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A Three-Dimensional Solution for Bending Analysis ofFunctionally Graded CeramicMetal Sandwich Plates withStretching Effect

Ahmed Hamidi, Mohamed Zidour, Abdelouahed Tounsi and Adda Bedia El abbes

Abstract : In this research, a simple but accurate sinusoidalplate theory for the thermomechanical bending analysis offunctionally graded sandwich plates is presented. The mainadvantage of this approach is that, in addition to incorporatingthe thickness stretching effect, it deals with only 5 unknowns asthe first order shear deformation theory (FSDT), instead of 6 asin the well-known conventional sinusoidal plate theory (SPT).The material properties of the sandwich plate faces are assumedto vary according to a power law distribution in terms of thevolume fractions of the constituents. The core layer is made of anisotropic ceramic material. Comparison studies are performed tocheck the validity of the present results from which it can beconcluded that the proposed theory is accurate and efficient inpredicting the thermomechanical behavior of functionally gradedsandwich plates. The effect of side-to-thickness ratio, aspect ratio,the volume fraction exponent, and the loading conditions on thethermomechanical response of functionally graded sandwichplates is also investigated and discussed.

Keywords : Sandwich plate, thermomechanical, analytical modelling, unctionally graded material, stretching effect.