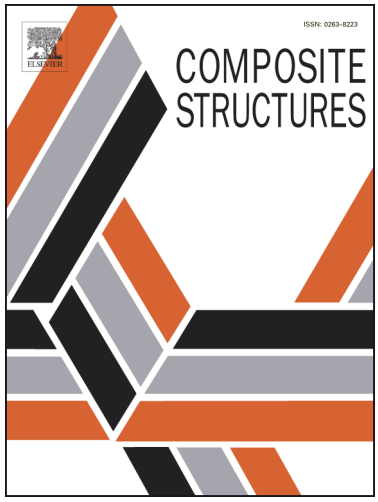

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On the Application of the Ritz Method to Free Vibration and Buckling Analysis of Highly Anisotropic Plates

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Abstract

In this paper insights are provided into the implementation and use of the Ritz method for free vibration and buckling analysis of composite plates. Focus is given on the choice of the trial functions in relation to the degree and the kind of anisotropy exhibited by the plates. The Ritz approximation is applied to models based both on the classical lamination theory and a more advanced variable-kinematic formulation, capable of dealing with several higher order plate theories within an unified framework. A very efficient computation of the Ritz integrals is proposed, which allows to handle hundreds of admissible functions. In this way, accurate upper bound solutions can be obtained even for problems where the convergence rate of the Ritz method is low due to extreme levels of anisotropy. The effect of different forms of elastic couplings, boundary conditions and amount of material anisotropy on the convergence and accuracy of the solution is investigated when different sets of admissible functions – Legendre and Chebyshev polynomials, as well as of trigonometric type – are adopted. Important remarks about the completeness and numerical efficiency of the selected basis are also provided.

Keywords: Ritz method; anisotropic plates; variable-kinematic; free-vibrations; buckling.

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