

Negative refraction and focusing of electromagnetic wave through high-symmetry quasicrystals

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Recently, negative refraction of electromagnetic waves in periodic photonic crystals was demonstrated experimentally and subwavelength images were observed. In this work, we report some theoretical and experimental investigations on the electromagnetic wave transport in high symmetry photonic quasicrystals (PQCs). It is shown that the negative refraction can appear in these transparent quasicrystalline photonic structures. It is interesting that the high symmetric two-dimensional PQC slabs possess universal feature for non-near-field focus of two kinds of polarized waves (S wave and P wave). That is to say, the non-near-field focus for two kinds of polarized waves can be realized by using the flat lenses, which are consisting of 12-fold, 10-fold and 8-fold two-dimensional PQCs with the same structures and parameters. Thus, potential applications of such a phenomenon to optical devices are anticipated.

[1]Z. Feng, X. Zhang, Y. Q. Wang, Z. Y. Li, B. Y. Cheng, and D. Z. Zhang, Phys. Rev. Lett. 94, 247402 (2005).