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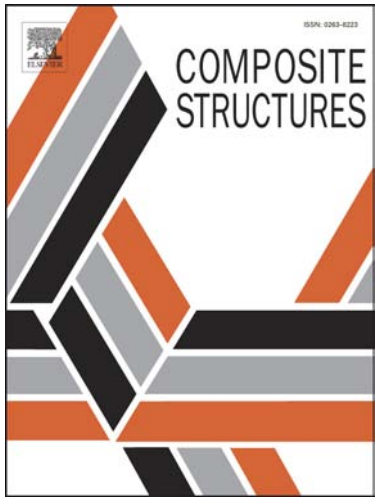

Thermo-mechanical analysis of laminated composite and sandwich beams based on a variables separation

P. Vidal, L. Gallimard, O. Polit

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Thermo-mechanical analysis of laminated composite and sandwich beams based on a variables separation

P. Vidal*, L. Gallimard, O. Polit*

Laboratoire Energétique, Mécanique, Electromagnétisme, Université Paris Ouest Nanterre-La Défense, 50 rue de Sèvres - 92410 Ville d'Avray - France

Abstract

In this paper, a finite element based on the variables separation is presented for the thermo-mechanical analysis of bi-dimensional laminated beams. Both the temperature and displacement fields are approximated as a sum of separated functions of x (axial coordinate) and z (transverse coordinate). This choice yields to an iterative process that consists of computing a product of two one-dimensional functions at each iteration. A fourth-order expansion with respect to the thickness direction are considered. The capability and the behavior of the presented approach are shown on various laminated and sandwich beams submitted to different thermal boundary conditions. Thermal and mechanical responses are assessed by comparing with other approaches available in literature, exact solutions and 2D Finite Element computation.

Keywords: finite element method, thermo-mechanical coupling, composite beam, variables separation

*Corresponding author
Email address: philippe.vidal@u-paris10.fr (P. Vidal)

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