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Wave Propagation In Functionally Graded Lattice Structures Under Impact Loads

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Abstract : Material scientists and engineers have introduced novel materials with complex geometries due to the recent technological advances and promotion of manufacturing methods. Among them, lattice structures with graded architectures denoted by functionally graded porous materials (FGPMs) have been developed to optimize the structural response. FGPMs are achieved by tailoring the size and density of the internal pores in one or more directions that lead to the desired mechanical properties and structural responses. Also, FGPMs provide more flexible transition and the possibility of designing and fabricating structural elements with complex and variable properties. In this paper, wave propagation in lattice structures with functionally graded (FG) porosity is investigated in order to examine the ability of shock absorbing effect. The behavior of FG porous beams with different porosity distributions under impact load and the effects of porosity distribution and porosity content on the wave speed are studied. Important conclusions are made, along with a discussion of the future scope of studies on FGPMs structures.

Keywords : functionally graded, porous materials, wave propagation, impact load, finite element
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