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## Phase properties of a double-periodic quasi-crystal composed of single-negative materials

A Rashidi and S Roshan Entezar

Department of Physics, University of Tabriz, Tabriz, Iran

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### Abstract

In this paper, the phase properties of waves reflected from one-dimensional double-periodic quasi-crystals consisting of single-negative materials are investigated using transfer matrix method. It is observed that, by increasing the double-periodic generation number, a large omnidirectional band gap is created in the single-negative frequency range. We limit our studies to the frequency range of this wide band phase compensator gap. The results show that the value of phase difference between TE-polarized and TM-polarized waves reflected from this band gap, is independent from generation number in a wide band frequency range. Also, the reflection phase difference increases by increasing the incident angle, and in the central parts of the gap remains almost constant. Furthermore, at two points near the edges of the gap, the value of the phase difference keeps almost zero in spite of the change of incident angle. Based on these properties, this structure can be used as a wide band phase compensator, an omnidirectional synchronous reflector, and a polarizer.

**Keywords:** phase, double-periodic quasi-crystal, single-negative, phase compensator, omni-directionally synchronous reflector, polarizer

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