Computational and Experimental Investigation of Vibration Characteristics of Variable Unit-Cell Gyroid Structures (Sim-AM 2019)

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ABSTRACT

Triply periodic minimal surface (TPMS) based geometries exhibit extraordinary mechanical, thermal, electrical and acoustic properties thanks to their unique topologies. There are various types of structures in the TPMS family. One of the most well-known TPMS structures is the gyroid surface model. This paper focuses on the vibrational behaviour of double gyroid lattice structures in terms of their natural frequencies and frequency responses. Powder bed fusion technology is employed to fabricate double gyroid lattice specimens, made of HS188 material, with three different feasible unit sizes at same volume ratio. Modal testing is performed to deduce the vibration characteristics of the lattice structures. Besides the experimental study, the dynamic performance of the double gyroid specimens is investigated computationally using Finite Element (FE) approach. Correlation level between experimental and FE results is examined.