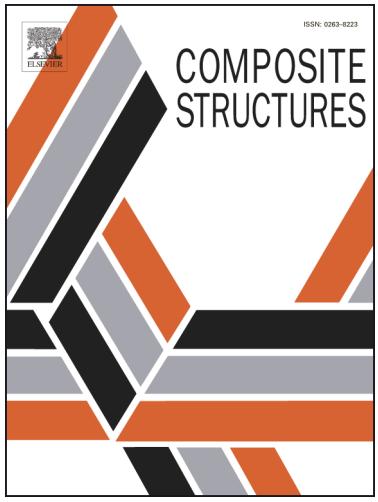

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Vibration and Flutter Analysis of Supersonic Porous Functionally Graded Material Plates with Temperature Gradient and Resting on Elastic Foundation

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Abstract:

In this paper, a unified solution is developed to analyze the vibration and flutter behaviors of supersonic porous functionally graded material (FGM) plates with general boundary conditions, in which the classical and non-classical boundary conditions can be dealt with. The one-dimensional Fourier equation of heat conduction is employed to calculate the temperature distribution through the thickness direction of the plate and the properties of temperature dependent materials can be further obtained. The first-order shear deformation theory (FSDT) and supersonic piston theory considering the yawed flow angle effect are employed to formulate the strain energy, kinetic energy and external work functions of the system. The motion equations of the supersonic porous FGM plate are derived by using the Hamilton's principle and the displacement components of the plate are expanded by the Fourier series combined with auxiliary functions. A considerable number of numerical examples concerning the vibration and flutter of the supersonic porous FGM plate are carried out to show the accuracy and efficiency of the described method. Finally, the