TOPOLOGY OPTIMIZATION OF ELASTIC INTERNAL RESONATORS FOR SANDWICH METASTRUCTURES

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Resumo. *Metastructures have gained attention in recent years due to their noise and vibration isolation properties in tunable frequency ranges, known as bandgaps, in which elastic and acoustic waves do not propagate. Metastructures are achieved from the addition of resonator elements, which act as vibration absorbers and are periodically distributed in host structures. The advantage of applying metastructures is that the bandgaps are generated based on the properties of the resonator elements. An approach in the investigation of metastructures is the search for optimal geometry of resonators, which can provide a reduction of vibrations in a greater range of frequencies, or allow the damping of relatively distant resonance peaks. That is why this research work proposes a topological optimization to find the geometry of an elastic resonator, as a building block of a sandwich type metastructure. In the development the Bi-directional Evolutionary Structural Optimization method, together with the objective function and the constraints, which represent the sensitivity of the resonator with respect to its properties and its coupling with the host structure, are implemented in a modeling tool based on finite elements. Numerical results show that the proposed modified method with penalization and the objective functions generate an efficient resonator geometry.*

Keywords: *Topology optimization. Metastructures. Control of vibrations.*