Layer Reduction Techniques Using Generalized Interlaminar Stress Continuity Theory in the Analysis of Composite Laminate

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ABSTRACT

A generalized interlaminar shear stress continuity theory which accounts the continuities of interlaminar shear stresses and displacements has been formulated.Since all the continuity conditions through the thickness and surface traction conditions on the laminate surfaces are satisfied exactly,the stresses can be calculated directly from the constitutive equations.However because of the multiple-layer approach in essence and the higher order of interpolation function,the number of degrees-of-freedom employed in the theory increases rapidly comparing to the single- layer approach.In this regards, a mixed single-layer and multiple- layer approach through the thickness is included in this genera- lized interlaminar shear stress continuity theory in this study. The theory retains the advantage of calculating stresses directly from the constitutive equations without increasing enormously the computational effort.Moreover,the order of displacement interpla- tion functions used in the single-and-multiple layer approach in this theory is studied to show its influence on solution accuracy .Finally,numerical examples of the analysis on laminated beam and plate strucure are also used to demonstrate the feasibility of this technique.

Keywords : composite laminate ; interlaminar stresses ; layer reduction

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