World Academy of Science, Engineering and Technology
International Journal of Materials and Metallurgical Engineering
Vol:18, No:07, 2024

Forced Vibration of an Auxetic Cylindrical Shell Containing Fluid Under the Influence of Shock Load

Authors : Korosh Khorshidi

Abstract : Due to the increasing use of different materials, such as auxetic structures, it is necessary to investigate mechanical phenomena, such as vibration, in structures made of these types of materials. This paper examines the forced vibrations of a three-layer cylindrical shell containing inviscid fluid under shock load. All three layers are made of aluminum, and the central layer is made of a re-entrant honeycomb cell structure. Using high-order shear deformation theories (HSDT) and Hamilton's principle, the governing equations of the system have been extracted and solved by the Galerkin weighted residual method. The outputs of the Abaqus finite element software are used to validate the results. The system is investigated with both simple and clamped support conditions. Finally, this study investigates the influence of the geometrical parameters of the shell and the auxetic structure, as well as the type, intensity, duration, and location of the load, and the effect of the fluid on the dynamic and time responses.

Keywords : force vibration, cylindrical shell, auxetic structure, inviscid fluid
Conference Title : ICMSE 2024 : International Conference on Materials Science and Engineering
Conference Location : Rome, Italy
Conference Dates : July 22-23, 2024