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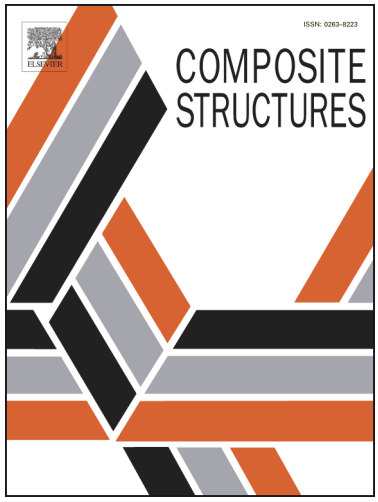

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Strong sampling surfaces formulation for laminated composite plates

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Abstract

The paper focuses on the application of the sampling surfaces (SaS) method to exact solutions of elasticity for laminated plates. The SaS method is based on choosing the arbitrary number of SaS parallel to the middle surface in order to introduce the displacements of these surfaces as basic plate unknowns. Such choice of unknowns with the use of the Lagrange polynomials in assumed approximations of displacements through the layer thicknesses leads to a compact laminated plate formulation. The feature of the proposed approach is that all SaS are located inside the layers at Chebyshev polynomial nodes. The use of outer surfaces and interfaces is avoided that makes possible to minimize uniformly the error due to the Lagrange interpolation. Therefore, the strong SaS formulation based on direct integration of the equilibrium equations of elasticity can be applied efficiently to the obtaining of 3D exact solutions for laminated plates.

Keywords: Elasticity; Exact solution; Laminated plate; Sampling surfaces method

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