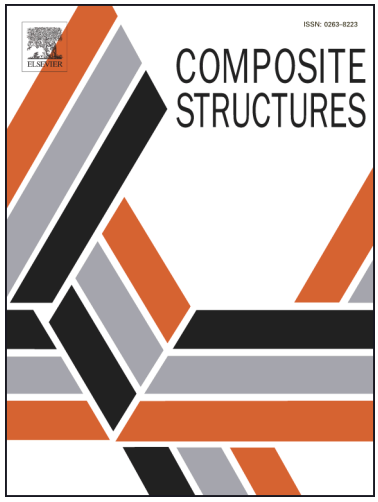

Bending behaviour of two directional functionally graded sandwich beams by using a quasi-3d shear deformation theory

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BENDING BEHAVIOUR OF TWO DIRECTIONAL FUNCTIONALLY GRADED SANDWICH BEAMS BY USING A QUASI-3D SHEAR DEFORMATION THEORY

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Abstract

This paper presents the static behaviour of two-directional functionally graded (FG) sandwich beams subjected to various sets of boundary conditions by using a quasi-3D shear deformation theory and the Symmetric Smoothed Particle Hydrodynamics (SSPH) method. The SSPH code, which is developed based on the present formulation of the FG sandwich beam, is validated by solving a simply supported conventional functionally graded beam problem. Numerical results which are in terms of maximum dimensionless transverse deflections, dimensionless axial, normal and shear stresses are compared with the analytical solutions and the results from previous studies. Various FG sandwich beam structures are investigated by considering different aspect ratios (L/h) and sets of boundary conditions and using power-law distribution.

Keywords: Meshless Method; Functionally Graded Sandwich Beam; Strecthing Effect; SSPH Method; Quasi-3D Shear Deformation Theory

1. Introduction

In recent years, the use of the structures which are made of functionally graded materials have been increasing in many modern engineering applications such as aerospace, marine, automotive, nuclear energy, biomedical and civil engineering due to varying material properties over a changing dimension which allow to enhance the bond strength through the layer interfaces, high resistance to temperature shocks, lower transverse shear stresses and high strength to weight ratio.