

## Investigation tow of negative refraction characters in the three different 2D phononic crystals

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### Abstract

In this paper, a two-dimensional phononic crystal comprising of steel rod in water is investigated. Three cross- sections for this rod are considered using finite element method (EFM). We plot the equifrequency surface of the first band, because of equifrequency surface convex around the edge of the first Brillouin Zone, we guess the negative effective phononic mass and so negative refraction. Moreover, the negative refraction behaviors are demonstrated by the simulation of a phononic crystal slab. The results show the maximum intensity for the phononic crystal with the circle, square, and triangle cross- section, of 1.15 MHz, 1.11MHz and 1.27MHz, respectively. The dependence of intensity and focal point distance on the slab thickness and between the source and the slab on the negative refractive is investigated. The results are in good agreement with other works.

**Keywords:** Phononic crystals, Equiefrequency, Negative refraction, Band Structure.

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