عنوان مقاله:

The influences of various auxetic cores on natural frequencies and forced vibration behavior of sandwich beam fabricated by ۳D printer based on third -order shear deformation theory

نویسندگان:

Rouhollah Hosseini - *Faculty of Mechanical and Mechatronics Engineering, Imam Hossein University, Tehran, Iran*

Masoud Babaei - *Faculty of Mechanical and Mechatronics Engineering, Imam Hossein University, Tehran, Iran*

Alireza Naddaf Oskouei - *Faculty of Mechanical and Mechatronics Engineering, Imam Hossein University, Tehran, Iran*

خلاصه مقاله:

In this article, free and forced vibration analyses of ۳D printed FG sandwich beam based on higher order beam theory is investigated. The core and face sheets of sandwich beam are integrally fabricated by ۳D printer. Therefore, ignoring the delamination between face sheets and core is a correct assumption. Three different cells are considered for the core including Re- entrant auxetic cell, anti-tetrachiral auxetic cell and conventional honeycomb cell. These cells are arranged along the thickness of structure based on cell thickness in four various patterns. The effective mechanical properties of cells are estimated by analytical relations. Finite element methods and Lagrange equations are employed for obtaining the effective stiffness and mass matrices of the sandwich beam. Finally, the influences of various parameters including various types of cells, various patterns of cell along the thickness of structure, thickness coefficient, the geometry of cells such as the interior angle and dimensions of cells on natural frequencies and transient deflection of structure have been studied. The results denote that the arrangement of cells along the thickness plays an important role on the vibration response of structure. On the other hand, for uniform thickness distribution of cells, Re –entrant auxetic cell has higher natural frequencies than other cells while in FG arrangements of cells, anti-tetrachiral cell with pattern A has higher natural frequencies than Re-entrant auxetic cell.

کلمات کلیدی:

Free Vibration, Forced vibration, FG graded auxetic cell, FEM, beam, higher-order beam theory

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