力解及其他數值解比較，顯示了本法極佳的精確度與適用性。