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Billel Rebai · Abdelhakim Bouhadra ·
Abdelmoumen Anis Bousahla · Mustapha Meradjah ·
Fouad Bourada  · Abdeldjebbar Tounsi ·
Abdelouahed Tounsi · Muzamal Hussain

Thermoelastic response of functionally graded sandwich plates using a simple integral HSDT

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Abstract In this work a novel integral higher shear deformation theory (HSDT) which introducing the transverse shear effect is developed for thermoelastic bending analysis of Titanium/Zirconia power-law functionally graded (P-FG) sandwich plates. This integral theory contains only four variable functions as against five in the case of other HSDTs. The proposed model has a reduced number of equations and satisfies automatically the free surface conditions (zero shear stresses) without using the shear correction factor. The P-FG sandwich plate is assumed composed of the isotropic core and FG skins. The governing equations of are derived and resolved via virtual work principle and Navier's model. The accuracy of the proposed analytical model is confirmed by comparing the results with those given by others model existing in the literature. Also, several parametric examples are presented to show the thermoelastic bending response of the various symmetric P-FG sandwich plates.

Keywords P-FG sandwich plate · Thermoelastic bending · Virtual work · Navier

1 Introduction

Functionally graded materials (FGMs) are excellent advanced composite materials and structures that will revolutionize the manufacturing world. This class of materials is widely utilized in different engineering domains for instance, the civil, mechanics, automotive, marine aerospace other fields. The increase use of

B. Rebai · A. Bouhadra · F. Bourada (✉) · A. Tounsi · A. Tounsi
Material and Hydrology Laboratory, Civil Engineering Department, Faculty of Technology, University of Sidi Bel Abbès, Sidi Bel Abbès, Algeria
e-mail: bouradafouad@yahoo.fr

A. Bouhadra
Département de Génie Civil, Faculté de Sciences & Technologie, Université de Abbès Laghrou Khenchela, Khenchela, Algeria

A. A. Bousahla · M. Meradjah
Laboratoire de Modélisation et Simulation Multi-Échelle, Département de Physique, Faculté Des Sciences Exactes, Université de Sidi Bel Abbès, Sidi Bel Abbès, Algeria

F. Bourada
Département Des Sciences et de la Technologie, Université de Tissemsilt, BP 38004, Ben Hamouda, Tissemsilt, Algeria

A. Tounsi
YFL (Yonsei Frontier Lab), Yonsei University, Seoul, Korea

A. Tounsi
Department of Civil and Environmental Engineering, King Fahd University of Petroleum & Minerals, Dhahran 31261, Eastern Province, Saudi Arabia

M. Hussain
Department of Mathematics, Govt. College University Faisalabad, Faisalabad 38000, Pakistan