

Band Gap Structures in Super Porous Phononic Crystals

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As one kind of new linear cellular alloys (LCAs), Kagome honeycombs, which are constituted by triangular and hexagonal cells, attract great attention due to the excellent performance compared to the ordinary ones. Instead of mechanical investigation, the elastic wave dispersion in Kagome structures are analyzed in this paper aiming to the multi-functional application of the materials. Firstly, the band structures in the ordinary 2D porous phononic structures (triangular or hexagonal honeycombs) are discussed. Then, based on these results, the wave dispersion in Kagome honeycombs is given. Through the component cell porosity controlling, the effects of component cells on the whole responses of the structures are investigated. The relation between the component cell porosity and the critical porosity of Kagome honeycombs is established. These results will provide an important guidance in the band structure design of super porous phononic crystals.

Keywords: Porous phononic crystal, Band structure, Pore shape, Finite element method