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New Ritz-solution shape functions for analysis of thermo-mechanical buckling and vibration of laminated composite beams

Ngoc-Duong Nguyen^a, Trung-Kien Nguyen^{a,*}, Thien-Nhan Nguyen^a, Huu-Tai Thai^b

^a Faculty of Civil Engineering, Ho Chi Minh City University of Technology and Education,
1 Vo Van Ngan Street, Thu Duc District, Ho Chi Minh City, Viet Nam.

^b School of Engineering and Mathematical Sciences, La Trobe University, Bundoora, VIC 3086,
Australia

Abstract

New hybrid shape functions for buckling and vibration analysis of laminated composite beams under thermal and mechanical loads are presented in this study. The displacement field of present work is based on a higher-order shear deformation beam theory. The governing equations of motion are derived from Lagrange's equations. A Ritz solution is developed in which new hybrid shape functions based on a combination of admissible and exponential functions for various boundary conditions are proposed. Numerical results are presented to compare with those from earlier works, and to examine the influences of span-to-height ratio, boundary conditions, material anisotropy and temperature changes on the buckling load and natural frequency of laminated composite beams.

Keywords: Ritz method; Thermo-mechanical effect; Laminated composite beams.

* Corresponding author. Tel.: + 848 3897 2092.

E-mail address: kiennt@hcmute.edu.vn (Trung-Kien Nguyen)

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