

عنوان مقاله:

Exact Solution for Free and Forced Vibrations of Rectangular FGM plates

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خلاصه مقاله:

The double sine series is applied to determine exact solutions for vibrations of simply supported rectangular functionally graded material (FGM) plates. In the modeling of mechanical properties of the plate material, it is assumed that Young's modulus and mass density vary across the thickness according to the power law function and poisson's ratio is constant. By these assumptions on the material properties and based upon the classical plate theory, the governing equations are derived as two coupled PDEs in terms of lateral displacement and stress functions. Solving these equations by double sine series gives closed form solutions for the natural frequencies and mode shapes of the plate and the effects of materials and geometric parameters on these quantities are analyzed. The results show that the natural frequencies have a good trend and exactly coincide with those that have known formula and belong to the isotropic simply supported rectangular plate. In addition, forced vibration analysis of the FGM plate is presented under harmonic exciting force. In this case, resonance and beating phenomena are studied for the FGM plate.

کلمات کلیدی:

Vibration, FGM, Exact Solution, Plate

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