Introduction

Metamaterials are engineered structures in which the design of a meta-atom with specific dynamics gives rise to on-demand and unusual behavior of the artificial structure, making it possible to manipulate waves. Most of the works up to now in elastodynamics, however, have been limited to linear material models [1]. This work intends to show that fascinating and unrevealed phenomena is yet to be discovered when nonlinearities proper of many real materials are taken into account.

Model

Continuous system

Discrete chain

Nonlinear spring

Results

DYNAMIC FEATURES

1. Nonreciprocity

2. Tunability

3. Multistability

Conclusions and Future Prospects

It was shown that cubic metamaterials exhibit multistability, tunability and nonreciprocity. Such features make them promising for applications in sensor technology, damage detection, imaging, energy harvesting, among others. In the future, the effect of other nonlinear material models in the dynamic behavior of metamaterials will be investigated.

Reference