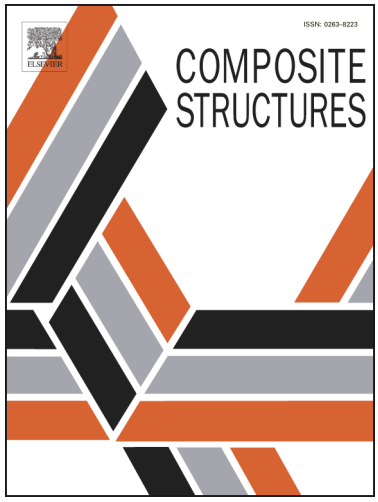

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Vibration analysis of multi-span lattice sandwich beams using the assumed mode method

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Abstract: So far, little attention has been paid to the vibration analysis of multi-span lattice sandwich beams, particularly using the assumed mode method (AMM). In this paper, the mode shapes of multi-span sandwich beams are assumed as those of uniform beams modified by the interpolation functions. The equation of motion of the beam is established using Hamilton's principle. The natural frequencies of multi-span pyramidal and Kagome sandwich beams so calculated agree well with those determined using the ANSYS software, which indicates that the present methodology is suitable for solving multi-span sandwich beams with lattice truss cores. The effects of Young's modulus, damping and geometric parameters of cores and sheets on the natural frequencies and time domain responses of two kinds of multi-span sandwich beams are analyzed. When the truss radius and sheet thickness are increased, the natural frequencies are increased initially and then decrease, while the vibration amplitudes at the mid-points of both the multi-span pyramidal and Kagome sandwich beams decrease. With the increase of the inclination angle of the truss α_c, the natural frequencies of structures experience a slight decline. In contrast, the amplitudes at the mid-points of the two different three-span sandwich beams both rise.

Keywords: multi-span lattice sandwich beam; free vibration analysis; assumed mode method; interpolation functions; natural frequency.

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